



# Missouri

## End-of-Course Assessments

Missouri Department of Elementary and Secondary Education

**Technical Report**  
**Phase II Assessments**  
**2009–2010**

English I  
Algebra II  
Geometry  
Government  
American History

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## LIST OF ABBREVIATIONS

Below is a list of abbreviations that appear frequently in this technical report.

ALD	Achievement-Level Descriptor
AMO	Additional Materials Order
ARC	Assessment Resource Center
AYP	Adequate Yearly Progress
CCSSO	Council of Chief State School Officers
CLE	Course-Level Expectation
CMS	Content Management System
<i>CSEM</i>	Conditional Standard Error of Measurement
CTT	Classical Test Theory
DESE	Department of Elementary and Secondary Education
DIF	Differential Item Functioning
DOK	Depth of Knowledge
EFT	Embedded Field Test
EOC	End-of-Course
FRL	Free and Reduced Lunch
FT	Field Test
GLE	Grade-Level Expectation
GRF	General Research File
IAP	Individualized Accommodation Program
IDEA	Individuals with Disabilities Education Act
IEP	Individualized Education Program
IPASS	Image-Based Performance Assessment Scoring System
IRT	Item Response Theory
ITS	Internet Testing Systems
LEP	Limited English Proficient
LOSS	Lowest Obtainable Scale Score
MAP	Missouri Assessment Program
MH	Mantel-Haenszel procedure
MOSIS	Missouri School Information System
MS	Mean Square
NCLB	No Child Left Behind
PCA	Principal Components Analysis
PE	Performance Event
RIF	Regional Instructional Facilitator
RSS	Riverside Scoring Service <sup>®</sup>
<i>SE</i>	Standard Error
<i>SEM</i>	Standard Error of Measurement
SR	Selected Response
TAC	Technical Advisory Committee
TCC	Test Characteristic Curve
TDS	Test Development Specialist
WP	Writing Prompt

## EXECUTIVE SUMMARY

This document provides a technical summary of the 2009–2010 administrations of the Missouri End-of-Course (MO EOC) Assessments in English I, Algebra II, Geometry, Government, and American History. The criterion-referenced MO EOC Assessments are designed to assess students' knowledge of Missouri's Course-Level Expectations (CLEs) in these five content areas. The 2009–2010 school year marked the first operational administration of the assessments.

### E.1 Background

In 1993, the Missouri legislature passed the Outstanding Schools Act (Senate Bill 380), requiring the Missouri State Board of Education to adopt challenging academic performance standards that define the skills and competencies necessary for students to successfully advance through the public school system, prepare for post-secondary education and the workplace, and participate as citizens in a democratic society. The Missouri State Board of Education formally adopted the academic standards known as the Show-Me Standards in January 1996.

In addition to mandating the development of rigorous academic standards, the Outstanding Schools Act of 1993 required the development and implementation of a comprehensive, primarily performance-based assessment program to measure student proficiency in the knowledge, skills, and competencies identified in the standards. Upon adoption of the standards in 1996, Missouri began developing the Missouri Assessment Program (MAP).

In January 2007, the Missouri State Board of Education approved a plan to replace the MAP for high school students with MO EOC Assessments beginning with English II, Algebra I, and Biology in the 2008–2009 school year. The remaining EOC Assessments (English I, Algebra II, Geometry, Government, and American History) were added the following year.

### E.2 Administration

The EOC Assessments are administered in three different assessment windows each year. Test windows are available for summer, fall, and spring, but reports are provided only after the spring testing window. Because the No Child Left Behind Act (NCLB) goal for every school in the state is Proficient as defined by the Missouri State Board of Education, EOC testing is conducted as close as possible to the end of each course to allow school staff and students the greatest opportunity to achieve the goal of proficiency.

The scope of this technical report includes the Fall 2009 and Spring 2010 assessments. Data analyses for the total assessed population, which includes students who have not yet reached the secondary level, are based on a combination of assessment results as well as Missouri Department of Elementary and Secondary Education (DESE) demographic criteria as required under NCLB.

Paper score reports for the MO EOC Assessments are produced and distributed following each Spring administration. The score reports for the 2009–2010 assessment year contained information from the Fall 2009 and Spring 2010 assessments. In future years,

reports will continue to include information from the previous year’s Summer, Fall, and Spring administrations.

### E.3 Student Performance

A MO EOC Assessment score describes the relationship of student performance to a defined level of achievement. Achievement-level descriptors (ALDs) associated with each level provide details about the content expectations that students at that level meet or exceed. Missouri uses four achievement levels for the EOC Assessments: Below Basic, Basic, Proficient, and Advanced.

Table E.1 displays the percentage of students at each achievement level for the Fall 2009 and Spring 2010 MO EOC Assessments. The NCLB Act requires states to assess all students at least once in high school in mathematics, English/communication arts, and science. Students who take the MO EOC Assessment but are not yet in high school are not included in Missouri’s high school accountability data. (Rather, their scores are “banked” until they actually reach high school, at which time they are rolled into the high school accountability data for that year.) However, the data for *all* tested students are used each year for purposes of item analysis, scaling, and equating. For this reason, the numbers and/or percentages of tested students reported in Table E.1 and elsewhere in this technical report do not match the numbers of students reported by DESE for accountability purposes.

**Table E.1: Percentage of Students at Each Achievement Level**

Test Period	Achievement Level	English I	Algebra II	Geometry	Government	Am. History
Fall 2009	Below Basic	13.2	9.1	8.1	15.0	23.8
	Basic	37.1	33.1	20.5	35.4	25.2
	Proficient	33.0	38.3	39.6	35.3	33.7
	Advanced	16.7	19.4	31.8	14.3	17.3
Spring 2010	Below Basic	12.5	19.5	19.2	12.5	31.8
	Basic	31.3	38.8	29.5	37.1	27.7
	Proficient	39.5	31.7	34.4	35.6	28.4
	Advanced	16.7	10.0	16.9	14.8	12.0

### E.4 Evidence Supporting the Validity of Inferences from the MO EOC Assessment Scores

The MO EOC Assessments are part of an integrated program of testing, accountability, and curricular and instructional support. This technical report provides extensive detail about the development and operation of EOC Assessments. While a section of this report is devoted specifically to the documentation of validity evidence for the MO EOC Assessment scores, all information contained in the report ultimately contributes to the argument for the validity of the scores for their intended purposes.

A summary of the information contained in this report follows.

### ***Chapter 1: Introduction***

Chapter 1 provides background information about the MAP in general as well as some context for the MO EOC Assessments. Additionally, the chapter provides information about the organizational support provided by each contractor and subcontractor for the MO EOC Assessment program. The chapter ends with a statement of purpose for this technical report

### ***Chapter 2: Test Development***

Chapter 2 contains thorough descriptions of each step in the development process for the MO EOC Assessments, including test design, test specifications and target point distributions, test blueprints, item writing, content and bias review procedures, test form assembly, and statistical item review. The evidence provided in this chapter is important to the content-related validity of the MO EOC Assessment scores. Additionally, the chapter covers principles of universal design and outlines the quality control processes employed throughout the test development process.

### ***Chapter 3: Achievement-Level Setting***

Chapter 3 details each step in the planning and execution of the November 2009 standard-setting event that resulted in the cut scores for each of the MO EOC achievement levels. Chapter 3 covers selection of participants, development of ALDs, an overview of the methodology and considerations for the data that were available at the time of the standard-setting event, detailed information about each step in the process, and standard-setting results. Additionally, the chapter contains many appendices with examples of the materials that participants used during the standard-setting event.

### ***Chapter 4: Item Analysis***

Chapter 4 contains summary information, including item difficulty and discrimination indices, at the item level for each content area. The chapter also contains information on omit rates for the Fall 2009 and Spring 2010 operational items, as well as differential item functioning (DIF) analyses performed on the Spring 2009 field-test item data.

### ***Chapter 5: Test Administration***

Chapter 5 contains information about the paper-and-pencil and online administration of the MO EOC Assessments, beginning with a description of students for whom the assessments are appropriate. Following this, the details of the administration are summarized. This summary includes a description of how the materials are distributed and how Test Examiners are trained, as well as information about the organization of the assessments, preparation of students to take the assessments, and directions for administration. Next, the chapter includes information about the accommodations allowed on the MO EOC Assessments. Finally, the chapter briefly describes how materials are submitted for processing and scoring.

### ***Chapter 6: Scanning, Scoring, and Quality Control Procedures***

Chapter 6 covers the processes involved with scanning, scoring, and controlling the quality of the resulting score information for the selected response items on the MO EOC Assessments. The chapter contains detailed information on how the Riverside Scoring Service<sup>®</sup> (RSS) prepared for processing the MO EOC selected response items, including a check of scanning procedures prior to receipt of materials. Next, it details how the materials were handled from the time they were received and processed at the RSS on through to report generation.

### ***Chapter 7: Scaling and Equating***

Chapter 7 begins with an introduction to the item response theory (IRT) model used for the scaling and equating of the MO EOC Assessments. The actual scaling and equating procedures are described in detail, including the calibration of the 2009 standalone field-test items, steps undertaken to establish a base scale for the MO EOC Assessments, examination of the stability of the linking items, steps taken to recenter the 2009 item bank, and steps taken to bring Spring 2010 field-test items onto the base scale. This chapter also includes information about the Fall 2009 and Spring 2010 operational forms, a description of the IRT model assumptions, and evidence of data-to-model fit.

### ***Chapter 8: Reporting***

Chapter 8 contains information about the reports Riverside Publishing produced for the MO EOC Assessments, including the Individual Student Report and Student Score Label. A brief summary of state-produced reports is also included.

### ***Chapter 9: Summary Statistics***

Chapter 9 provides descriptive statistics for raw scores and scale scores for the MO EOC Assessments. Raw score statistics are summarized by test administration, content area, and cluster. Scale score statistics are summarized for each content area and are also broken down by gender, ethnicity, migrant status, free and reduced lunch (FRL), limited English proficient, Title I, Individualized Education Program, and accommodations.

### ***Chapter 10: Reliability***

Chapter 10 begins by defining reliability and providing an overview of reliability estimation techniques. Raw-score internal consistency reliability coefficients are presented for all students and for each demographic group. Conditional standard errors of measurement (*CSEMs*) are also presented at each scale-score cut point.

### ***Chapter 11: Validity***

Chapter 11 provides evidence supporting the validity of the MO EOC Assessments for their intended purposes. After a brief introduction to the validity evidence for the MO EOC Assessments, the chapter documents more specific evidence related to test content, the internal structure of the assessments, and other types of validity evidence proposed by the *Standards for Educational and Psychological Testing* (AERA, APA, and NCME 1999). The chapter summarizes and reiterates validity evidence presented in earlier chapters in addition to providing new information not presented elsewhere. It provides a thorough argument supporting the validity of the MO EOC Assessments for measuring

Missouri students' mastery of the CLEs, for identifying students' strengths and weaknesses, for serving as a basis for evaluating accountability plans, and for program evaluation.



## CHAPTER 1: INTRODUCTION

### 1.1 History of Missouri's End-of-Course Assessments

In 1993, the Missouri legislature passed the Outstanding Schools Act (Senate Bill 380), requiring the Missouri State Board of Education to adopt challenging academic performance standards defining the skills and competencies necessary for students to successfully advance through the public school system, prepare for post-secondary education and the workplace, and participate as citizens in a democratic society. The Missouri State Board of Education formally adopted the academic standards known as the Show-Me Standards in January 1996.

These 73 standards are organized around four broad goals that address application, communication, problem solving, and responsible decision making. Thirty-three process standards emphasize the importance of engaging students of all ages in hands-on, active learning and integrating practical, challenging learning across all content areas. An additional 40 content standards define the academic skills and knowledge that provide the foundation for student learning in six content areas: Communication Arts, Mathematics, Science, Social Studies, Fine Arts, and Health/Physical Education. Content standards serve as the vehicle through which students demonstrate proficiency in the broader process standards. The Show-Me Standards are available for review on the Missouri Department of Elementary and Secondary Education's (DESE) website at <http://dese.mo.gov/standards/index.html>.

In 2001, DESE developed Grade-Level Expectations (GLEs) to assist districts in articulating the Show-Me Standards across grade levels and content areas. GLEs have been developed for Mathematics, Communication Arts, Science, Social Studies, Physical Education, Health, Music, Visual Arts, and Theater. GLEs are available for review on the DESE website at <http://dese.mo.gov/divimprove/curriculum/GLE/index.html>.

In addition to mandating the development of rigorous academic standards, the Outstanding Schools Act of 1993 also required the development and implementation of a comprehensive assessment program to measure student proficiency in the knowledge, skills, and competencies identified within the standards. Upon adoption of the standards in 1996, Missouri began developing the Missouri Assessment Program (MAP) in collaboration with the statewide assessment contractor, CTB/McGraw-Hill.

The Missouri State Board of Education adopted the purposes listed below to serve as guiding principles for development of the MAP:

- Improving students' acquisition of important knowledge, skills, and competencies
- Monitoring the performance of Missouri's educational system
- Empowering students and their families to improve their educational prospects
- Supporting the teaching and learning process

The first MAP assessments administered to students statewide were grade-span Mathematics assessments in grades 4, 8, and 10 in spring 1998. A voluntary grade-span Communication Arts Assessment for students in grades 3, 7, and 11 was also administered in spring 1998 and became mandatory in spring 1999. Voluntary Science and Social Studies grade-span assessments (grades 3, 7, and 10, and grades 4, 8, and 11, respectively) were added to the program in subsequent years. A voluntary Health/Physical Education assessment was available in 2000, and a Fine Arts assessment was field tested in 2001. Budget constraints prevented Science, Social Studies, and Health/Physical Education assessments from being added to the required components of the assessment program. Likewise, lack of funding prevented the completion of Fine Arts assessment development.

Through the Spring 2005 administration, the MAP statewide assessment program included grade-span tests in the following grade levels/subject areas:

- Mathematics at grades 4, 8, and 10
- Communication Arts at grades 3, 7, and 11
- Science at grades 3, 7, and 10
- Social Studies at grades 4, 8, and 11 (Districts had the opportunity to administer grade-span Science and Social Studies assessments voluntarily at the designated grade levels.)

All MAP assessments included three types of items: selected response (SR), constructed response (CR), and Performance Events (PE). For all content areas, MAP assessments included selected response items from the TerraNova Survey Edition. CR and PE items were custom-developed with significant input from Missouri educators.

During the initial MAP development/implementation period, DESE developed two to four equivalent forms for each content area/grade level assessment, using the first form for a voluntary testing cycle and administering the next form(s) in subsequent years. Early in the development phase, DESE tried out new items using separate field tests that usually occurred in the fall of the school year. As the program continued, each test form contained embedded field test (EFT) items. Small-scale pilots continued, as well.

As each content area/grade level assessment was administered, DESE used the Bookmark approach to set achievement levels, defining student performance through spring 2005 as Advanced, Proficient, Nearing Proficiency, Progressing, or Step 1.

After nearly a decade of MAP administration, new federal and state legislation prompted change in the program. To comply with requirements of the No Child Left Behind Act (NCLB) legislation, Missouri's assessment program needed to incorporate Mathematics and Communication Arts assessments in all elementary and middle school grade levels (grades 3 through 8) and at one high school grade level. As a result, new grade-level assessments were developed for both content areas. These assessments were administered for the first time in spring 2006.

Additional NCLB requirements necessitated the addition of a mandatory science assessment once in the elementary grade range, once in the middle school grade range, and once in the high school grade range, beginning in spring 2008. The voluntary Science

assessment in grades 3, 7, and 10 became a requirement and was moved to grades 5, 8, and 11. The voluntary Social Studies MAP assessment was eliminated following the spring 2007 administration. Missouri's assessment system changed further in 2008–2009 when high school content area MAP assessments were replaced by End-of-Course (EOC) Assessments.

## **1.2 Brief Description of Missouri's Current Assessment System**

The current MAP system includes the following assessment components for elementary and middle school:

- Grades 3–8 Communication Arts
- Grades 3–8 Mathematics
- Grades 5 and 8 Science

The EOC Assessments administered in 2009–2010 included:

Phase I Assessments for:

- English II
- Algebra I
- Biology

Phase II Assessments for:

- English I
- Algebra II
- Geometry
- Government
- American History

In addition, the statewide assessment program currently includes the Missouri Assessment Program–Alternate (MAP-A) for students with severe cognitive disabilities and a Personal Finance assessment for high school students who do not enroll in a personal finance course or who are receiving personal finance credit for embedded coursework.

## **1.3 Summary of the MO EOC Assessments**

In response to feedback from Missouri districts regarding large-scale assessments for high school, the Missouri End-of-Course (MO EOC) Assessments were developed and first administered in 2008 for English II, Algebra I, and Biology. The Phase II MO EOC Assessments listed above were developed and first administered in 2009. The MO EOC Assessments were created to address the needs of Missouri districts, schools, teachers, and students, while also meeting state and federal requirements. The Missouri State Board of Education identified the following purposes for the Missouri EOC Assessments:

- Measuring and reflecting students' mastery toward post-secondary readiness
- Identifying students' strengths and weaknesses
- Communicating expectations for all students
- Serving as the basis for state and national accountability plans
- Evaluating programs

Course-Level Expectations (CLEs) outline the ideas, concepts, and skills that form the foundation for an assessed EOC subject area, regardless of student grade level. Because a course such as Algebra I could be delivered at any grade level, CLEs replace the GLEs. This replacement is necessary because each EOC Assessment is more specific and tailored to each EOC subject area. Districts can offer courses with different titles that cover the same CLEs.

Each Phase II MO EOC Assessment includes only SR items. An SR item presents students with a question followed by four response options. PE or CR items are not included on the Phase II Assessments. All MO EOC Assessments are offered in both paper-and-pencil and online administration modes.

#### **1.4 Testing, Reporting, and Accountability**

Evidence of students' progress in meeting the Show-Me Standards/CLEs is obtained from the MO EOC Assessments. These assessments provide the data that DESE uses to inform students, parents, the public, and the state legislature about students' performance; to help make informed decisions about educational issues; and to drive student services throughout the state.

The MO EOC Assessment reports provide useful information for determining the performance of students in a particular school and classroom. These reports help identify students who are below Proficient in a particular test area so that the school may determine a course of action that will meet the students' specific needs. Additionally, districts may use locally designed assessments, aligned to the Show-Me Standards/CLEs, to provide more detailed information for each student in specific test areas.

Testing for the MO EOC Assessments is conducted during three state-designated windows each year. Test windows are available for Summer, Fall, and Spring. Per contract requirements, however, paper reports for all administrations are provided only after the Spring testing window each year. (Teachers may use an online interface to access student raw scores for the SR items.) Because the NCLB goal for every school in the state is Proficient, as defined by the Missouri State Board of Education, MO EOC testing is conducted as close as possible to the end of each course to allow school staff and students the greatest opportunity to achieve that goal of Proficient.

Data for this technical report were collected during Fall 2009 and Spring 2010 operational administrations. Data analyses for the total assessed population, which includes students who have not yet reached the secondary level, are based on a combination of assessment results as well as DESE-provided demographic criteria required under NCLB.

## 1.5 MO EOC Assessments Organizational Support

DESE coordinates the development and implementation of the MO EOC Assessments. In addition to planning, scheduling, and directing all EOC activities, the staff is extensively involved in numerous test reviews, security, and quality assurance procedures. Riverside Publishing is the primary contractor working in partnership with Questar, Internet Testing Systems (ITS), Bookette, and others. The main activities for each of these groups are outlined in Table 1.1.

**Table 1.1: Main Activities for Groups Involved in MO EOC Organizational Support**

Group	Responsibilities
Riverside Publishing	<ul style="list-style-type: none"> <li>• Provides program management, including primary contact with DESE; coordinates all meetings; handles all administrative costs/activities; generates all program management reports and status reports</li> <li>• Works with DESE to develop items with Missouri educators</li> <li>• Creates <i>Test Coordinator's Manual</i>, <i>Test Examiner's Manual</i>, and other ancillary materials</li> <li>• Facilitates all review meetings with Missouri teachers and DESE</li> <li>• Conducts all psychometric analyses, reporting, linking/equating studies, and associated tasks, including participating in achievement-level setting</li> <li>• Provides all needed prepress work for program materials through camera-ready art</li> <li>• Produces all materials, including online, paper-and-pencil, Braille, and Large Print versions of test</li> <li>• Accounts for secure test books received after testing</li> <li>• Provides a direct customer service line, including technical support and general support to the program and customer interactions</li> <li>• Stores materials after testing</li> <li>• Participates in and presents at TAC meetings</li> <li>• Scores all selected response items</li> <li>• Produces and distributes all score reports and the <i>Guide for Interpreting Results</i></li> <li>• Completes the technical report for DESE</li> <li>• Completes additional research studies</li> </ul>
Questar	<ul style="list-style-type: none"> <li>• Provides online enrollment and pre-ID system for use by Missouri districts</li> <li>• Packages and distributes all materials</li> <li>• Barcodes test books with security IDs</li> <li>• Leads facilitation and planning of achievement-level setting and provides members for the achievement-level-setting team</li> <li>• Contributes to the technical report</li> <li>• Participates in meetings with DESE, contributes to status reports, etc.</li> </ul>

**Table 1.1: Main Activities for Groups Involved in MO EOC Organizational Support (continued)**

Group	Responsibilities
Internet Testing Services (ITS)	<ul style="list-style-type: none"> <li>• Sets up a Missouri DESE-branded website for access to the online testing system</li> <li>• Provides the online test delivery of one complete form for each administration for the following content areas: English II, Algebra I, and Biology beginning in 2008, and Integrated Math II, Integrated Math III, Geometry, Algebra II, English I, American History, and Government beginning in 2009</li> <li>• Provides system documentation for test administrators and the DESE website</li> <li>• Provides technical support from 8 A.M. to 6 P.M., Monday through Friday, for the Riverside Publishing help desk</li> <li>• Produces and hosts practice tests for the English II, Algebra I, and Biology content areas</li> <li>• Provides online tools for graphing and table creation/editing and provides an equation editor</li> <li>• Offers ruler and reference sheets in tests</li> <li>• Provides three administrations per contract year in fall, spring, and summer for all content areas</li> <li>• Supplies a data feed of results from ITS to Riverside Publishing</li> <li>• Transfers student images from the Phase I Session II testing events for the teacher interface and for ARC to score</li> </ul>
Bookette	<ul style="list-style-type: none"> <li>• Provides a web-based interactive, software-based tutorial to help teachers learn how to score Performance Event and Writing Prompt items</li> <li>• Provides customer support as needed</li> </ul>
Districts	<ul style="list-style-type: none"> <li>• Distribute materials to the school buildings, track all secure materials, and promptly return all materials, including answer documents, for scoring</li> <li>• Assist in the timely resolution of scoring alerts</li> <li>• Act as liaison between Riverside Publishing and buildings</li> </ul>
School Buildings	<ul style="list-style-type: none"> <li>• Administer tests, track all secure materials, and promptly return materials to districts for scoring</li> </ul>
RR Donnelly	<ul style="list-style-type: none"> <li>• Prints all nonscannable testing materials</li> </ul>
Techniforms	<ul style="list-style-type: none"> <li>• Prints all scannable test books and answer documents</li> </ul>
Region IV, 3X	<ul style="list-style-type: none"> <li>• Prints Braille and Large Print versions, respectively</li> </ul>

## **1.6 Purpose of the Technical Report**

The purpose of this technical report is to provide information about the technical characteristics of the 2009 field-test administration and 2009–2010 operational administration of the Missouri EOC Assessments. Because this report is technical in nature and the intended audience is psychometric and educational research experts, it is best understood with a working knowledge of measurement concepts such as reliability and validity and statistical concepts such as correlation and central tendency. For some chapters, the reader is presumed to have basic familiarity with advanced topics in measurement and statistics such as item response theory (IRT).

This technical report provides extensive detail about the development and operation of the Missouri EOC Assessments. The empirical reliability of the assessments and validity of intended uses of the scores are reported explicitly in this document. While Chapter 10: Reliability is relatively straightforward, the steps in creating and operating the program are all aspects of validity, which is discussed in Chapter 11. The validity of score use and interpretation for any assessment stems from the statement of the test’s purpose and the intended use of the scores; the steps taken in designing the test; and the processes of developing the content of the test, consulting with stakeholders, communicating about the test to users, scoring and reporting, and data analysis. The careful documentation of each of these steps is a necessary piece of a comprehensive, defensible validity argument for the intended uses of the assessment scores. In short, while there is a specific chapter devoted to validity, other parts of this document provide evidence necessary to assess the validity of the Missouri EOC Assessment scores for their intended purposes.

In reading this technical report, it is critical to remember that the testing program does not exist in a vacuum; it is not just a test. It is one part of a complex network intended to help schools focus their energies on improving student learning. The Missouri EOC Assessment is an integrated program of testing and accountability, as well as curricular and instructional support. It can be evaluated properly only within its full context.



## CHAPTER 2: TEST DEVELOPMENT

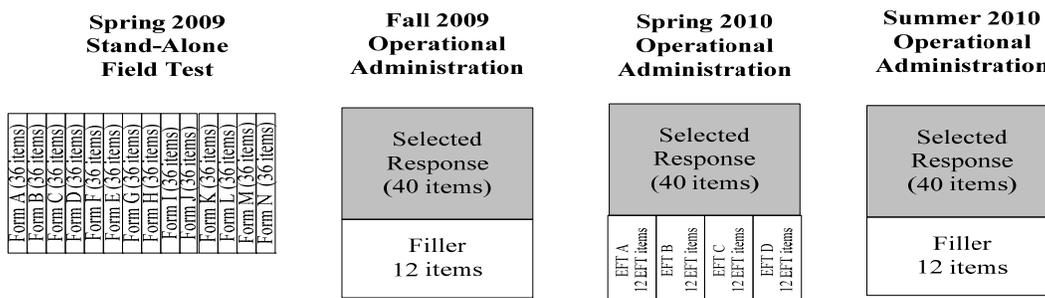
### 2.1 Introduction

The English I, Algebra II, Geometry, Government, American History, and Integrated Mathematics II and III End-of-Course (EOC) Assessments were first administered operationally during the 2009–2010 school year. This chapter provides an overview of the development of the Missouri End-of-Course (MO EOC) Assessments, including the test specifications, item development, item review, and test forms development. According to the *Standards for Educational and Psychological Testing* (AERA, APA, and NCME 1999) (hereafter referred to as the Standards), “Important validity evidence can be obtained from an analysis of the relationship between a test’s content and the construct it is intended to measure” (p. 11). Accordingly, the thorough descriptions of the test development procedures included in this chapter provide evidence to support the construct validity of the MO EOC Assessments.

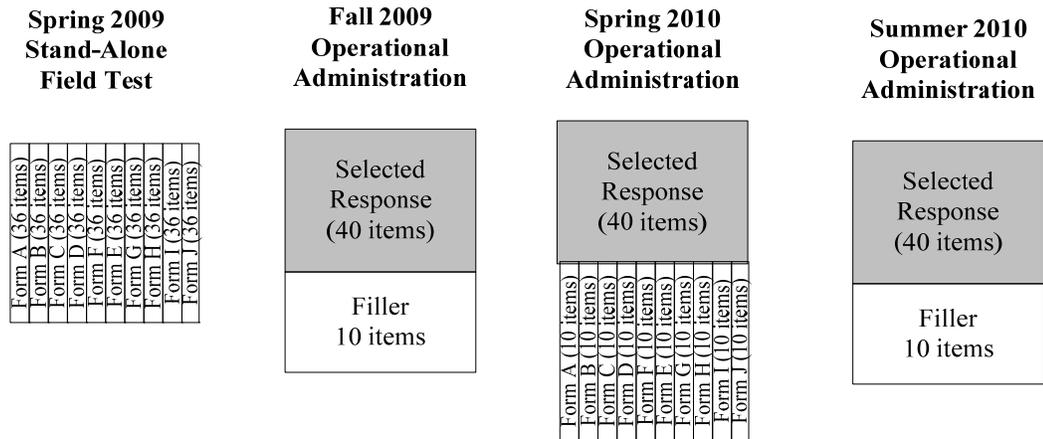
### 2.2 Design of the MO EOC Assessments

Figure 2.1 details the design of the Spring 2009 standalone field test, Fall 2009 operational administration, and Spring 2010 operational administration with embedded field test (EFT) for English I. Figure 2.2 details the design of the Spring 2009 standalone field test, Fall 2009 operational administration, and Spring 2010 operational administration with EFTs for Algebra II, Geometry, Government, and American History. Figure 2.3 details the design of the Spring 2009, Fall 2009, and Spring 2010 Integrated Mathematics II and III assessments. It should be noted that the Missouri Department of Elementary and Secondary Education (DESE) made the determination to discontinue these two assessments because of extremely low actual enrollments for the Fall 2009 assessments and low projections of the number of students who would enroll to take these assessments in Spring 2010.

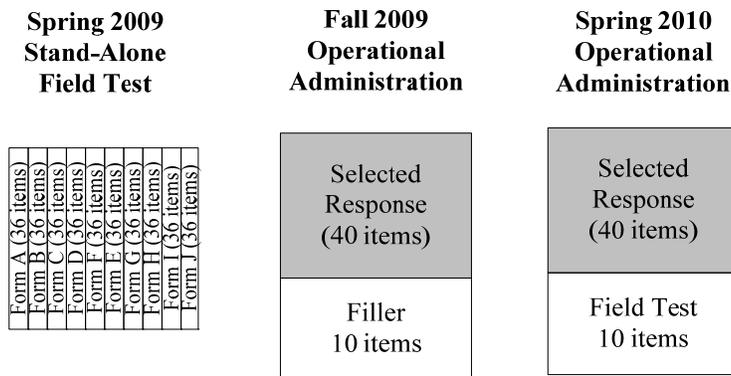
**Figure 2.1: Field Test and Operational Assessment Design, English I**



**Figure 2.2: Field Test and Operational Assessment Design, Algebra II, Geometry, Government, and American History**



**Figure 2.3: Field Test and Operational Assessment Design, Integrated Mathematics II and III**



### **2.2.1 Spring 2009 Standalone Field Test**

The Spring 2009 standalone field test provided item data to inform the 2009–2010 operational forms selection process. There were 10 unique forms of 36 items each for Algebra II, Geometry, Government, and American History. English I field tested 14 unique forms with 36 items on each form, and Integrated Mathematics II and III each piloted 4 forms with 36 items on each one. Forms for each course were spiraled at the student level across the state.

### **2.2.2 Fall 2009 Operational Administration**

The Fall 2009 administration consisted of seven operational assessments. English I consisted of one 52-item selected response (SR) form. Algebra II, Geometry, Government, American History, and Integrated Mathematics II and III consisted of one 50-item SR form each. In addition to the 40 scored items, each Algebra II, Geometry, Government, American History, and Integrated Mathematics II and III test book in the

Fall 2009 administration contained a set of 10 EFT items. The English I test book contained 12 EFT items in addition to the 40 scored items.

### ***2.2.3 Spring 2010 Operational Administration***

The Spring 2010 assessments consisted of seven operational assessments. For all seven assessments, the forms consisted of 40 operational SR items. For English I, there were 4 unique sets of 12 EFT items. For Algebra II, Geometry, Government, and American History there were 10 unique sets of 10 field-test items. There was one form each of Integrated Mathematics II and III with online administration only. As previously noted, because these assessments were discontinued by DESE, districts never accessed the online Integrated Mathematics II and III assessments in spring 2010.

### ***2.2.4 Summer 2010 Operational Administration***

The Summer 2010 assessments consisted of five operational assessments with filler items in the EFT slots. There was one form for each course except Integrated Mathematics II and III.

### ***2.2.5 Released Forms***

In addition to the operational forms that were constructed for 2009–2010, DESE and Riverside Publishing also worked together to construct “released” forms for each operational assessment. These forms were posted on the DESE website in August 2009. They were constructed to mirror the test content of the actual operational forms (minus the EFT items) to allow Missouri teachers, parents, and students the opportunity to review the new format and representative content of the EOC Assessments. Although these forms were constructed to parallel the operational forms, the items in these released forms were never used on an operational EOC Assessment.

## **2.3 Test Blueprints**

The test blueprint specifies the relative percentages of items in each high-level content strand. This document helps ensure that each strand is represented by the minimum number of points (8) for student score reports.

Riverside Publishing content experts worked with DESE to develop blueprints for each course before item writing began in fall 2008. Blueprint development was guided by the Missouri Show-Me Standards.

Tables 2.1 through 2.7 outline the test construction blueprints for English I, Algebra II, Geometry, Integrated Mathematics II, Integrated Mathematics III, American History, and Government.

**Table 2.1: Test Construction Blueprint for English I**

<b>Big Idea</b>	<b>Target # of Points</b>	<b>Point Range *</b>	<b>Target % Total Points</b>	<b>Minimum Emphasis</b>	<b>Maximum Emphasis</b>
1. Develop and apply skills and strategies to the reading process	15	13–17	38%	<b>33%</b>	<b>43%</b>
2. Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama from a variety of cultures and times	12	10–14	30%	<b>25%</b>	<b>35%</b>
3. Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	13	11–15	32%	<b>28%</b>	<b>38%</b>
<b>Total</b>	40	40	100%		

*Note:* Total score points for each content strand may vary depending on which passages are selected for a particular administration. The percentage of total score points from each content strand (emphasis) will fall within the blueprint range described above.

\*The minimum number of points in each strand will be 8.

This blueprint was built under the following assumptions:

1. The reading passages will generally be balanced between nonfiction and fiction. A slight imbalance may occur if an odd number of passages appears on the operational test.
2. Content strand 1 has a larger percentage of total points because it can be assessed using both fiction and nonfiction passages.

**Table 2.2: Test Construction Blueprint for Algebra II**

<b>Content Strand</b>	<b>Target # of Points</b>	<b>Point Range</b>	<b>Target % Total</b>	<b>Minimum Emphasis</b>	<b>Maximum Emphasis</b>
Number and Operations	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
Algebraic Relationships	22	20–24	55%	<b>50%</b>	<b>60%</b>
Data and Probability	10	9–11	25%	<b>22.5%</b>	<b>27.5%</b>
<b>Total</b>	40	40	100%		

**Table 2.3: Test Construction Blueprint for Geometry**

<b>Content Strand</b>	<b>Target # of Points</b>	<b>Point Range</b>	<b>Target % Total</b>	<b>Minimum Emphasis</b>	<b>Maximum Emphasis</b>
Algebraic Relationships	8	7–10	20%	<b>18%</b>	<b>25%</b>
Geometric and Spatial	24	22–24	60%	<b>55%</b>	<b>60%</b>
Measurement	8	7–9	20%	<b>18%</b>	<b>23%</b>
<b>Total</b>	40	40	100%		

**Table 2.4: Test Construction Blueprint for Integrated Mathematics II**

<b>Content Strand</b>	<b>Target # of Points</b>	<b>Point Range</b>	<b>Target % Total</b>	<b>Minimum Emphasis</b>	<b>Maximum Emphasis</b>
Number and Operations	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
Algebraic Relationships	16	14–18	40%	<b>35%</b>	<b>45%</b>
Geometric and Spatial Relationships	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
Data and Probability	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
<b>Total</b>	40	40	100%		

**Table 2.5: Test Construction Blueprint for Integrated Mathematics III**

<b>Content Strand</b>	<b>Target # of Points</b>	<b>Point Range</b>	<b>Target % Total</b>	<b>Minimum Emphasis</b>	<b>Maximum Emphasis</b>
Number and Operations	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
Algebraic Relationships	16	14–18	40%	<b>35%</b>	<b>45%</b>
Geometric and Spatial Relationships	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
Data and Probability	8	7–9	20%	<b>17.5%</b>	<b>22.5%</b>
<b>Total</b>	40	40	100%		

**Table 2.6: Test Construction Blueprint for American History**

Reporting Categories (all within Strand 3)	Target # of Points	10% Tolerance	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Government	8	0.8	7–9	20%	18%	23%
History	16	1.6	14–18	40%	35%	45%
Economics	8	0.8	7–9	20%	18%	23%
Geography	8	0.8	7–9	20%	18%	23%
<b>Totals</b>	40		40	100%		

**Reporting Categories**

- CLEs within 3a. A, I, N, W, and X will report under History.
- CLEs within 3a. K and M will report under Government.
- CLEs within 3a. J, O, P, and R will report under Economics.
- CLEs within 3a. U and V will report under Geography.

**Table 2.7: Test Construction Blueprint for Government**

Content Strand	Target # Points	10% tolerance	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Principles of Constitutional Democracy	20	2.0	18–22	50%	45%	55%
Principles and Processes of Governance Systems	20	2.0	18–22	50%	45%	55%
<b>Totals</b>	40		40	100%		

**2.4 Test Specifications**

Standard 1.6<sup>1</sup> specifically addresses the appropriateness of test content and its relationship to a solid validity argument. Additionally, Standard 3.3<sup>2</sup> defines “test specifications” and provides examples of the type of information that should be included in a specification document. The test specifications describe the content and format of the test and delineate the ideal number of items and points assessed for each Course-Level Expectation (CLE). This section details the development and use of the test specification documents for the MO EOC Assessments.

In 2008, Riverside Publishing content experts developed draft test specifications for each course. These draft test specifications were subsequently reviewed and approved by MO DESE. The specifications were finalized in fall 2008, before the development of items for field-test forms.

<sup>1</sup> **Standard 1.6:** When the validation rests in part of the appropriateness of test content, the procedures followed in specifying and generating test content should be described and justified in reference to the construct the test is intended to measure or the domain it is intended to represent. If the definition of the content sampled incorporates criteria such as importance, frequency, or criticality, these criteria should also be clearly explained and justified (p. 18).

<sup>2</sup> **Standard 3.3:** The test specifications should be documented, along with their rationale and the process by which they were developed. The test specifications should define the content of the test, the proposed number of items, the item formats, the desired psychometric properties of the items, and the item and section arrangement. They should also specify the amount of time for testing, directions to the test takers, procedures to be used for test administration and scoring, and other relevant information (p. 43).

The test specification document serves as the foundation for all test item development. The material in the test specifications is designed for use by Riverside Publishing content experts and MO DESE to construct tests containing the following items:

- Aligned to the Missouri CLEs
- Aligned to Norman Webb’s depth of knowledge (DOK) cognitive levels
- SR
- Standalone and passage-based

Detailed descriptions of the test content measured in English I, Algebra II, Geometry, Integrated Mathematics II and III, American History, and Government are presented in the following sections.

### ***2.4.1 English I***

The English I MO EOC Assessment measures students’ achievement in reading. All administrations of the test contain commissioned passages that comprise both fiction and nonfiction and cover a wide range of genres, including poems, short stories, newspaper articles, historical fiction, functional texts, and webpages. The questions associated with each passage are in SR format. There are 40 SR items on the English I Assessment.

Table 2.8 contains targets for the CLE point distribution on the English I operational forms. Some of the CLE point targets may not be met because the use of a passage or scenario is not conducive to items written to the CLE. Some Big Ideas are not represented in this chart because they are not assessed at this course level.

Tables 2.9 through 2.12 contain actual point distributions for the Summer 2009, Fall 2009, Spring 2010, and Summer 2010 operational forms.

**Table 2.8: Target Point Distributions for the English I Operational Forms**

<b>Big Idea</b>	<b>Concept</b>	<b>CLE</b>	<b>DOK</b>	<b>Range/CLE</b>
1. Develop and apply skills and strategies to the reading process	E. Vocabulary	Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary, and thesaurus	2	4–6
	H. Post Reading	Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details d. draw conclusions e. paraphrase f. summarize	3	6–9
	I. Making Connections	Compare, contrast, analyze, and evaluate connections a. text to text (information and relationships in various fiction and nonfiction works)	3	2–3
2. Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama from a variety of cultures and times	A. Text Features	Analyze and evaluate the text features in grade-level text	3	2–3
	B. Literary Techniques	Identify and, explain literary techniques, emphasizing a. irony b. imagery c. repeated sound, line, or phrase d. analyze literary techniques previously introduced	3	3–4
	C. Literary Elements	Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. evaluate the effect of author's style	3	4–7

**Table 2.8: Target Point Distributions for the English I Operational Forms (continued)**

Big Idea	Concept	CLE	DOK	Range/CLE
3. Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	A. Text Features	Explain, analyze and evaluate the author’s use of text features to clarify meaning	3	2–3
	B. Literary Techniques	Identify, explain, and analyze literary techniques in nonfiction, emphasizing a. irony b. imagery c. repeated sound, line, or phrase d. figurative language and sound devices previously introduced	3	3–4
	C. Text Structures	Use details from informational and persuasive text(s) to a. identify and explain the organizational patterns b. analyze and evaluate effectiveness of word choice c. analyze and evaluate for accuracy and adequacy of evidence d. analyze and evaluate point of view e. analyze and evaluate author's viewpoint/perspective f. evaluate proposed solutions g. demonstrate comprehension skills previously introduced	3	5–7

**Table 2.9: Actual Point Distributions for the Summer 2009 English I Operational Form**

Form Blueprint				
Reporting Categories	Blueprint		Actual	
	# Items	# Points	# Items	# Points
	MC	MC	MC	MC
1. Develop and apply skills and strategies to the reading process	13–17	13–17	15	15
2. Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10–14	10–14	14	14
3. Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11–15	11–15	11	11
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.10: Actual Point Distributions for the Fall 2009 English I Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
1. Develop and apply skills and strategies to the reading process	13-17	13-17	17	17
2. Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10-14	10-14	9	9
3. Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11-15	11-15	14	14
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.11: Actual Point Distributions for the Spring 2010 English I Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
1. Develop and apply skills and strategies to the reading process	13-17	13-17	14	14
2. Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10-14	10-14	11	11
3. Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11-15	11-15	15	15
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.12: Actual Point Distributions for the Summer 2010 English I Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
1. Develop and apply skills and strategies to the reading process	13-17	13-17	16	16
2. Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10-14	10-14	12	12
3. Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11-15	11-15	12	12
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

### **2.4.2 Algebra II**

The Algebra II EOC Assessment measures students' ability to solve problems by applying mathematical concepts. The three strands assessed on the Algebra II Assessment are as follows:

- Numbers and Operations
- Algebraic Relationships
- Data and Probability

The 40 SR questions are aligned to the strands listed above. Table 2.13 contains targets for the CLE point distribution on the Algebra II operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.14 through 2.17 contain actual point distributions for the Summer 2009, Fall 2009, Spring 2010, and Summer 2010 operational forms.

**Table 2.13: Target Point Distributions for the Algebra II Operational Forms**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Numbers and Operations	1. Understand numbers, ways of representing numbers, relationships among numbers, and number systems	A. Read, write, and compare numbers	Compare and order rational and irrational numbers, including finding their approximate locations on a number line	1	3–4
		B. Represent and use real numbers	Use real numbers and various models, drawings, etc. to solve problems	3	4–5
Algebraic Relationships	1. Understand patterns, relations, and functions	B. Create and analyze patterns	Generalize patterns using explicitly or recursively defined functions	2	2–3
		C. Classify objects and representations	Compare and contrast various forms of representations of patterns	3	2–3
		D. Identify and compare functions	Compare properties of linear, exponential, logarithmic, and rational functions	2	2–3
		E. Describe the effects of parameter changes	Describe the effects of parameter changes on functions	2	2–3
	2. Represent and analyze mathematical situations and structures using algebraic symbols	A. Represent mathematical situations	Use symbolic algebra to represent and solve problems that involve exponential, quadratic and logarithmic relationships	3	2–3
		B. Describe and use mathematical manipulation	Describe and use algebraic manipulations, inverse, or composition of functions	2	1–2
		C. Use equivalent forms	Use and solve equivalent forms of equations and inequalities	2	2–3
		D. Use systems	Use and solve systems of linear and quadratic equations or inequalities with two variables	3	2–3
	3. Use mathematical models to represent and understand quantitative relationships	A. Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	2–3
	4. Analyze change in various contexts	A. Analyze change	Analyze exponential and logarithmic functions by investigating rates of change, intercepts, and asymptotes	3	3–4

**Table 2.13: Target Point Distributions for the Algebra II Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Data and Probability	1. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	C. Represent and interpret data	Select and use appropriate graphical representation of data and, given one-variable quantitative data, describe its shape and calculate summary statistics	3	2–3
	2. Select and use appropriate statistical methods to analyze data	A. Describe and analyze data	Apply statistical measures of center to solve problems	3	2–3
		C. Represent data algebraically	Given a scatterplot, determine the type of function which models the data	2	1–2
	4. Understand and apply basic concepts of probability	A. Apply basic concepts of probability	Describe the concepts of sample space and probability distribution	2	1–2
B. Use and describe compound events		Use and describe the concepts of conditional probability and independent events and how to compute the probability of a compound event	2	2–3	

**Table 2.14: Actual Point Distributions for the Summer 2009 Algebra II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Numbers and Operations	7–9	7–9	8	8
Algebraic Relationships	20–30	20–30	22	22
Data and Probability	10–13	10–13	10	10
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.15: Actual Point Distributions for the Fall 2009 Algebra II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Numbers and Operations	7–9	7–9	8	8
Algebraic Relationships	20–30	20–30	22	22
Data and Probability	10–13	10–13	10	10
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.16: Actual Point Distributions for the Spring 2010 Algebra II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Numbers and Operations	7–9	7–9	8	8
Algebraic Relationships	20–30	20–30	22	22
Data and Probability	10–13	10–13	10	10
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.17: Actual Point Distributions for the Summer 2010 Algebra II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Number and Operations	7–9	7–9	8	8
Algebraic Relationships	20–30	20–30	22	22
Data and Probability	10–13	10–13	10	10
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

### 2.4.3 Geometry

The Geometry EOC Assessment measures students’ ability to solve problems by applying mathematical concepts. The three strands assessed on the Geometry Assessment are as follows:

- Algebraic Relationships
- Geometric and Spatial Relationships
- Measurement

The 40 SR questions are aligned to the strands listed above. Table 2.18 contains targets for the CLE point distribution on the Geometry operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.19 through 2.22 contain actual point distributions for the Summer 2009, Fall 2009, Spring 2010, and Summer 2010 operational forms.

**Table 2.18: Target Point Distributions for the Geometry Operational Forms**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Algebraic Relationships	1. Understand patterns, relations, and functions	B. Create and analyze patterns	Generalize patterns using <u>explicitly</u> or <u>recursively</u> defined functions	2	1–2
		C. Classify objects and representations	Compare and contrast various forms of <u>representations</u> of patterns	3	1–2
		D. Identify and compare functions	Understand and compare the properties of <u>linear</u> and <u>nonlinear functions</u>	2	1–2
	2. Represent and analyze mathematical situations and structures using algebraic symbols	B. Describe and use mathematical manipulation	Apply appropriate properties of exponents to simplify expressions and solve equations	2	1–2
		A. Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	2–3
	3. Use mathematical models to represent and understand quantitative relationships	A. Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	2–3
	4. Analyze change in various contexts	A. Analyze change	Analyze linear and quadratic functions by investigating rates of change, intercepts, and zeros	3	2–3

**Table 2.18: Target Point Distributions for the Geometry Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Geometric and Spatial Relationships	1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	A. Describe and use geometric relationships	Use inductive and deductive reasoning to establish the validity of geometric conjectures, prove theorems, and critique arguments made by others	3	6–7
		2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	A. Use coordinate systems	Make conjectures and solve problems involving two-dimensional objects represented with Cartesian coordinates	3
	3. Apply transformations and use symmetry to analyze mathematical situations	A. Use transformations on objects	Use and apply constructions and the coordinate plane to represent translations, reflections, rotations, and dilations of objects	2	3–4
		C. Use symmetry	Identify types of symmetries of two- and three-dimensional figures	2	3–4
	4. Use visualization, spatial reasoning, and geometric modeling to solve problems	A. Recognize and draw three-dimensional representations	Draw and use vertex-edge graphs or networks to find optimal solutions and draw representations of three-dimensional geometric objects from different perspectives	3	4–5
		B. Draw and use visual models	Draw or use <u>visual models</u> to represent and solve problems	3	
Measurement	2. Apply appropriate techniques, tools, and formulas to determine measurements	B. Use angle measurement	Solve problems of angle measure, including those involving triangles or other polygons and of parallel lines cut by a transversal	2	4–5
		C. Apply geometric measurements	Determine the surface area and volume of geometric figures, including cones, spheres, and cylinders	2	3–4
		E. Use relationships within a measurement system	Use <u>unit analysis</u> to solve problems	2	

**Table 2.19: Actual Point Distributions for the Summer 2009 Geometry Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Algebraic Relationships	7–12	7–12	8	8
Geometric and Spatial Relationships	22–27	22–27	24	24
Measurement	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.20: Actual Point Distributions for the Fall 2009 Geometry Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Algebraic Relationships	7–12	7–12	8	8
Geometric and Spatial Relationships	22–27	22–27	24	24
Measurement	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.21: Actual Point Distributions for the Spring 2010 Geometry Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Algebraic Relationships	7–12	7–12	8	8
Geometric and Spatial Relationships	22–27	22–27	24	24
Measurement	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.22: Actual Point Distributions for the Summer 2010 Geometry Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Algebraic Relationships	7–12	7–12	8	8
Geometric and Spatial Relationships	22–27	22–27	24	24
Measurement	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

#### **2.4.4 Integrated Mathematics II**

The Integrated Mathematics II EOC Assessment measures students’ ability to solve problems by applying mathematical concepts. The four strands assessed on the Mathematics II Assessment are as follows:

- Numbers and Operations
- Algebraic Relationships
- Geometric and Spatial Relationships
- Data and Probability

The 40 SR questions are aligned to the strands listed above. Table 2.23 contains targets for the CLE point distribution on the Integrated Mathematics II operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.24 through 2.26 contain actual point distributions for the Summer 2009, Fall 2009, and Spring 2010 operational forms.

**Table 2.23: Target Point Distributions for the Integrated Mathematics II Operational Forms**

<b>Strand</b>	<b>Big Idea</b>	<b>Concept</b>	<b>CLE</b>	<b>DOK Level</b>	<b>Range/CLE</b>
Numbers and Operations	1. Understand numbers, ways of representing numbers, relationships among numbers, and number systems	A. Read, write, and compare numbers	Compare and order rational and irrational numbers, including finding their approximate locations on a number line	1	2–3
		B. Represent and use real numbers	Use real numbers and various models, drawings, etc. to solve problems	3	3–4
	2. Understand meanings of operations and how they relate to one another	C. Apply properties of operations	Apply properties of exponents to simplify expressions or solve equations	2	2–3

**Table 2.23: Target Point Distributions for the Integrated Mathematics II Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Algebraic Relationships	1. Understand patterns, relations, and functions	B. Create and analyze patterns	Generalize patterns using explicitly or recursively defined functions	2	1–2
		C. Classify objects and representations	Compare and contrast various forms of representations of patterns	3	1–2
		D. Identify and compare functions	Understand and compare the properties of linear, exponential, and quadratic functions (include domain and range)	2	2–3
		E. Describe the effects of parameter changes	Describe the effects of parameter changes on quadratic and exponential functions	2	1–2
	2. Represent and analyze mathematical situations and structures using algebraic symbols	A. Represent mathematical situations	Use symbolic algebra to represent and solve problems that involve quadratic relationships, including recursive relationships	3	2–3
		B. Describe and use mathematical manipulation	Describe and use algebraic manipulations, including factoring and rules of integer exponents	2	2–3
		C. Use equivalent forms	Use and solve equivalent forms of equations and inequalities (piece-wise and quadratic)	2	1–2
		D. Use systems	Use and solve systems of linear equations or inequalities with two variables	2	1–2
	3. Use mathematical models to represent and understand quantitative relationships	A. Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	1–2
	4. Analyze change in various contexts	A. Analyze change	Analyze quadratic functions by investigating rates of change, intercepts, and zeros	3	2–3

**Table 2.23: Target Point Distributions for the Integrated Mathematics II Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Geometric and Spatial Relationships	1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	A. Describe and use geometric relationships	Use trigonometric relationships with right triangles to determine lengths and angle measures	2	1–2
	2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	A. Use coordinate systems	Make conjectures and solve problems involving two-dimensional objects represented with Cartesian coordinates	3	2–3
	3. Apply transformations and use symmetry to analyze mathematical situations	A. Use transformations on objects	Use and apply constructions and matrices to represent translations, reflections, rotations, and dilations	2	2–3
		B. Use transformations on functions	Translate, dilate, and reflect quadratic and exponential functions	2	2–3
Data and Probability	2. Select and use appropriate statistical methods to analyze data	A. Describe and analyze data	Apply statistical concepts to solve problems and distinguish between a statistic and a parameter	3	2–3
		C. Represent data algebraically	Given a scatterplot, determine the type of function which models the data	2	1–2
	4. Understand and apply basic concepts of probability	A. Apply basic concepts of probability	Describe the concepts of sample space and probability distribution	2	2–3
		B. Use and describe compound events	Use and describe the concepts of conditional probability and independent events	2	2–3

**Table 2.24: Actual Point Distributions for the Summer 2009 Integrated Mathematics II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Numbers and Operations	7–10	8	8	8
Algebraic Relationships	14–24	14–24	16	16
Geometric and Spatial Relationships	7–11	7–11	8	8
Data and Probability	7–11	7–11	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.25: Actual Point Distributions for the Fall 2009 Integrated Mathematics II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Numbers and Operations	7–10	8	8	8
Algebraic Relationships	14–24	14–24	16	16
Geometric and Spatial Relationships	7–11	7–11	8	8
Data and Probability	7–11	7–11	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.26: Actual Point Distributions for the Spring 2010 Integrated Mathematics II Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Numbers and Operations	7–10	8	8	8
Algebraic Relationships	14–24	14–24	16	16
Geometric and Spatial Relationships	7–11	7–11	8	8
Data and Probability	7–11	7–11	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

### 2.4.5 Integrated Mathematics III

The Integrated Mathematics III EOC Assessment measures students' ability to solve problems by applying mathematical concepts. The four strands assessed on the Mathematics III Assessment are as follows:

- Numbers and Operations
- Algebraic Relationships
- Geometric and Spatial Relationships
- Data and Probability

The 40 SR questions are aligned to the strands listed above. Table 2.27 contains targets for the CLE point distribution on the Integrated Mathematics III operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.28 through 2.30 contain actual point distributions for the Summer 2009, Fall 2009, and Spring 2010 operational forms.

**Table 2.27: Target Point Distributions for the Integrated Mathematics III Operational Forms**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Numbers and Operations	1. Understand numbers, ways of representing numbers, relationships among numbers, and number systems	A. Read, write, and compare numbers	Compare and order rational and irrational numbers, including finding their approximate locations on a number line	1	2–3
		B. Represent and use real numbers	Use real numbers and various models, drawing, etc. to solve problems	3	3–4
	2. Understand meanings of operations and how they relate to one another	C. Apply properties of operations	Apply properties of logarithms to simplify expressions or solve equations	2	2–3

**Table 2.27: Target Point Distributions for the Integrated Mathematics III Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Algebraic Relationships	1. Understand patterns, relations, and functions	B. Create and analyze patterns	Generalize patterns using explicitly or recursively defined functions	2	1–2
		C. Classify objects and representations	Compare and contrast various forms of representations of patterns	3	1–2
		D. Identify and compare functions	Understand and compare the properties of linear, quadratic, exponential, logarithmic, rational, and periodic functions (include asymptotes)	2	2–3
		E. Describe the effects of parameter changes	Describe the effects of parameter changes on logarithmic and exponential functions	2	1–2
	2. Represent and analyze mathematical situations and structures using algebraic symbols	A. Represent mathematical situations	Use symbolic algebra to represent and solve problems that involve exponential and logarithmic relationships, including recursive and parametric relationships	3	2–3
		B. Describe and use mathematical manipulation	Describe and use algebraic manipulations, including inverse of functions, composition of functions, and rules of exponents	2	2–3
		C. Use equivalent forms	Use and solve equivalent forms of equations and inequalities (exponential, logarithmic and rational)	2	1–2
		D. Use systems	Use and solve systems of linear and quadratic equations or inequalities with two variables	3	1–2
	3. Use mathematical models to represent and understand quantitative relationships	A. Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem (including recursive forms)	2	1–2
	4. Analyze change in various contexts	A. Analyze change	Analyze exponential and logarithmic functions by investigating rates of change, intercepts, and asymptotes	3	2–3

**Table 2.27: Target Point Distributions for the Integrated Mathematics III Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Geometric and Spatial Relationships	1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	A. Describe and use geometric relationships	Use inductive and deductive reasoning to determine lengths and angle measures in all types of triangles and to establish the validity of geometric conjectures, proved theorems, and critique arguments made by others	3	4–5
	3. Apply transformations and use symmetry to analyze mathematical situations	B. Use transformations on functions	Perform simple transformations and their compositions on linear, quadratic, logarithmic, and exponential functions	2	2–3
	4. Use visualization, spatial reasoning, and geometric modeling to solve problems	A. Recognize and draw three-dimensional representations	Draw representations of three-dimensional geometric objects from different perspectives using a variety of tools	3	1–2
Data and Probability	1. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	A. Formulate questions	Describe the characteristics of well-designed studies, including the role of randomization in survey and experimental research	3	1–2
		C. Represent and interpret data	Display and analyze bivariate data where one variable is categorical and the other is numerical	3	1–2
	2. Select and use appropriate statistical methods to analyze data	B. Compare data representations	Recognize how linear transformations of single-variable data affect shape, center, and spread	3	1–2
		C. Represent data algebraically	Create a scatterplot, describe its shape, and determine and analyze regression equations	3	1–2
	3. Develop and evaluate inferences and predictions that are based on data	A. Develop and evaluate inferences	Describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference	3	1–2
	4. Understand and apply basic concepts of probability	B. Use and describe compound events	Use and describe how to compute the probability of a compound event	2	2–3

**Table 2.28: Actual Point Distributions for the Summer 2009 Integrated Mathematics III Operational Form**

Reporting Categories	Form Blueprint			
	Blueprint		Actual	
	# Items	# Points	# Items	# Points
	MC	MC	MC	MC
Numbers and Operations	7–10	7–10	8	8
Algebraic Relationships	14–24	14–24	16	16
Geometric and Spatial Relationships	7–11	7–11	8	8
Data and Probability	7–13	7–13	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.29: Actual Point Distributions for the Fall 2009 Integrated Mathematics III Operational Form**

Reporting Categories	Form Blueprint			
	Blueprint		Actual	
	# Items	# Points	# Items	# Points
	MC	MC	MC	MC
Numbers and Operations	7–10	7–10	8	8
Algebraic Relationships	14–24	14–24	16	16
Geometric and Spatial Relationships	7–11	7–11	8	8
Data and Probability	7–13	7–13	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.30: Actual Point Distributions for the Spring 2010 Integrated Mathematics III Operational Form**

Reporting Categories	Form Blueprint			
	Blueprint		Actual	
	# Items	# Points	# Items	# Points
	MC	MC	MC	MC
Numbers and Operations	7–10	7–10	8	8
Algebraic Relationships	14–24	14–24	16	16
Geometric and Spatial Relationships	7–11	7–11	8	8
Data and Probability	7–13	7–13	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

### 2.4.6 American History

The American History assessment measures students' abilities to understand our history and participate in our civic life as citizens and consumers. The American History forms consist of 40 SR items that are aligned to Strand 3. Individual CLEs within that strand report out to the following categories:

- History
- Government
- Economics
- Geography

Table 2.31 contains targets for the CLE point distribution on the American History operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.32 through 2.35 contain actual point distributions for the Summer 2009, Fall 2009, Spring 2010, and Summer 2010 operational forms.

**Table 2.31: Target Point Distributions for the American History Operational Forms**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Missouri, United States, and World History	3a. Knowledge of continuity and change in the history of Missouri and the United States	A. Understand the migrations of people from many regions to North America	Describe the migrations of people from many regions of the world and the interactions of cultures and religious traditions that have contributed to America's history from Reconstruction to the present: a. motivations for immigration b. challenges to immigrants	3	3–4
		I. Political development in the United States	Analyze the evolution of American democracy, its ideas, institutions, and political processes from Reconstruction to the present, including: a. Reconstruction b. struggle for civil rights c. expanding role of government d. expanding participation in political processes	3	3–4

**Table 2.31: Target Point Distributions for the American History Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
		J. Understanding economic concepts	Apply the following major economic concepts in the context of the historical period studied: a. natural resources, labor, and capital resources b. supply and demand (shortages and surpluses) c. business cycle d. government regulation and deregulation e. unemployment and full employment f. inflation and deflation g. savings and investment h. profit	3	2
		K. Principles and purposes of government	Explain the importance of the following principles of government since Reconstruction a. majority rule and minority rights b. constitution and civil rights c. checks and balances	2	4
		M. Processes of governmental systems	Analyze the roles and influence of political parties and interest groups since Reconstruction to the present	3	4
		N. Economic development in the United States	Describe the historical development of the American economy, including a. impact of geographic factors b. role of the frontier and agriculture c. impact of technological change and urbanization on land, resources, society, politics, and culture d. changing relationships between government and the economy	2	3–4

**Table 2.31: Target Point Distributions for the American History Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
		O. Understanding the roles of people, business, and government in the economic system of the United States	Analyze the roles people, business, labor unions, and government play in the U.S. economy: a. how monopolies affect people's lives and how they are regulated b. how boycotts, strikes, and embargoes affect trade and people's options c. monetary policy (why the Federal Reserve System influences interest rates and money supply) d. fiscal policy (government taxation and spending)	3	2
		P. Understanding functions and effects of economic institutions	Survey the functions and effects of major economic institutions of the U.S. economy, such as corporations, labor unions, and financial institutions	2	2
		R. Understanding the roles of the government in the U.S. economy	Identify the roles of government in the U.S. economy (defining and protecting property rights, maintaining competition, promoting goals such as full employment, stable prices, growth, and justice)	2	2
		U. Understanding relationships within places	Distinguish major patterns and issues with regard to population distribution, demographics, settlements, migrations, and cultures in the United States.	2	4
		V. Understanding relationships between and among regions	List and explain criteria that give regions their identities in different periods of U.S. history. Explain how and why regions change.	2	4

**Table 2.31: Target Point Distributions for the American History Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
		W. Foreign and domestic policy developments	Describe and evaluate the evolution of U.S. domestic and foreign policies from Reconstruction to the present, including a. isolationism b. immigration policy c. Manifest Destiny d. imperialism e. two world wars f. Cold War g. New Deal h. global interdependence	3	3–4
		X. Causes, comparisons, and results of major twentieth-century wars	Examine the wars of the twentieth century pertinent to U.S. history, including causes, comparisons, consequences, and peace efforts	2	3–4

**Table 2.32: Actual Point Distributions for the Summer 2009 American History Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
History	14–18	14–18	16	16
Government	7–9	7–9	8	8
Economics	7–9	7–9	8	8
Geography	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.33: Actual Point Distributions for the Fall 2009 American History Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
History	14–18	14–18	16	16
Government	7–9	7–9	8	8
Economics	7–9	7–9	8	8
Geography	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.34: Actual Point Distributions for the Spring 2010 American History Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
History	14–18	14–18	16	16
Government	7–9	7–9	8	8
Economics	7–9	7–9	8	8
Geography	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.35: Actual Point Distributions for the Summer 2010 American History Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
History	14–18	14–18	16	16
Government	7–9	7–9	8	8
Economics	7–9	7–9	8	8
Geography	7–9	7–9	8	8
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

### **2.4.7 Government**

The Government assessment measures students’ abilities to understand our history and participate in our civic life as citizens and consumers. The Government forms consist of 40 SR items that are aligned to Strands 1 and 2 as follows:

- Principles of Constitutional Democracy
- Principles and Processes of Governance Systems

Table 2.36 contains targets for the CLE point distribution on the Government operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.37 through 2.40 contain actual point distributions for the Summer 2009, Fall 2009, Spring 2010, and Summer 2010 operational forms.

**Table 2.36: Target Point Distributions for the Government Operational Forms**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Principles of Constitutional Democracy	1. Knowledge of the principles expressed in documents shaping constitutional democracy in the United States	A. Principles of constitutional democracy in the United States	Apply the following principles of constitutional democracy to historical and contemporary issues: a. checks and balances b. separation of powers c. federalism d. representation e. popular sovereignty f. due process of law g. judicial review	3	2–4
			Determine the civic responsibilities of individual citizens	2	2–4
			Assess the changing roles of government: a. philosophy b. limits c. duties	2	2–4
			Describe the historical foundations of the U.S. governmental system as reflected in the following documents: a. Magna Carta b. Enlightenment writings of Hobbes, Locke, Rousseau, Montesquieu, and the Social Contract Theory c. Mayflower Compact d. Declaration of Independence e. Articles of Confederation	3	2–4
			Identify and give examples of democracies and republics	2	2–4
		B. Role of citizens and government in carrying out constitutional principles	3	2–4	
		Explain the relevance and connection of constitutional principles in the following documents: a. U.S. Constitution b. Federalist Papers c. Amendments to the Constitution, emphasizing the Bill of Rights d. Key Supreme Court decisions, <i>Marbury v. Madison</i> , <i>McCulloch v. Maryland</i> , <i>Miranda v. Arizona</i> , <i>Plessy v. Ferguson</i> , <i>Brown v. Topeka Board of Education</i>			

**Table 2.36: Target Point Distributions for the Government Operational Forms (continued)**

Strand	Big Idea	Concept	CLE	DOK Level	Range/CLE
Principles and Processes of Governance Systems	2. Knowledge of principles and processes of governance systems	A. Principles and purposes of government	Describe the structure of government and the purposes of laws (with emphasis on the federal and state governments) in general	1	4–5
			Explain the importance of the following principles of government: a. limited government b. majority rule and minority rights c. constitution and civil rights d. checks and balances e. merits of the above principles	2	4–5
		C. Processes of governmental systems	Explain the processes pertaining to: a. selection of political leaders (with an emphasis on presidential and parliamentary systems) b. functions and styles of leadership (including authoritarian, democratic, and laissez-faire) c. governmental systems d. how laws and rules are made, enforced, changed, and interpreted	2	4–5
			Evaluate the roles and influence of political parties and interest groups	3	4–5

**Table 2.37: Actual Point Distributions for the Summer 2009 Government Operational Form**

Reporting Categories	Form Blueprint			
	Blueprint		Actual	
	# Items	# Points	# Items	# Points
	MC	MC	MC	MC
Principles of Constitutional Democracy	18–22	18–22	20	20
Principles and Processes of Governance Systems	18–22	18–22	20	20
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.38: Actual Point Distributions for the Fall 2009 Government Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Principles of Constitutional Democracy	18-22	18-22	20	20
Principles and Processes of Governance Systems	18-22	18-22	20	20
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.39: Actual Point Distributions for the Spring 2010 Government Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Principles of Constitutional Democracy	18-22	18-22	20	20
Principles and Processes of Governance Systems	18-22	18-22	20	20
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

**Table 2.40: Actual Point Distributions for the Summer 2010 Government Operational Form**

<b>Form Blueprint</b>				
<b>Reporting Categories</b>	<b>Blueprint</b>		<b>Actual</b>	
	<b># Items</b>	<b># Points</b>	<b># Items</b>	<b># Points</b>
	<b>MC</b>	<b>MC</b>	<b>MC</b>	<b>MC</b>
Principles of Constitutional Democracy	18-22	18-22	20	20
Principles and Processes of Governance Systems	18-22	18-22	20	20
<b>Total Items</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>

## **2.5 Development of Test Items**

Content-related evidence of validity supporting test interpretation is presented in terms of how the 2009–2010 MO EOC Assessments were assembled for English I, Algebra II, Geometry, Government, American History, and Integrated Mathematics II and III. Detailed information regarding both item-development procedures and content coverage is included in this section.

The forms for the Fall 2009 and Spring 2010 administrations were constructed using items that were field tested in spring 2009. During the process of building the forms for the 2009–2010 operational test administrations, statistical characteristics (i.e.,  $p$ -values and point-biserial correlations) were monitored to ensure that the statistical properties of the forms were similar within each content area and across operational test forms for fall, spring, and summer.

Riverside Publishing Test Development Specialists (TDSs) created a detailed item and passage development plan based on the blueprints for each content area. The plan included the number of items necessary for each assessable CLE, as well as an outline of the review process for developed items and passages. This process included internal Riverside Publishing reviews, a DESE review on a percentage of the items, and content and bias review by Missouri educators.

### **2.5.1 Item Writing**

The individuals who created all the test items were Missouri educators, DESE staff members, Regional Instructional Facilitators (RIF), and Riverside Publishing TDSs. English I passages were developed by item writers trained by Riverside Publishing, Riverside Publishing TDSs, and DESE staff. These passages were developed and refined prior to the item-writing workshops. Requirements to be an item writer included experience in classroom teaching and expert content knowledge.

In January 2008, Riverside Publishing conducted item-writing workshops to develop SR items for Algebra II, Geometry, Government, and American History. These workshops were conducted at the Assessment Resource Center (ARC) office space in Columbia, Missouri. Participants in the workshops included Missouri educators, DESE staff and Regional Instructional Facilitators, and Riverside Publishing TDSs. The workshops were held during a five-day period and were conducted with 15–20 teacher participants per content area. Teacher participants were selected by DESE to represent school districts throughout Missouri.

In March 2008, Riverside Publishing conducted item-writing workshops to develop SR items for English I and Integrated Mathematics II and III. English I participants wrote SR items associated with the passages that had been developed prior to the item-writing workshops. The content developed at the both workshops was based on the Missouri Show-Me Standards and CLEs.

During the item-writing workshops, Riverside Publishing TDSs conducted training sessions with the item writers and provided instructions on avoiding bias and stereotyping of groups and individuals based on gender, race, ethnicity, religion, age, language, socioeconomic group, and disability. Riverside Publishing TDSs also trained item writers to write items that adhere to the principles of universal design, making the items

accessible to the widest range of students. For example, items and passages were written using clear and concise language, and all graphics and tables were labeled and were not overly crowded with extraneous information. Instruction was also provided on developing items at particular cognitive levels based on Norm Webb's DOK levels.

Riverside Publishing TDSs trained item writers to enter content into the company's electronic Content Management System (CMS). During training, item writers wrote several items and received feedback on them. Participants also received feedback through CMS, and Riverside Publishing TDSs responded to teachers' items as they were submitted. As items were produced, they were continuously reviewed, revised, edited, and evaluated by Riverside Publishing TDSs and DESE staff. Item writers who generated high-quality work on or ahead of schedule were given additional assignments.

As items were written, they were tracked according to the item development plan. Riverside Publishing kept careful records to maintain a workflow that generated items in assessment strands and CLEs as required by the test blueprint. All items and passages went through several rounds of internal reviews, including content and editorial reviews. Riverside Publishing TDSs reviewed each item with respect to alignment, clarity, grade appropriateness, and correspondence to item specifications.

### ***2.5.2 Universal Design***

Riverside Publishing TDSs are experienced in employing the principles of universal design in item development so that all students have equal access to the assessments. Riverside Publishing included these principles when training Missouri teachers to write the test items.

According to the *NCEO Synthesis Report 44* (Thompson, Johnstone, and Thurlow 2002), there are seven elements of universally designed assessments:

1. Inclusive assessment population
2. Precisely defined constructs
3. Accessible, nonbiased items
4. Amenable to accommodations
5. Simple, clear, and intuitive instructions and procedures
6. Maximum readability and comprehensibility
7. Maximum legibility

All items for the MO EOC Assessments were developed with these elements in mind. Riverside Publishing ensured the development of MO EOC items in accordance with these principles in the following manner:

- Items were developed to include a wide array of contexts and cultures. These item types may make students feel more included, increase motivation, and avoid bias.
- The test and item specifications served as a model for precisely defining the constructs that the tests would measure. These specifications indicated to the item writer, content reviewer, and TDS exactly what was to be measured. The item could assess a particular part of a standard or a combination of elements within a

standard. The reviews served as a method for eliminating items that included assessment of knowledge outside the standard. For example, a mathematics item should have nonmathematical vocabulary below grade level; otherwise, the item might also be assessing reading ability, introducing construct-irrelevant variance.

- The review of items, which was performed by reviewers who included Missouri teachers from diverse ethnic and geographic backgrounds, served to ensure that all items were accessible to as many students as possible.
- Riverside Publishing staff members trained Missouri teachers to create clear and simple instructions so that students would have a clear understanding of the task needed to answer an item. Teacher review committees had an opportunity to review the instructions to ensure that they were appropriate for the grade levels and subject areas. To ensure the appropriateness of the level of the vocabulary, *Children's Writer's Word Book* and *EDL Core Vocabulary* were employed by test developers and item review committees.
- Finally, items with text, graphics, tables, maps, and diagrams were constructed with maximum legibility.

### ***2.5.3 Content and Bias Review Process***

Standard 3.6<sup>3</sup> specifically addresses the importance of item review by both an examination of the item statistics and the use of expert panels of judges. This section details the steps that were taken to ensure that the items chosen for the operational forms of the MO EOC Assessments were of high technical quality and were free from bias. Content and bias reviews were conducted in July 2008 in Columbia, Missouri. The content review committees included DESE staff, Missouri educators from around the state, Regional Instructional Facilitators, and Riverside Publishing staff.

The content and bias review committees reviewed SR items using the following criteria:

- Overall quality and syntactical clarity
- Content coverage and content appropriateness
- Alignment to the specified CLE
- Appropriate contexts
- One clearly correct answer and plausible distractors for SR items
- Freedom from bias or any racial, socioeconomic, gender, or other sensitivity issues

Before reviewing the items, a group training session was held with all committee members. Riverside Publishing presented a PowerPoint that described the MO EOC program, the test development process, and the content and bias review procedures. After the large-group session, the committee members went to their respective break-out rooms to discuss the week's activities in more detail. The committee members were provided

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<sup>3</sup> **Standard 3.6:** The type of items, response formats, scoring procedures, and test administration procedures should be selected based on the purposes of the test, the domain to be measured, and the intended test takers. To the extent possible, test content should be chosen to ensure that intended inferences from test scores are equally valid for members of different groups of test takers. The test review process should include empirical analyses and, when appropriate, the use of expert judges to review items and response formats. The qualifications, relevant experiences, and demographic characteristics of expert judges should also be documented (p. 44).

with copies of the CLEs and item specifications for the courses for the items they were to review. Each Riverside Publishing content facilitator reviewed these documents with the committee and answered any questions. The committee members were given the following checklists that could be referenced throughout the review process:

For SR items:

- Does the item assess the assigned CLE?
- Is the item clear, concise, and complete?
- Does the item contain accurate and sufficient content information?
- Is the item grade-level appropriate, and are the vocabulary and syntax appropriate for the students at the intended grade? (Reference the *EDL Core Vocabularies*.)
- Is the item fair to all students and free of bias and sensitivity issues?
- Does the item have correct punctuation, and is it grammatically correct?
- Is the item free from spelling and typographical errors?
- Is clueing avoided within an item stem and options, as well as among items?
- Does the item stand alone? (The answer to one item should not be dependent on the content of another item.)
- Are the equations, tables, charts, graphs, and other art clear, accurate, and necessary?
- Does the item have only one correct answer?
- Does the item have unique, plausible distractors containing common errors students would make?
- Are all the options parallel in form and arranged in logical order?
- Do all distractors contain clear rationale statements? (Math and Science only)
- Is the item free from absolutes (“none of the above,” “all of the above”) as options and free from the use of negatives (“not,” “none,” “except”) in the stem?
- Does the item avoid repeating words from the stem in the options?
- Does the item pose a single problem (although the solution may require more than one step)?

Missouri educators participated in the review process for each content area. The committee members read and reviewed each item. Discussions were held about whether or not the items met the criteria listed above. The committees then rejected or revised any items they deemed unsatisfactory. If there was disagreement about how to proceed with an item, the Riverside Publishing facilitator polled the group and followed the direction of the majority. Approximately 98% of the items were accepted (as-is or with edits) by the content and bias committees. Table 2.41 shows the number of items that were reviewed in 2008. The accepted items were placed in a pool of items from which the 2009 standalone field-test forms were built.

To further preserve validity, all item review sessions were held in secure meeting rooms, and all materials were confidential. Committee members were required to sign confidentiality agreements so that the integrity of the test content was not compromised. Although educators were encouraged to share information with their colleagues about the process of the item review, they were made fully aware of the expectation that any information about specific items and passages was to remain secure and confidential.

**Table 2.41: 2008 Content/Bias Item Review Acceptance Rates**

	<b>Total Number of Items Presented for Review</b>	<b>Number of Items Accepted (As Is or With Edits)</b>	<b>Acceptance Rate (Items Accepted As Is or With Edits)</b>
<b>Algebra II</b>	490	488	99.5%
<b>Geometry</b>	488	471	97%
<b>English I</b>	669	669	100%
<b>American History</b>	494	470	95%
<b>Government</b>	492	474	96%
<b>Integrated Math II</b>	380	380	100%
<b>Integrated Math III</b>	380	378	99.4%

## **2.6 Test Form Assembly**

### ***2.6.1 Field-Test Selection and Administration***

The items accepted at the content/bias review were used to build the standalone field-test forms that were administered in spring 2009. Field-test items were selected so that each form met the established operational blueprint requirements for content coverage as closely as possible. For any standalone field-test form that deviated slightly from the blueprint, another field-test form made up for that difference, so that the entire pool of field-tested items met the blueprint requirements.

The MO EOC Spring 2009 field test consisted of 10 SR forms of 36 items each for Algebra II, Geometry, Government, and American History. English I field tested 14 unique forms with 36 items on each form, and Integrated Mathematics II and III each piloted 4 forms with 36 items on each form. All field-test forms were reviewed and approved by DESE. The forms for each course were spiraled at the student level across the State.

### ***2.6.2 Statistical Item Review***

After completion of the 2009 field-test item scoring, Riverside Publishing TDSs and psychometricians reviewed the statistical characteristics of the items. Riverside Publishing used classical item statistics, including  $n$ -counts,  $p$ -values, percentage choosing each response option, point-biserial correlations, and differential item functioning (DIF) analysis for the SR items. Additionally, the Rasch model was used for distractor analysis for the SR items.

During the data review on June 19, 2009, the Riverside Publishing Research and Test Development staff and DESE staff reviewed students' performance on the Spring 2009 field-test items. Items were carefully reviewed with respect to their statistical

characteristics. Item reviewers from DESE and Riverside Publishing were provided with the following information:

- Form
- Position
- Item as it appeared in the printed books
- Item alignment to the Missouri Show-Me State Standards
- The  $p$ -value of the correct answer and percentage of students who selected each distractor
- Point-biserial correlation of correct response and point-biserial for each distractor
- Total number of students who attempted to answer each question
- DIF using the Mantel-Haenszel (MH) (1959) procedure and Educational Testing Service (ETS) classification

Riverside Publishing and DESE staff reviewed items that were flagged because of statistics that fell outside the parameters determined by the Riverside Publishing Research staff. Table 2.42 contains the guidelines used for data review.

**Table 2.42: Criteria for Flagged Items**

Item Flagging Criteria	Indicates
If $p$ -value of keyed response $< 0.35$	Difficult item
If $p$ -value of keyed response $> 0.95$	Easy item
If $p$ -value of keyed response $< p$ -value of distractor	Possible miskey
If $p$ -value of distractor $> 0.35$	Possible second correct option
If point-biserial of keyed response $< 0.20$	Poorly discriminating item
If point-biserial of a distractor is $> 0.00$	Possible second correct option
If ETS classification is B or C (from DIF analysis)	Possible bias in item

Each flagged item was reviewed, and then Riverside Publishing and DESE made a decision about whether the item should be accepted or rejected. The review included items flagged with moderate to severe DIF (an ETS classification of B or C). A flagged item was accepted if the review team determined that the item was strong and tested students on content they were expected to know. Accepted items were then made available in the pool of items that could be used to create the operational forms. Items that the review team felt were biased or inappropriate for the Missouri EOC Assessments were rejected. Rejected items were removed from the item pool, making them invalid for the MO EOC Assessments. Of the 2,233 total items reviewed, 93% were accepted.

### ***2.6.3 Operational Test Selection and Administration***

In June and July 2009, Riverside Publishing TDSs selected operational items for test forms for use in 2009 and 2010. Using item response theory (IRT) item difficulty information, four equivalent operational forms were selected for each content area. These four forms are the operational component of the Fall, Spring, and Summer EFT forms, as

well as the released form. The Fall form was administered in November 2009, the Spring form in April 2010, and the Summer form in June 2010.<sup>4</sup>

The operational form construction process was based on content requirements and statistical criteria. The steps associated with assembling test forms included the following:

1. *Determine form design.* Each form consisted of operational items and EFT items.
2. *Select items that meet content specifications.* Each form was constructed based on the test specifications for that content area. The test specifications delineated the item distribution across assessment strands. They also outlined the test length, type of items, and number of points to be assessed at each CLE.
3. *Evaluate statistical specifications, and select items to meet these specifications.* Spreadsheets (form matrices) were used to ensure that the test forms met statistical specifications. These matrices contained the following statistics: average  $p$ -values, point-biserial correlations, and DIF statistics. Riverside Publishing psychometricians conducted a review of the test forms to ensure equivalence of test difficulty across forms.
4. *Review and approve test forms.* Once the content and statistical specifications were met for each content area, the forms were reviewed and approved by DESE. The forms were then released for production and additional content and editorial reviews.

## **2.7 Braille and Large Print Versions**

Beyond employing the principles of universal design, all operational assessments were offered in Braille and Large Print versions for visually impaired students taking the Missouri EOC Assessments. The Fall 2009 operational paper-and-pencil version was converted into Braille and large print to accommodate these students.

Once the Braille and Large Print Forms were created, two separate reviews were held on September 17 and 18, 2009, with educators from Missouri who had specialized training in working with visually impaired students.

The teachers consulted the *Large Print and Braille Style Guide*, which was also used during form composition, and relied on their own expertise to determine whether changes to directions, passages, or items were needed or whether items should be omitted. The Riverside Publishing Braille vendor (Region IV) also reviewed the forms and made recommendations based on how items, passages, and directions would be transcribed to Braille.

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<sup>4</sup> The Summer 2010 administration is part of the 2010–2011 assessment year, and its results are not included in this technical report.

Riverside Publishing and DESE reviewed the recommendations from all of these sources. It was determined that no items had to be omitted to accommodate students who needed Large Print materials. For the Braille version of the form, three items from Geometry and one item from English I were removed because the content of the items prohibited transcription to Braille. Students taking the Braille form were given credit for these items. The embedded field test items were eliminated from both versions of these forms due to the irregular testing conditions and the small sample sizes for these groups. These versions of the Large Print and Braille forms were used through the Summer 2010 test administration.

## **2.8 Online Forms Construction**

All items were written so they could be presented in the online delivery system without any alterations.

## **2.9 Quality Control for Test Construction**

Checklists and quality control procedures accompany each stage of form development. Following is a list of some quality control procedures used during the assembly of the MO EOC Assessment forms:

- Construct forms based on all content requirements noted in the test blueprint and test specifications
- Verify correct number of items per standard or reporting category based on test blueprint
- Review items to ensure a wide sampling of the knowledge and skills being measured
- Ensure that all items have been through the appropriate review procedures and are approved for use by DESE
- Check for a variety of item topics, equal distribution of males and females, ethnicities, etc.
- Verify appropriate portions of items with and without artwork
- Check for clueing across all items on each form
- Verify equal or nearly equal distribution of answer choices for SR items
- Ensure that the test meets the required statistical specifications (i.e., that as many items as possible have  $p$ -values between 0.35 and 0.90 and as many items as possible have point-biserial correlations above 0.20)
- Consider any statistical flags or problems
- Check statistics to ensure that the collection of items on a given form yields an overall difficulty that falls within the specified range
- Verify that items have not been released to the public
- Verify correct answer key for each item
- Perform content review of form (senior staff)
- Perform statistical review of form (psychometrician/statistician)
- Send form to DESE for review and approval

## **2.10 Summary**

The MO EOC Assessments in English I, Algebra II, Geometry, Government, American History, and Integrated Mathematics II and III provide an indication of student progress toward achieving the knowledge and skills identified in the Missouri Show-Me Standards. Just as the Show-Me Standards guided item development and selection process, the consideration of content played an equally important role in form development. Form development required a balance of both content coverage and item difficulty. As items were selected for inclusion on particular forms, every effort was made to balance the content coverage to ensure the items aligned to the Missouri Show-Me Standards/CLEs being assessed while simultaneously considering the overall difficulty of the form. DESE made the determination to discontinue the Integrated Mathematics II and III assessments due to extremely low actual enrollments for the Fall 2009 assessments and low projections of enrollment for Spring 2010.

## **CHAPTER 3: ACHIEVEMENT-LEVEL SETTING**

### **3.1 Introduction**

One purpose of assessment is to establish clear guidelines for educational decision making. By assigning meaning to test scores, standard setting allows policymakers, administrators, teachers, and parents to make statements about the level of proficiency of individual students and groups of students. The purpose of this chapter is to provide documentation of the achievement-level-setting (or standard-setting) event conducted for the Missouri End-of-Course (MO EOC) Assessments on November 2–5, 2009.

### **3.2 Goal of the Standard Setting**

The main goal of the standard-setting event was to establish three cut scores for each test in the MO EOC Assessments:

1. The cut score that differentiates Below Basic performance from Basic performance
2. The cut score that differentiates Basic performance from Proficient performance
3. The cut score that differentiates Proficient performance from Advanced performance

In other words, the determination of three cut scores yields four performance categories for each assessment.

### **3.3 Overview of the Standard Setting**

During the November 2009 event, achievement-level-setting activities were undertaken for five MO EOC Assessments: English I, Algebra II, Geometry, American History, and Government. These five assessments were administered operationally for the first time during the 2009–2010 school year.

It should be noted that the original plan for achievement-level setting included sessions for Integrated Math II and Integrated Math III. However, before the event, DESE made the determination to discontinue these two assessments due to extremely low actual enrollments for the Fall 2009 assessments and low projections of the number of students who would enroll to take these assessments in Spring 2010. Additionally, DESE received only five participant nominations for the Integrated Math panels, confirming the low participation in these two courses statewide.

### **3.4 Staff and Participants**

Staff from Questar Assessment, Inc., a subcontractor to Riverside Publishing, planned and facilitated the standard-setting workshops in consultation with Riverside Publishing's MO EOC Assessment team. Questar's most-experienced facilitators—Michael Beck, Sheila Potter, and Leon Dreyfus—served as facilitators for the workshops. Each of these individuals has facilitated standard-setting sessions for multiple clients for both elementary-level and high-school-level assessments.

In addition to the staff from Questar, three psychometricians from Riverside Publishing attended the workshops. Their function was to enter panelist data, produce tables and reports, and oversee data quality control as well as observe activities in each of the groups. A Riverside Publishing program manager was present for the entire workshop to assist Missouri Department of Elementary and Secondary Education (DESE) staff and the panelists with logistical issues. Content area specialists from Riverside Publishing's Content Development group were present in the five panel rooms to serve as resources for content-related questions. Finally, curriculum staff from DESE attended the standard-setting workshops to serve as content resources to the appropriate panels.

### ***3.4.1 Participant Recruitment***

In July 2009, DESE electronically distributed informational letters and panelist nomination forms to all Missouri district superintendents, Regional Professional Development Center (RPDC) directors, and selected professional educator organizations. In addition, DESE contacted the Director of the Missouri Department of Higher Education's Curriculum Alignment Initiative. The cover letters described the process and impact of the standard-setting event and provided some preliminary details such as date and location. The letters also stressed that this was a unique opportunity for panels of educators and other individuals to discuss Course-Level Expectations (CLEs) for each applicable course and to review assessment items to determine the appropriate "cut scores" for each achievement level. Each addressee was given the opportunity to nominate one or more classroom teachers, nonteacher educators, post-secondary educators, or business professionals with appropriate content knowledge to be considered for participation in the standard-setting event. The panelist nomination letters and forms were also distributed to an applicable group of education-related professional organizations in Missouri. A list of those organizations is included as Appendix A.

The requirements for participation were as follows:

*For classroom teachers:* The teacher must have taught the course for which he or she is being nominated to serve as a panelist for a minimum of five years. The teacher should be familiar with the Show-Me Standards and the applicable CLE. Finally, the teacher should be recognized as "outstanding" in professional performance.

*For nonteacher educators and post-secondary educators:* The educator may be a nonteacher educational staff member in a building or district central office or an instructor or administrator at a post-secondary institution. The educator must have familiarity with the course content for which he or she is being nominated to serve as a panelist. He or she should be familiar with the Show-Me Standards and applicable Course-Level Expectations. Finally, the educator must be recognized as "outstanding" in professional performance by the individual making the nomination.

*For business professionals:* The business professional must have familiarity with the content of the course for which he or she is being nominated to serve as a panelist. Additionally, the individual either should use high school course content for the applicable content area in his or her daily professional work *or* be familiar with the knowledge and skills that high school students completing the applicable courses must possess to have a firm foundation for further coursework or for the workplace. Finally,

the business professional must not be a current or former employee of the public school system.

Appendix B contains copies of the nomination letters sent to district administrators, RPDC directors, and professional educator organizations. Appendix C contains copies of the nomination forms for classroom teachers, nonteacher educators, and business professionals. Appendix D contains a copy of the panelist qualification guidelines that were mailed with the nomination packets.

### ***3.4.2 Panel Characteristics***

A total of 100 panelist nomination forms were received by DESE by September 1, 2009: 30 for English I, 18 for Algebra II, 16 for Geometry, 23 for American History, and 13 for Government. (Some individuals were nominated to serve on more than one panel. An additional five panelists were nominated to serve on Integrated Mathematics II and III panels, for which standard setting did not occur. Three of those individuals, who were all classroom teachers, were assigned to the Algebra II and Geometry panels.) From these nomination forms, DESE's Curriculum and Assessment staff members chose panelists based upon expertise, demographic characteristics, and types of schools and student populations represented.

An effort was made to ensure representation of the state's urban, suburban, and rural schools and communities, as well as to include representation from the state's 11 RPDC regions. Additionally, as much as possible given the nomination pool, an attempt was made to include panelists with expertise in working with students with special needs and English-language learner (ELL) students. By design, panel slots were heavily populated with classroom teachers. Additionally, with the exception of the American History panel, each panel included one representative of the Missouri Department of Higher Education's Curriculum Alignment Initiative. These individuals have been involved in developing draft competencies for entry into college-level coursework. Historically, DESE has had difficulty, even with targeted recruiting, with locating minority panelists to create panels that are demographically similar to Missouri's population. However, an attempt was made to include educators on each panel who work in districts that serve significant numbers of minority children.

In a few instances, more than one panelist from the same school district was nominated for the same content area. In these cases, DESE chose only one of the nominees to serve on the panel to avoid overrepresentation of any one district on the panels.

A total of 73 panelists participated in the standard-setting workshop. Three members of the English I panel and two members of the Geometry panel had participated in an earlier achievement-level-setting workshop for other Missouri assessments. A small portion (approximately 10 percent) of the panelists had worked on some phase of standards development or assessment development at the state level. The remaining panelists were involved in leadership activities in their individual districts as they implemented EOC Assessments and aligned curriculum to CLEs. More than half of each panel was made up of active classroom teachers in the relevant content area; several other panel members were nonteacher professional educators, such as administrators and curriculum coordinators. Table 3.1 contains summary information about the demographic

characteristics of each panel. Appendix E contains detailed information about the demographic characteristics of each panel.

**Table 3.1: Summary of Panel Characteristics for Phase II Assessments**

Category	Panel				
	English I	Algebra II	Geometry	American History	Government
Gender					
Male	2	3	6	10	6
Female	14	13	10	3	6
Race					
White	15	15	16	12	11
Other	1	1	0	1	1
Community Size					
Rural	8	10	11	8	3
Suburban	6	5	4	3	6
Urban	1	1	1	2	3
Not Applicable	1	0	0	0	0
Position					
Classroom Teacher	9	13	13	11	7
Nonteacher Educator	6	1	2	2	3
Higher Education Professional	1	2	1	0	1
Business Professional	0	0	0	0	1
RPDC Region					
Heart of Missouri	3	1	1	1	1
Kansas City	4	1	3	1	2
Missouri Western	0	0	1	0	0
Northeast	1	0	0	0	0
Northwest	0	1	0	0	0
St. Louis	3	5	2	4	5
South Central	1	2	3	3	2
Southeast	0	3	3	1	1
Southwest	2	3	2	1	1
West Central	1	0	1	2	0
Not Applicable	1	0	0	0	0
<b>Totals</b>	16	16	16	13	12

The MO EOC Assessments use the same achievement-level labels used for the grade-level Missouri Assessment Program (MAP): Advanced, Proficient, Basic, and Below Basic. For each of these levels, the achievement-level descriptor (ALD) describes the specific knowledge and skills that a student at that level must be able to demonstrate. As suggested by the Technical Advisory Committee (TAC), Riverside Publishing drafted ALDs and presented the drafts to DESE. Prior to the standard-setting workshop, DESE conducted sessions devoted to revising these ALDs.

### **3.5 Overview of Standard-Setting Activities**

#### ***3.5.1 Methodology and Data Considerations***

The specific methodology used for the standard-setting activities was a modified Angoff procedure, as recommended by the state's TAC. The Angoff procedure and its modifications are well-recognized and heavily researched methods for establishing student performance standards for tests such as the EOC. Missouri achievement-level-setting workshops for the grade-level MAP used an item-mapping procedure commonly known as Bookmark standard setting; however, that method requires placing the items in a difficulty-ordered item book, which necessitates that the item difficulty parameters be known. In the case of the 2009 MO EOC Assessments, because the operational assessment window had not ended at the time of the event, parameter estimates from the operational test forms were not available. Additionally, the method for and timing of this standard-setting event mirrored the Phase I event that took place in fall 2008. In that case, the standard setting was scheduled for fall due to federal submission requirements, and the modified Angoff method was used because operational data were not available at the time of the event. The modified Angoff method does not require placing the items in difficulty order; it was, therefore, a suitable choice of methods for this event.

The modified Angoff method requires three distinct rounds of panelist judgments. Between the first and second rounds, Riverside Publishing provided the panelists with item-difficulty data for their consideration. Because operational data were not available in November, the item data were derived from the Spring 2009 field-test event. Panelists were appropriately cautioned about the limitations of such data.

Before the last round of judgments, Riverside Publishing staff provided the panelists with statewide impact data for the assessment. These data were intended to serve as an anchor for the panelists' recommendations. Again, because actual performance data were not available, the data were based on projected statewide score distributions generated from the Spring 2009 field-test event. It is likely that a standalone field-test event would produce lower-than-expected results due to decreased student motivation; therefore, Riverside Publishing psychometricians would consider the field-test data "lower-bound" estimates of actual student performance in an operational event. As with the item-level data estimates, the facilitators cautioned the panelists about relying too much on these impact data.

Despite the limitations of the field-test data for the standard-setting activities, we believe that providing panelists with even tentative data was desirable, both to mirror procedures used for establishing standards for previous Missouri assessments and to provide panelists with an "external reality check" on their evolving recommendations. Past

technical advisory committee discussions confirmed the use of these projected statewide impact data.

In addition to the caveats about item level data and impact data, panel facilitators clearly communicated to the panelists that the results of their standard-setting activities would be purely advisory to DESE. DESE would consider the recommendations and present them to the state board of education for approval.

### ***3.5.2 Description of the Test Forms and Considerations***

The MO EOC Phase II Assessments are composed of only selected response (multiple choice) items. DESE chose to use the MO EOC Spring 2010 operational forms for the standard-setting event. These forms were selected from the several available operational forms because they would be the most widely used in the 2009–2010 test administration year. Although the final printed test books were not available yet at the time of the event, Riverside Publishing staff presented the panelists with prototypes that contained all the test items in the same order and with the same “look and feel” as the final printed test books.

## **3.6 Specific Standard-Setting Activities**

The Standard-Setting Session Agendas provided general guides regarding the time devoted to each activity. Copies of the agendas are included as Appendix F. Questar facilitators held closely to the times contained in the agenda. They used identical processes, including presentation slides and scripts, across all five sessions to minimize any intersession differences related to facilitator or session variance.

The following sections provide details about the processes that Questar and Riverside Publishing followed during the course of the standard-setting workshop.

### ***3.6.1 General Process Overview***

The first 90 minutes of the three-day session served as an introduction and overview to the general standard-setting processes. First, Dr. Andrea Wood, Director of Assessment for DESE, oriented the panelists to the MO EOC program and briefly outlined the session purpose and intended outcomes.

Next, Michael Beck of Questar led a general overview, “What Is Standard Setting?” Its purpose was to ensure a common understanding of the fundamental elements of the process. Mr. Beck included a brief overview of the general process of establishing student performance standards, ground rules for panelist activities, and some key elements for the panelists to focus on when attempting to set standards. Mr. Beck also advised the panelists that their work was advisory to DESE. This introduction was a high-level overview of the standard-setting process; individual facilitators provided more detail about each step in the process after the panels broke into content-specific groups. The PowerPoint slides presented during the opening session are included as Appendix G of this report.

Finally, Dr. Sheila Potter of Questar provided a general overview of ALDs and their importance to the standard-setting process. Since the panels would be reviewing, editing, and expanding on draft versions of the ALDs provided by the state, it was important for

panelists to understand the critical role of ALDs in the standard-setting process. Following this activity, panelists divided into the content-specific panel break-out rooms, where all remaining work for the sessions took place.

### ***3.6.2 Panelists Take the Operational Assessments***

After reconvening in the content-area panels, panelists first introduced themselves and signed DESE-provided confidentiality forms. Facilitators introduced themselves and reiterated the high-level standard-setting processes that Mr. Beck had discussed during the opening session. Facilitators then allowed the panelists time to take and score the Spring 2010 form of the operational assessment. For this activity, panelists had access to the test administration procedures, the actual test content, and all relevant scoring materials. Field-test items that were included in these forms were removed from the test books. Because these were “live” materials, facilitators stressed the confidentiality of all of the items.

The primary purpose of this activity was to familiarize panelists with the actual, complete assessment content before beginning the standard-setting judgments. Following this review of the tests, each panel spent a short time reacting to the assessment content: difficulty, sources of challenge, scoring issues, and general and specific reactions. This exercise provided the panelists, especially those not familiar with the MO EOC Assessments, with a context concerning the definition of Proficient as conveyed by the assessments.

### ***3.6.3 Panelists Discuss and Fine-Tune the ALDs***

At the standard-setting workshop, participants devoted a significant portion of time to fine-tuning the draft ALDs for each assessment. The facilitators provided the panelists with draft copies of the appropriate ALDs, copies of the MO EOC Assessment blueprint, and the appropriate CLEs. Using these materials as references and drawing on the expertise of the panelists, the Questar facilitators led each panel in an extended discussion and exercise to refine and elaborate each of the ALDs. Once this activity was complete, the panels relied on the resulting ALDs as a reference during the actual standard-setting activities. In addition, the panelists were allowed to make appropriate, though generally minor, revisions and refinements to the ALDs during and after the standard-setting activities.

All content-area panels began this activity with a review of the draft ALDs for the particular content area. Separate panels of Missouri educators had developed these draft ALDs during DESE-led sessions several weeks earlier. The ALD review activity was highly interactive, with panelists suggesting changes and other refinements—both substantive and editorial—to the draft ALDs. The ultimate task was to operationalize specific behaviors indicating performance at the Advanced, Proficient, Basic, and Below Basic levels in the content area. The activity involved brainstorming, with each panelist’s ideas recorded and considered without expecting consensus. Panel suggestions were written on the draft ALDs, a copy of which was given to each panelist or placed on chart paper displayed around the room. Panelists were later able to refer to these pages, along with the original drafts, during the actual judgment activities. The thoroughness of the ALD refinement activities and the extent to which the panelists, individually and as a

group, internalized the ALDs significantly impacted the soundness of the subsequent standard-setting activities. For this reason, approximately one and a half hours were devoted to this activity in the session agenda.

At the conclusion of the standard-setting sessions, DESE collected the panelist recommendations for ALD revisions for consideration in the wording of the final ALDs. Appendix H contains a copy of the draft ALDs that was distributed to the panelists at the outset of the standard-setting workshop. The panels' final edits are indicated within the draft ALDs.

### ***3.6.4 Orientation to the Modified Angoff Procedures***

After completion of the ALD review activity, facilitators oriented the panels to the specific tasks involved with the modified Angoff standard-setting process. The modified Angoff process requires panelists to read and make judgments about each successive item in the test book, using the following procedures. When reading an item, panelists were to consider the item's importance in the context of the underlying CLE, the task(s) required of the student, and the item's difficulty. They were to decide what percentage of minimally Proficient students should be able to answer the item correctly. Panelists were then to decide what percentage of minimally Advanced students would answer the item correctly. Finally, they were to decide what percentage of minimally Basic students would answer the item correctly. (While the MO EOC Assessments contain four levels of student performance, cuts are made at only three locations on the score distribution.) The panelists were instructed to consider their judgments in this order—Proficient, Advanced, and Basic—as it anchors the item judgments on the most important cut, Proficient. In addition, once panelists made their judgment for the Proficient students, they had a clearer, more defined range of values to consider for the other two cuts.

The facilitators included the following important points in their presentations:

- Panelists should focus on the *threshold* of performance in each category.
- Panelists should review and recall what each performance descriptor means.
- Panelists should focus on the group of students who would take the MO EOC Assessment students statewide, not just the students in the school or district in which they work.

Finally, the facilitators explained that the panelists' judgments should be made independently and anonymously and that security of the testing materials should be maintained at all times.

The steps outlined in Sections 3.6.1 through 3.6.4 composed the activities of the first day of the workshop. The second day began with an overview of the previous day's activities and outcomes, after which panelists took a five-item selected response qualifying test concerning the standard-setting procedures they were about to use. A copy of this instrument is provided as Appendix I. This qualifying test was used to ensure that all panelists understood the importance of the ALDs and selected elements of the modified Angoff procedure before beginning the process of making item judgments.

Before moving on to the Round 1 judgments, facilitators asked the panelists to complete and sign a form indicating that they understood the information they had received and

discussed and that they felt prepared to make their Round 1 judgments. All panelists so indicated. An example of this form is included as Appendix J.

### ***3.6.5 Round 1 Judgments***

At this point, panelists were ready to make their Round 1 judgments. This work was completed anonymously (via judge identification numbers known only to the individual panelist and Riverside Publishing staff) and independently. Panelists indicated their judgments on specially designed scannable rating sheets developed for each content area. These rating sheets contained three fields for each test item: one for Basic, one for Proficient, and one for Advanced. As panelists made their judgments for each item, facilitators instructed them to “bubble in” one value for each achievement level (in other words, for Item 1, the panelist entered a number corresponding to the percentage of students expected to choose a correct answer at the minimally Basic level, a number for the minimally Proficient level, and a number for the minimally Advanced level). Panelists followed this procedure for all the test items. An example rating sheet is included as Appendix K.

Most panelists completed their first round of judgments within 60 minutes; however, there was no time limit for this activity, and some panelists required 90 minutes to complete their judgments. This is not unusual for the first round of judgments in a modified Angoff workshop; often some panelists are still struggling to understand the task at this point, thus requiring more time to make their judgments. After panelists completed their judgments, they turned in their rating sheets and were excused for the evening.

### ***3.6.6 Feedback and Discussion of Round 1 Judgments***

During the evening, the Riverside Publishing psychometricians prepared reports of the Round 1 judgment results. The next morning’s session began with an overview of these reports. The first report was a table displaying all three raw score cuts as determined individually by each panelist’s judgments. This table also contained the entire panel’s average, median, highest, and lowest raw score cuts, as well as the standard deviation of all the panelists’ judgments for each of the three raw score cuts. The second report contained a frequency display of all three cut scores (Basic, Proficient, and Advanced) recommended by each panelist. This bar graph displayed all the panelists’ judgments on a single graph so that areas of dispersion or overlap in the raw cut scores would be apparent. These reports were anonymous; ID numbers, rather than names, were used to identify individual panelists.

The facilitators spent time reviewing these reports with the participants to ensure that everyone understood how to interpret the information contained in them. Using the Round 1 results, facilitators then led an extended discussion of the Round 1 judgments. Most of the work focused on the interim judgments of panelists at an individual test item level. Facilitators actively engaged all the panelists in the discussion to gauge whether they had indicated the item percentage values that they intended, that the reasoning processes they followed in making their judgments were consistent with good practice, and that the panelists clearly understood the mechanics of making item judgments. Throughout these discussions, facilitators focused on the key elements of the standard-

setting process: establishing the *threshold* of each cut, projecting the cuts for a *statewide* population of these students, and focusing on the particular *course* and *performance level* of the target populations.

Much like a jury deliberation, this discussion also allowed the panelists to hear their peers' comments and rationales for their judgments. This phase took around one hour, depending on the session; facilitators permitted discussion to continue until they perceived that all panelists were prepared to make their second round of judgments.

Next, facilitators distributed statewide item difficulty data derived from the 2008 field-test event. The derived item difficulties were item *p*-values, or the proportion of students who answered the item correctly in the 2009 field-test event. Recall from Section 3.5.1 that the data used to derive the item difficulty values were collected during a standalone field-test event. During the presentation of the item difficulty data, facilitators advised the panelists that caution should be taken in interpreting the item difficulty data, since student motivation may not have been the same as it would be on an operational assessment. Facilitators also explained that these data were relevant, but not critical, to the process of setting standards.

### **3.6.7 Round 2 Judgments**

During Round 2, panelists again worked independently to make judgments about the percentage of students at the threshold of each achievement level who would answer each item correctly. Facilitators explained to the panelists that they were free to maintain their Round 1 judgments or to revise them as they deemed appropriate. Before beginning this round of judgments, panelists were once more reminded of the key elements of the process and were asked to focus specifically on the ALDs for their assessment. Again, there was no time limit, although this round required significantly less time than did Round 1 because the panelists more clearly understood the judgment process. In addition, they were increasingly familiar with the specific items for which they were making the judgments. Further, many panelists had begun to formulate some or all of their Round 2 item judgments during the discussion of the Round 1 results.

After panelists completed their Round 2 judgments and recorded their recommendations on their rating sheets, they submitted the forms and were excused for lunch. After all rating sheets were collected, Riverside Publishing psychometricians prepared the reports of the Round 2 judgments.

### **3.6.8 Feedback and Discussion of Round 2 Judgments**

When the panels convened after the lunch break, facilitators presented the results of the Round 2 judgments. The reports showing the Round 2 results were used to guide another discussion of specific items. The presentation and discussion at this stage were similar to, although more focused than, those following Round 1.

Following this discussion, facilitators provided panelists with estimated statewide impact data—that is, the percentages of students statewide whose performance likely would be labeled Below Basic, Basic, Proficient, or Advanced if the panels' Round 2 judgments were adopted. The panels' median Round 2 judgments were used to determine cut scores for this report. Again, facilitators advised the panelists that the impact data were relevant to, but not essential for, setting performance standards. (This cautionary information was

especially important in the case of MO EOC Assessments, as the data were not grounded in an operational administration of the assessments.)

When facilitators were comfortable that all panelists were prepared to make their final recommendations, they proceeded to Round 3 of judgments.

### ***3.6.9 Round 3 of Judgments, Meeting Evaluation, and Final Inspection of ALDs***

For Round 3, the panelists' judgments consisted of one recommended cut score for each achievement level; panelists were not required to make item-level judgments. Panelists were given unlimited time to complete their Round 3 (final) recommendations, although most completed their judgments within 20 minutes. All panelists clearly understood that only the Round 3 judgments counted as their recommendations and that the three rounds were not combined in any way to form the proposed cuts.

After completing their final round of judgments, panelists completed a written evaluation of the process. This evaluation covered the panelists' opinions of the adequacy of the training provided and their comfort with and confidence in their judgments on a round-by-round basis. The form also contained spaces for the panelists to write other comments concerning the workshop. A copy of this evaluation is included as Appendix L of this report.

After facilitators collected the panelist evaluations, they allowed the panels time for a final review of the ALDs. During this time, panelists were allowed to discuss and, if necessary, fine-tune or revise the ALDs. Finally, panelists were thanked for their participation and dismissed.

## **3.7 Session Results by Panel and Round**

Appendices M, N, O, P, and Q contain the feedback reports by round for English I, Algebra II, Geometry, Government, and American History, respectively. Selected data from these graphs and tables are summarized below for ease of cross-round and cross-content-area comparison.

The standard-setting literature typically considers the *median* recommendation to be the best indicator of a panel's judgment, as the median would not be impacted by the judgments of a few outlying panelists. In the case of this standard-setting event, as a review of Appendices M through Q indicates, all median and mean Round 3 cut scores are within a single rounded raw-score point for all of the content areas. Therefore, the choice of a measure of central tendency for these particular panels would not markedly impact the resulting cut scores.

Table 3.2 contains the median panel cut scores for all rounds and content areas. As the data in Table 3.2 indicate, the panels did not make significant changes to their recommended cut scores across the three rounds of judgments. This is not to say that individual panelists made the same recommendations across rounds. In fact, across the 15 sets of judgments between rounds (five content areas with three cut scores each), the average difference in the number of raw score points between cut scores was 0.67 between Rounds 1 and 2, 0.40 between Rounds 2 and 3, and 0.93 between Rounds 1 and 3. (The median raw-score change between any pair of rounds was 0.)

**Table 3.2: Median Recommended Cut Scores by Content Area and Round**

Cut*	Content Area														
	English I			Algebra II			Geometry			Government			American History		
	B	P	A	B	P	A	B	P	A	B	P	A	B	P	A
Round 1	18	26	32	14	23	33	17	27	33	15	25	33	18	26	32
Round 2	18	26	33	14	24	33	17	24	32	15	26	34	19	25	32
Round 3/Final	16	25	33	16	24	33	17	24	32	15	25	34	19	25	32
No. Points Possible	40			40			40			40			40		

\*B = Basic, P = Proficient, A = Advanced

As is typically the case with standard-setting activities conducted over multiple rounds, the standard deviations of panelists' recommendations got smaller across rounds, indicating both an increasing level of panelist understanding of the process and increasing interpanel agreement based on group discussions between rounds of judgments. This is illustrated graphically through an examination of the frequency bar charts in Appendices M through Q, as well as statistically in the tabled results. The bars representing Basic, Proficient, and Advanced cut scores clearly become taller and more compact over each round of judgments. While panelists came closer to their peers in judging the most appropriate cut scores, even in Round 3—not unexpectedly—there was still a fair amount of spread in the recommended scores.

Standard errors of the median judgments (*SEJs*) were computed for all cut scores across all panels and are presented in Table 3.3. The *SEJ* is a measure of the degree of variability among the participants in each panel. It is calculated in the following manner:

$$SEJ = SE_{Mean} \times 1.25,$$

where  $SE_{Mean}$  is the standard error of the mean of the panel's cut scores.  $SE_{Mean}$  is calculated by taking the standard deviation of the participant ratings divided by the square root of the number of panelists. Lower values of *SEJ* indicate greater cut score agreement among the participants within a panel. In no case did the Round 3 *SEJ* reach a whole raw-score unit. Most were lower than half of a raw-score point. This indicates that the final median judgments are highly stable.

**Table 3.3: Standard Errors of Median Judgments for Each Cut Score Across Rounds and Panels**

Panel	Basic			Proficient			Advanced		
	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
English	2.20	1.34	0.75	0.38	0.23	0.37	0.07	0.03	0.05
Algebra	0.67	0.63	0.35	0.94	0.62	0.34	0.16	0.13	0.11
Geometry	1.46	0.86	0.51	0.40	0.40	0.40	0.11	0.12	0.08
Government	1.85	0.63	0.24	0.88	0.41	0.19	0.10	0.07	0.02
Am. History	0.98	0.61	0.57	0.71	0.87	0.44	0.21	0.19	0.17

Table 3.4 summarizes the projected statewide percentages of students whose EOC scores will fall in each of the four performance categories. These data are based on the Spring 2009 field-test results and were viewed as “lower-bound” estimates of the likely statewide results that were obtained at the end of the 2009–2010 school year.

**Table 3.4: Projected Statewide Percentages of Students Scoring in the Various Performance Categories on the EOC Assessments, 2009**

Assessment	Below Basic	Basic	Proficient	Advanced
English I	9%	34%	37%	20%
Algebra II	14%	45%	33%	8%
Geometry	18%	30%	38%	14%
Government	12%	44%	34%	10%
Am. History	23%	32%	30%	15%

### 3.8 Results of Participant Evaluations

Appendix R contains the data collected from panelists for the rating-scale type items on the evaluation forms. For the questions pertaining to the organization and adequacy of information provided in the opening session, the panelists generally provided ratings of 4 or 5 (on a scale of 1 to 5, with 5 being the highest). For the evaluation questions pertaining to the discussions of the achievement-level descriptors and the panelists’ understanding of each of the ALDs after the discussions, in all cases, at least 80% of the panelists provided ratings of 4 or 5. The questions pertaining to the panelists’ understanding of the judgment process and feedback on the results of each round received similar scores. Overall, these data indicate that the panelists generally understood what was expected of them, were comfortable with the process, and were comfortable with the resulting cut scores.



## CHAPTER 4: ITEM ANALYSIS

### 4.1 Introduction

Item analyses were conducted for Missouri End-of-Course (MO EOC) Assessments in English I, Algebra II, Geometry, Government, and American History. In this chapter, the summary information, which includes mean item score and discrimination indices, is presented at the item level for each content area. The item summary statistics presented in this section ( $p$ -values, point-biserial correlations, and omit rates) are based on the operational administrations that included responses from 23,300 students for fall 2009 and 160,565 students for spring 2010 across the five content areas. The differential item functioning (DIF) analyses are based on the Spring 2009 standalone field-test data.

### 4.2 Analysis of Forms for Each End-of-Course Assessment

Tables 4.1 through 4.10 summarize item difficulty, discrimination, and omit rates for the items that composed each assessment for the Fall 2009 and Spring 2010 operational administrations. For each item, the  $p$ -value is the proportion of students who answered the item correctly. The item discrimination, or corrected point-biserial correlation, is the correlation between students' item scores and their total scores on the remaining test items. Both item difficulty and item discrimination are expressed in the raw score metric.

**Table 4.1: Item Statistics for English I, Fall 2009 Operational Administration**

<b>Item</b>	<b><i>p</i>-Value/Mean</b>	<b>Corrected Point-Biserial Correlation</b>	<b>Omit Rate %</b>
1	0.78	0.29	0.00
2	0.61	0.44	0.00
3	0.81	0.37	0.00
4	0.49	0.29	0.00
5	0.64	0.44	0.00
6	0.42	0.25	0.00
7	0.54	0.33	0.00
8	0.83	0.28	0.00
9	0.86	0.30	0.00
10	0.68	0.23	0.00
11	0.51	0.28	0.00
12	0.72	0.37	0.00
13	0.84	0.32	0.00
14	0.54	0.34	0.00
15	0.89	0.19	0.00
16	0.39	0.25	0.00
29	0.38	0.31	0.00
30	0.63	0.41	0.00
31	0.57	0.48	0.00
32	0.64	0.45	0.00
33	0.61	0.33	0.00
34	0.43	0.42	0.00
35	0.84	0.40	0.00
36	0.64	0.43	0.00
37	0.57	0.45	0.00
38	0.58	0.39	0.00
39	0.62	0.42	0.00
40	0.62	0.40	0.00
41	0.40	0.24	0.00
42	0.51	0.36	0.00
43	0.36	0.31	0.00
44	0.44	0.28	0.00
45	0.28	0.41	0.00
46	0.65	0.36	0.00
47	0.69	0.40	0.00
48	0.70	0.43	0.00

**Table 4.1: Item Statistics for English I, Fall 2009 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
49	0.39	0.34	0.00
50	0.45	0.29	0.00
51	0.36	0.31	0.00
52	0.57	0.43	0.00

**Table 4.2: Item Statistics for Algebra II, Fall 2009 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.69	0.35	0.00
2	0.82	0.29	0.00
3	0.73	0.36	0.00
4	0.26	0.32	0.00
5	0.62	0.43	0.00
6	0.61	0.33	0.01
7	0.62	0.31	0.00
8	0.30	0.31	0.01
9	0.65	0.47	0.00
10	0.40	0.23	0.00
16	0.56	0.21	0.00
17	0.47	0.35	0.00
18	0.47	0.32	0.00
19	0.88	0.31	0.00
20	0.74	0.39	0.00
21	0.56	0.48	0.00
22	0.82	0.22	0.00
23	0.54	0.32	0.00
24	0.56	0.46	0.00
25	0.66	0.39	0.00
26	0.65	0.43	0.00
27	0.73	0.35	0.00
28	0.70	0.30	0.00
29	0.65	0.38	0.00
30	0.44	0.35	0.00
31	0.38	0.17	0.00
32	0.71	0.29	0.00
33	0.46	0.22	0.00

**Table 4.2: Item Statistics for Algebra II, Fall 2009 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
34	0.69	0.32	0.00
35	0.69	0.32	0.00
41	0.76	0.31	0.00
42	0.72	0.36	0.00
43	0.81	0.15	0.00
44	0.64	0.35	0.00
45	0.67	0.36	0.00
46	0.47	0.38	0.00
47	0.56	0.40	0.00
48	0.38	0.23	0.01
49	0.57	0.48	0.00
50	0.47	0.42	0.01

**Table 4.3: Item Statistics for Geometry, Fall 2009 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.69	0.28	0.00
2	0.93	0.22	0.00
3	0.58	0.44	0.01
4	0.73	0.44	0.00
5	0.83	0.24	0.00
6	0.73	0.42	0.00
7	0.81	0.17	0.00
8	0.63	0.29	0.00
9	0.82	0.33	0.00
10	0.68	0.51	0.00
16	0.53	0.43	0.00
17	0.77	0.41	0.01
18	0.69	0.34	0.00
19	0.47	0.27	0.01
20	0.71	0.32	0.00
21	0.65	0.38	0.00
22	0.86	0.47	0.00
23	0.83	0.34	0.00
24	0.73	0.41	0.00
25	0.84	0.29	0.00
26	0.52	0.31	0.00

**Table 4.3: Item Statistics for Geometry, Fall 2009 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
27	0.70	0.56	0.00
28	0.73	0.45	0.00
29	0.75	0.36	0.00
30	0.79	0.36	0.00
31	0.70	0.49	0.00
32	0.48	0.39	0.00
33	0.72	0.34	0.01
34	0.77	0.42	0.00
35	0.45	0.45	0.00
41	0.74	0.35	0.00
42	0.38	0.17	0.01
43	0.48	0.27	0.00
44	0.55	0.29	0.00
45	0.51	0.46	0.00
46	0.64	0.51	0.00
47	0.58	0.44	0.00
48	0.65	0.43	0.00
49	0.64	0.30	0.00
50	0.71	0.35	0.00

**Table 4.4: Item Statistics for Government, Fall 2009 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.67	0.37	0
2	0.52	0.07	0
3	0.39	0.26	0
4	0.82	0.45	0
5	0.45	0.25	0
6	0.83	0.33	0
7	0.79	0.35	0
8	0.62	0.32	0
9	0.65	0.39	0
10	0.70	0.50	0
16	0.46	0.37	0
17	0.35	0.24	0
18	0.7	0.29	0

**Table 4.4: Item Statistics for Government, Fall 2009 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
19	0.71	0.44	0
20	0.77	0.28	0
21	0.65	0.41	0
22	0.57	0.39	0
23	0.45	0.32	0
24	0.47	0.30	0
25	0.59	0.42	0
26	0.60	0.50	0
27	0.68	0.40	0
28	0.54	0.15	0
29	0.70	0.47	0
30	0.71	0.41	0
31	0.71	0.44	0
32	0.60	0.41	0
33	0.55	0.37	0
34	0.64	0.44	0
35	0.74	0.27	0
41	0.55	0.39	0
42	0.57	0.29	0
43	0.77	0.42	0
44	0.45	0.33	0
45	0.71	0.37	0
46	0.52	0.37	0
47	0.35	0.24	0
48	0.68	0.47	0
49	0.54	0.44	0
50	0.52	0.48	0

**Table 4.5: Item Statistics for American History, Fall 2009 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.73	0.34	0.00
2	0.91	0.18	0.00
3	0.74	0.41	0.00
4	0.69	0.33	0.00
5	0.78	0.44	0.00
6	0.71	0.34	0.00
7	0.67	0.35	0.00

**Table 4.5: Item Statistics for American History, Fall 2009 Operational Administration (continued)**

<b>Item</b>	<b><i>p</i>-Value/Mean</b>	<b>Corrected Point-Biserial Correlation</b>	<b>Omit Rate %</b>
8	0.61	0.13	0.00
9	0.72	0.43	0.00
10	0.70	0.33	0.00
16	0.48	0.22	0.00
17	0.67	0.41	0.00
18	0.52	0.37	0.00
19	0.43	0.29	0.00
20	0.56	0.31	0.00
21	0.53	0.34	0.00
22	0.85	0.35	0.00
23	0.30	0.24	0.00
24	0.59	0.35	0.00
25	0.49	0.19	0.00
26	0.35	0.26	0.00
27	0.39	0.30	0.00
28	0.36	0.26	0.00
29	0.59	0.42	0.00
30	0.45	0.35	0.00
31	0.78	0.35	0.00
32	0.44	0.22	0.00
33	0.43	0.35	0.00
34	0.40	0.27	0.00
35	0.44	0.24	0.00
41	0.37	0.46	0.00
42	0.63	0.41	0.00
43	0.55	0.40	0.00
44	0.84	0.34	0.00
45	0.37	0.21	0.00
46	0.65	0.48	0.00
47	0.73	0.51	0.00
48	0.75	0.40	0.00
49	0.36	0.21	0.00
50	0.62	0.40	0.00

**Table 4.6: Item Statistics for English I, Spring 2010 Operational Administration**

<b>Item</b>	<b><i>p</i>-Value/Mean</b>	<b>Corrected Point-Biserial Correlation</b>	<b>Omit Rate %</b>
1	0.85	0.40	0.00
2	0.75	0.41	0.00
3	0.56	0.21	0.00
4	0.79	0.39	0.00
5	0.83	0.31	0.00
6	0.60	0.14	0.00
7	0.58	0.17	0.00
8	0.91	0.38	0.00
9	0.70	0.21	0.00
10	0.84	0.35	0.00
11	0.62	0.35	0.00
12	0.50	0.33	0.00
13	0.60	0.34	0.00
14	0.72	0.41	0.00
15	0.54	0.20	0.00
16	0.42	0.36	0.00
29	0.44	0.46	0.00
30	0.34	0.16	0.00
31	0.69	0.35	0.00
32	0.61	0.43	0.00
33	0.52	0.26	0.00
34	0.53	0.24	0.00
35	0.62	0.37	0.00
36	0.61	0.24	0.00
37	0.69	0.47	0.00
38	0.75	0.40	0.00
39	0.62	0.46	0.00
40	0.64	0.43	0.00
41	0.64	0.49	0.00
42	0.66	0.30	0.00
43	0.70	0.45	0.00
44	0.42	0.31	0.00
45	0.51	0.38	0.00
46	0.59	0.40	0.00
47	0.66	0.42	0.00
48	0.55	0.31	0.00

**Table 4.6: Item Statistics for English I, Spring 2010 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
49	0.67	0.39	0.00
50	0.41	0.30	0.00
51	0.72	0.44	0.00
52	0.59	0.20	0.00

**Table 4.7: Item Statistics for Algebra II, Spring 2010 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.69	0.35	0.00
2	0.82	0.29	0.00
3	0.73	0.36	0.00
4	0.26	0.32	0.00
5	0.62	0.43	0.00
6	0.61	0.33	0.01
7	0.62	0.31	0.00
8	0.30	0.31	0.01
9	0.65	0.47	0.00
10	0.40	0.23	0.00
16	0.56	0.21	0.00
17	0.47	0.35	0.00
18	0.47	0.32	0.00
19	0.88	0.31	0.00
20	0.74	0.39	0.00
21	0.56	0.48	0.00
22	0.82	0.22	0.00
23	0.54	0.32	0.00
24	0.56	0.46	0.00
25	0.66	0.39	0.00
26	0.65	0.43	0.00
27	0.73	0.35	0.00
28	0.70	0.30	0.00
29	0.65	0.38	0.00
30	0.44	0.35	0.00
31	0.38	0.17	0.00
32	0.71	0.29	0.00
33	0.46	0.22	0.00

**Table 4.7: Item Statistics for Algebra II, Spring 2010 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
34	0.69	0.32	0.00
35	0.69	0.32	0.00
41	0.76	0.31	0.00
42	0.72	0.36	0.00
43	0.81	0.15	0.00
44	0.64	0.35	0.00
45	0.67	0.36	0.00
46	0.47	0.38	0.00
47	0.56	0.40	0.00
48	0.38	0.23	0.01
49	0.57	0.48	0.00
50	0.47	0.42	0.01

**Table 4.8: Item Statistics for Geometry, Spring 2010 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.72	0.34	0.00
2	0.72	0.49	0.00
3	0.80	0.44	0.00
4	0.70	0.39	0.00
5	0.74	0.49	0.00
6	0.84	0.32	0.00
7	0.77	0.35	0.00
8	0.71	0.52	0.00
9	0.75	0.39	0.00
10	0.47	0.37	0.00
16	0.43	0.44	0.00
17	0.66	0.34	0.00
18	0.64	0.35	0.00
19	0.71	0.46	0.00
20	0.74	0.41	0.00
21	0.59	0.09	0.00
22	0.86	0.21	0.00
23	0.83	0.28	0.00
24	0.69	0.34	0.00
25	0.79	0.26	0.00
26	0.57	0.41	0.00

**Table 4.8: Item Statistics for Geometry, Spring 2010 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
27	0.73	0.35	0.00
28	0.54	0.42	0.00
29	0.61	0.31	0.00
30	0.30	0.17	0.00
31	0.59	0.36	0.00
32	0.36	0.35	0.00
33	0.37	0.39	0.00
34	0.58	0.36	0.00
35	0.42	0.44	0.00
41	0.46	0.31	0.00
42	0.39	0.32	0.00
43	0.54	0.29	0.00
44	0.48	0.32	0.00
45	0.52	0.40	0.00
46	0.47	0.25	0.00
47	0.45	0.24	0.00
48	0.21	0.24	0.00
49	0.45	0.25	0.00
50	0.49	0.34	0.00

**Table 4.9: Item Statistics for Government, Spring 2010 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.59	0.27	0.00
2	0.64	0.40	0.00
3	0.66	0.32	0.00
4	0.46	0.13	0.00
5	0.51	0.30	0.00
6	0.78	0.40	0.00
7	0.74	0.40	0.00
8	0.62	0.33	0.00
9	0.40	0.57	0.00
10	0.68	0.39	0.00
16	0.56	0.49	0.00
17	0.75	0.39	0.00
18	0.58	0.33	0.00

**Table 4.9: Item Statistics for Government, Spring 2010 Operational Administration (continued)**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
19	0.41	0.53	0.00
20	0.80	0.32	0.00
21	0.81	0.34	0.00
22	0.60	0.46	0.00
23	0.76	0.31	0.00
24	0.66	0.43	0.00
25	0.72	0.34	0.00
26	0.44	0.28	0.00
27	0.65	0.47	0.00
28	0.70	0.36	0.00
29	0.42	0.27	0.00
30	0.66	0.28	0.00
31	0.58	0.38	0.00
32	0.63	0.38	0.00
33	0.50	0.25	0.00
34	0.44	0.26	0.00
35	0.59	0.43	0.00
41	0.51	0.33	0.00
42	0.72	0.33	0.00
43	0.68	0.31	0.00
44	0.55	0.47	0.00
45	0.44	0.31	0.00
46	0.46	0.27	0.00
47	0.55	0.41	0.00
48	0.70	0.54	0.00
49	0.71	0.39	0.00
50	0.66	0.41	0.00

**Table 4.10: Item Statistics for American History, Spring 2010 Operational Administration**

Item	<i>p</i> -Value/Mean	Corrected Point-Biserial Correlation	Omit Rate %
1	0.64	0.34	0.00
2	0.60	0.34	0.00
3	0.60	0.36	0.00
4	0.74	0.43	0.00
5	0.39	0.31	0.00
6	0.66	0.37	0.00
7	0.65	0.32	0.00

**Table 4.10: Item Statistics for American History, Spring 2010 Operational Administration  
(continued)**

<b>Item</b>	<b><i>p</i>-Value/Mean</b>	<b>Corrected Point-Biserial Correlation</b>	<b>Omit Rate %</b>
8	0.53	0.32	0.00
9	0.63	0.41	0.00
10	0.37	0.12	0.00
16	0.52	0.47	0.00
17	0.59	0.42	0.00
18	0.59	0.18	0.00
19	0.44	0.23	0.00
20	0.55	0.20	0.00
21	0.84	0.15	0.00
22	0.60	0.49	0.00
23	0.51	0.19	0.00
24	0.41	0.18	0.00
25	0.52	0.30	0.00
26	0.47	0.21	0.00
27	0.61	0.31	0.00
28	0.48	0.20	0.00
29	0.35	0.25	0.00
30	0.51	0.30	0.00
31	0.75	0.37	0.00
32	0.62	0.22	0.00
33	0.34	0.25	0.00
34	0.42	0.32	0.00
35	0.55	0.38	0.00
41	0.64	0.40	0.00
42	0.73	0.36	0.00
43	0.32	0.22	0.00
44	0.64	0.45	0.00
45	0.59	0.39	0.00
46	0.65	0.23	0.00
47	0.50	0.41	0.00
48	0.67	0.46	0.00
49	0.51	0.40	0.00
50	0.72	0.44	0.00

### 4.3 Speededness

The consequence of time limits on examinees' scores is called speededness. A test is speeded if examinees taking it score lower than they would have had the test not been timed. Most speededness statistics are based on the number of items that were not attempted by students. For the purpose of this analysis, if a student did not attempt the last item on any of the separately timed subsections of the test, it was assumed that the student might not have reached the item because he or she ran out of time.

The MO EOC Assessments were not designed to be speeded tests. Rather, they were intended to be "power tests"; that is, all students were expected to have ample time to finish all items and prompts.

The last column in Tables 4.1 through 4.10 shows the percentage of students who omitted each selected response item for each MO EOC Assessment. It is clear from the tables that the omit rates are negligible or zero for the majority of items.

### 4.4 Item Bias Statistics

Differential item functioning (DIF) occurs when an item has difficulty measures that vary across contexts for similarly able subgroups of examinees. Using the Spring 2009 standalone field-test data, DIF was examined with the Mantel-Haenszel (MH) procedure (Mantel and Haenszel 1959) for SR items.

The Mantel-Haenszel procedure is a nonparametric approach to DIF. In the MH procedure, total raw scores are held constant while the odds ratio is estimated. In practice, the odds ratio is generally converted to the delta metric, and the Educational Testing Service (ETS) categorization is applied to flag the significance of DIF effects (Dorans and Holland 1993).

With the groups matched on raw score, the comparable examinees can be placed in  $2 \times 2$  tables of group by item response, where  $j$  equals the number of levels of the matching variable. For these analyses,  $j$  equals each observed score category of the  $k$ -item tests, with  $j = 0, 1, 2, \dots, k$ , then one  $2 \times 2$  table for a given item with score category  $j$  can be represented as

	Correct	Incorrect	Total
Reference	$y_j$	$x_j$	$m_j$
Focal	$y'_j$	$x'_j$	$m'_j$
Total	$n_j$	$n'_j$	$N_j$

The Delta MH test statistic and variance have the following form:

$$DeltaMH = 2.35 \ln \frac{\left[ \sum_{j=0}^K \frac{(y_j x'_j - y'_j x_j)}{N_j} \right]}{\sum_{j=0}^K \frac{y'_j x_j}{N_j}},$$

where  $y_j$ ,  $x_j$ ,  $y'_j$ , and  $x'_j$  are the frequency counts of cells of the  $2 \times 2$  tables and  $N_j$  is the total  $n$  for the cells.

The critical values of the ETS categorizations are 1.00 and 1.50 on the delta scale for categories A, B, and C. Specifically, if the absolute value of delta is smaller than 1.00, the item is categorized as A. If the absolute value of delta is larger than or equal to 1.50, the item is classified as C. Otherwise, items are categorized as B. In both the A and C categories, statistical significance is set at the 5% level for a single item.

Results of the DIF analyses for the items contained in the Fall 2009 and Spring 2010 operational administrations (based on Spring 2009 standalone field-test data) are summarized in Table 4.11. Table 4.12 contains DIF statistics for the entire pool of MO EOC Assessment items.

**Table 4.11: Frequency Distribution of DIF Categories for the Fall 2009 and Spring 2010 Operational Assessments**

Test	Group***	Selected Response Items*					
		A**	A-**	B**	B-**	C**	C-**
<b>Fall 2009</b>							
English I	M/F	38	0	1	1	0	0
	W/B	36	0	0	4	0	0
	W/H	37	0	0	2	0	1
Algebra II	M/F	38	0	1	1	0	0
	W/B	37	0	0	3	0	0
	W/H	39	0	0	1	0	0
Geometry	M/F	38	0	1	1	0	0
	W/B	35	0	1	4	0	0
	W/H	38	0	1	1	0	0
Government	M/F	35	0	1	4	0	0
	W/B	36	0	1	3	0	0
	W/H	37	0	1	2	0	0
American History	M/F	35	0	1	4	0	0
	W/B	34	0	3	3	0	0
	W/H	40	0	0	0	0	0

*Note:* Classifications with a negative sign (“-”) favor the reference group, while classifications with no sign favor the focal group.

\*The MH procedure is applied for SR items.

\*\*DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.

\*\*\*DIF contrast groups: M/F, male versus female; W/B, white versus African American; and W/H, white versus Hispanic.

**Table 4.11: Frequency Distribution of DIF Categories for the Fall 2009 and Spring 2010 Operational Assessments (continued)**

Test	Group <sup>***</sup>	Selected Response Items <sup>*</sup>					
		A <sup>**</sup>	A- <sup>**</sup>	B <sup>**</sup>	B- <sup>**</sup>	C <sup>**</sup>	C- <sup>**</sup>
<b>Spring 2010</b>							
English I	M/F	39	0	0	1	0	0
	W/B	37	0	1	2	0	0
	W/H	40	0	0	0	0	0
Algebra II	M/F	39	0	0	1	0	0
	W/B	38	0	0	2	0	0
	W/H	36	0	0	3	0	1
Geometry	M/F	37	0	1	2	0	0
	W/B	35	0	0	5	0	0
	W/H	38	0	1	1	0	0
Government	M/F	39	0	0	1	0	0
	W/B	35	0	1	4	0	0
	W/H	40	0	0	0	0	0
American History	M/F	36	0	0	4	0	0
	W/B	34	0	3	3	0	0
	W/H	39	0	1	0	0	0

*Note:* Classifications with a negative sign (“-”) favor the reference group, while classifications with no sign favor the focal group.

<sup>\*</sup>The MH procedure is applied for SR items.

<sup>\*\*</sup>DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.

<sup>\*\*\*</sup>DIF contrast groups: M/F, male versus female; W/B, white versus African American; and W/H, white versus Hispanic.

**Table 4.12: Frequency Distribution of DIF Categories by Item Type for the Entire Pool of MO EOC Assessment Items (Spring 2009 Field Test)**

Test	Group <sup>***</sup>	Selected Response Items <sup>*</sup>					
		A <sup>**</sup>	A- <sup>**</sup>	B <sup>**</sup>	B- <sup>**</sup>	C <sup>**</sup>	C- <sup>**</sup>
English I	M/F	454	0	22	23	2	3
	W/B	455	0	22	25	1	1
	W/H	488	0	6	7	1	2
Algebra II	M/F	337	0	7	13	0	3
	W/B	324	0	17	19	0	0
	W/H	341	0	8	10	0	1
Geometry	M/F	340	0	7	11	1	1
	W/B	314	0	19	27	0	0
	W/H	348	0	8	3	0	1
Government	M/F	342	0	9	8	1	0
	W/B	322	0	17	20	0	1
	W/H	344	0	9	5	0	2
American History	M/F	338	0	7	15	0	0
	W/B	313	0	24	21	1	1
	W/H	348	0	6	6	0	0

*Note:* Classifications with a negative sign (“-”) favor the reference group, while classifications with no sign favor the focal group.

<sup>\*</sup>The MH procedure is applied for SR items.

<sup>\*\*</sup>DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.

<sup>\*\*\*</sup>DIF contrast groups: M/F, male versus female; W/B, white versus African American; and W/H, white versus Hispanic.

## 4.5 Summary

The item analyses provided in this chapter show that the MO EOC Assessments have sound psychometrics properties. For example, *p*-values show that MO EOC Assessment items measure achievement across a broad range of difficulty. Also, item discrimination values show that most items are appropriately correlated with the total test score and thus contribute to distinguishing between lower-performing and higher-performing students. In addition, very few students omitted items during testing. The low percentage of students omitting SR items provides evidence that the test is a power test of the students’ skills and not a speeded test. Finally, item bias statistics based on data from the Spring 2009 standalone field-test administration shows the items to be generally free from statistical bias.



## CHAPTER 5: TEST ADMINISTRATION

### 5.1 Introduction

This chapter contains information about Department of Elementary and Secondary Education (DESE) and Riverside Publishing processes that ensure the standardized administration of the Missouri End-of-Course (MO EOC) Assessments. The Standards (AERA, APA, and NCME 1999) state that, “For tests designed to assess the examinee’s knowledge, skills, or abilities, standardization helps to ensure that all examinees have the same opportunity to demonstrate their competencies” (p. 61). In other words, careful attention to the details of information dissemination, Test Examiner training, accommodations and modifications, and test security help ensure that students taking the EOC Assessments in different locations have equal opportunities for success.

The *EOC Test Coordinator’s Manual* and *Test Examiner’s Manual* contain detailed information about the testing guidelines, materials handling, and standardized administration instructions for the EOC Assessments. While those manuals are not included here, much of the information contained in this chapter can be found in them.

For the MO EOC Assessments, districts can choose either paper-and-pencil or online delivery format. The *Online Test Examiner’s Manual* contain information specific to the registration for and administration of the online version of the MO EOC Assessments. Relevant information related to the online delivery, where it differs from the paper-and-pencil format, is included in this chapter.

### 5.2 Students for Whom the EOC Assessments Are Appropriate

The responsibility and authority for testing students in the MO EOC Assessments at the appropriate time in the course of instruction belong to the local district. The EOC Assessments are based on Course-Level Expectations (CLEs) rather than on Grade-Level Expectations (GLEs). Therefore, when the content of the CLEs is covered in the local school district’s curriculum, the test may be administered regardless of student grade level or course name.

#### 5.2.1 Students with Individualized Education Programs

A student with disabilities, as classified under the Individuals with Disabilities Education Act (IDEA), has an Individualized Education Program (IEP) that, in part, governs whether a particular assessment is appropriate for the student. In the case of the EOC Assessments, decisions about whether a student with a disability will participate in the assessments are made by the student’s IEP team and are documented in the IEP. All students must take the three Phase I EOC Assessments (English II, Algebra I, and Biology), plus the Government EOC Assessment from Phase II. However, if a student’s disability qualifies him or her to take the MAP-Alternate Assessment (MAP-A), that student will not be required to participate in the EOC Assessment.

#### 5.2.2 Students with Individual Accommodation Programs

Students with Individual Accommodation Programs (IAPs) are considered disabled under Section 504 of the 1973 Rehabilitation Act. These students are not served under IDEA

and are not documented with a particular designation for the EOC Assessment. However, professionals who are knowledgeable about a student's disability and educational needs should make accommodation decisions for the student, as they would for a student with an IEP.

### ***5.2.3 English Language Learner Students***

Students who have been in the United States for 12 months or less at the time of test administration may be exempted by the local school district from taking EOC English assessments.

## **5.3 Students for Whom a School or District Is Accountable**

For accountability purposes, Missouri must include the results for any student who is eligible to take the EOC Assessments and has been enrolled at least one full academic year in a school (for school accountability) or district (for district accountability) without transferring out of the building or district for a significant period of time and re-enrolling. A full academic year is defined as the last Wednesday in September through the EOC Assessment administration. A significant period of time is considered one more than half of the eligible days between the last Wednesday in September and the test administration. DESE obtains enrollment information from the Missouri School Information System (MOSIS) data that are reported by school districts. This rule applies to the building and district summary levels independently. For example, a student who is coded in a building less than a year but was in the district a full academic year is excluded from the building totals but is included in the district totals.

## **5.4 Dissemination of Testing Materials and Information**

Riverside Publishing works with Questar Assessment, a subcontractor for the EOC Assessment program, to gather all enrollment counts and distribute all paper-and-pencil testing materials. Riverside Publishing distributes all password information for the online system. Before the start of the test window, districts enter their enrollment counts and scheduled testing window into ServicePoint, an online enrollment and materials ordering system. From those enrollment counts, Questar generates each district's order. All paper-and-pencil materials are shipped one week before the district's designated testing window. Districts that administer the assessments online receive an e-mail message with password information one week prior to test administration. The District Test Coordinator (DTC) is responsible for inventorying all paper-and-pencil materials, as well as for distributing the online test information to the test administrators. If additional materials are needed, the Test Coordinator is responsible for placing an Additional Materials Order (AMO) through ServicePoint.

## **5.5 District and Test Examiner Training**

DESE is responsible for training the Test Coordinators on EOC test administration. The Regional Instructional Facilitators (RIFs) are first trained by the Assistant Director of Assessment on all information covered in the *Test Coordinator's Manual* and the *Test Examiner's Manual*. The RIFs then conduct training sessions for the districts within their region. The RIFs also provide assistance with test administration and serve as liaisons

between DESE and the districts. Both DESE and Riverside Publishing are available to answer any questions the districts may have about the EOC Assessment administration.

Riverside Publishing provides training to districts that administer the EOC Assessments online. The hour-long training session is conducted via WebEx and gives an overview of both the administrative and student sides of the online system.

## **5.6 Test Security**

The EOC Assessment test books and online assessment are secure. Test Coordinators are instructed to keep the materials in a locked room or cabinet at all times when not in use. No testing materials may be photocopied, duplicated, scanned, or made accessible to personnel who are not responsible for testing. Additionally, written or oral discussion of specific EOC Assessment items breaches the security and integrity of the test. In accordance with the Standards, the *Test Coordinator's Manual* and *Test Examiner's Manual* contain explicit instructions about test security for Test Coordinators and Test Examiners.<sup>5</sup> When the tests are delivered online, Test Examiners do not have access to the student screens for the online assessment, only to the test administrator features. In addition, a secure browser must be installed on each student computer prior to administration of the online assessments. Test items, as well as student responses, are encrypted during transmission to and from student computers.

## **5.7 Test Administration**

### **5.7.1 Test Organization**

Students take the Phase II EOC Assessments in one session. The session contains only selected response (SR) items. Each item consists of a stem followed by four response options. Answers are marked on a separate answer sheet. For the online assessment, the Phase II MO EOC Assessments also comprise one session. For each SR item, the student clicks an answer choice. Students are required to complete the practice tests on the DESE website prior to testing. These practice tests include instructions on how to use the tools in the system and practice questions for the students.

### **5.7.2 Test and Ancillary Materials**

District Test Coordinators or School Test Coordinators are responsible for distributing all EOC Assessment materials to Test Examiners. The materials provided by Riverside Publishing and/or DESE include the following:

- *Test Examiner's Manual* (online and paper-and-pencil)
- *Test Coordinator's Manual*
- Building Identification Sheets
- Group Identification Sheets
- Student barcode labels
- Test books
- Answer sheets

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<sup>5</sup> **Standard 5.7:** Test users have the responsibility of protecting the security of test materials at all times (p. 64).

- Math reference sheets (if applicable)
- Return kit materials

Students need the following additional materials for the paper-and-pencil assessment; these materials are not provided by Riverside Publishing or DESE:

- No. 2 pencils
- Scratch paper

For the online assessment, each student needs a computer with a monitor, a mouse, and a keyboard. Adequate space should be left between workstations. Students can use scratch, grid, or draft paper and a writing utensil while taking the online assessment. The Test Examiner needs the following:

- A computer for logging on to the proctor interface
- A writing board and utensil

Additionally, students taking either the paper-and-pencil or online version may use a four-function calculator for the Algebra II and Geometry assessments. (This is not required.)

### ***5.7.3 Preparing the Classroom and the Students***

The *Test Examiner's Manual* contains specific instructions for teachers and other test administrators regarding how the classroom should be prepared for testing. These include the following:

- Planning for the distribution and collection of materials
- Planning the seating arrangement to prevent students from seeing other students' responses
- Eliminating distractions such as bells and telephones
- Using a "Do Not Disturb" sign on the door
- Removing from students' view any classroom maps, charts, or other materials that relate to the test content
- Making arrangements for students who may not finish testing in the allotted time

Before students begin the assessment using the online system, a representative of the district or school must do the following:

- Read the entire *Online Test Examiner's Manual*
- Run a system check on each workstation used for testing
- Ensure that the MO EOC browser is downloaded to each workstation for test delivery
- Read the frequently asked questions from the link on the Test Examiner's login page
- Input identification information for students who were not included in the MOSIS precode file
- Contact Riverside Publishing if any changes need to be made to the student roster
- Create a test session immediately before testing

Additionally, while students await proctor approval, the Test Examiner must set and verify class information and set students' testing status codes and/or accommodations information in the online system.

The *Test Examiner's Manual* and *Online Test Examiner's Manual* explain some ways teachers may prepare their students for testing, including the following:

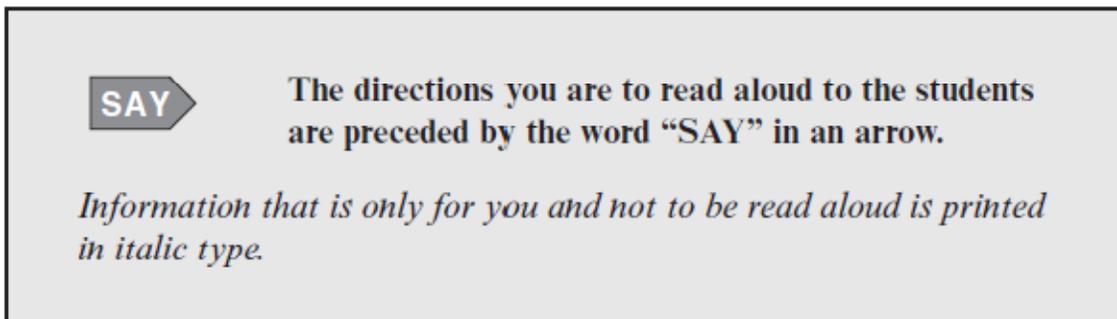
- Helping students approach the testing with a relaxed, positive attitude
- Encouraging and motivating students to do their best work
- Explaining test strategies, such as skipping harder items and coming back to them later
- Reassuring students that they will be given ample time to do their best work

Students are NOT allowed to use electronic devices, such as cellular phones, digital cameras, gaming devices, or scanners during the testing session. However, students may use four-function calculators during the Algebra II and Geometry test sessions.

#### 5.7.4 Directions for Administration

In accordance with Standard 5.1,<sup>6</sup> specific standardized directions for administration are printed in the *Test Examiner's Manual*. Directions that are to be read aloud to the students are printed in **bold** type and have a callout arrow in the margin for clarity. Information for the teacher that should not be read aloud is in *italic* type. Figure 5.1 provides an example of the type styles used in the *Test Examiner's Manual* to differentiate between spoken and unspoken instructions. Figure 5.2 provides an example of a script from the English I EOC Assessment. Figure 5.3 provides an example of a script from the online English I EOC Assessment.

**Figure 5.1: Examples of Type Styles Used to Differentiate Between Spoken and Unspoken Instructions in the *Test Examiner's Manual***



<sup>6</sup> **Standard 5.1:** Test administrators should follow carefully the standardized procedures for administration and scoring specified by the test developer, unless the situation or a test taker's disability dictates that an exception should be made (p. 63).

Figure 5.2: Example Script from the *Test Examiner’s Manual* for the English I EOC Assessment

**Teacher Directions:**

*Distribute the test books and answer sheets. Make sure each student has the correct answer sheet if barcode labels were affixed before testing. Have the students write their name on the line provided on the front cover of the test book. Before administering the test, take a moment to have the students look through the test book.*

*Students may NOT use a dictionary, grammar handbook, or thesaurus for English I. Ensure that all students use a non-mechanical No. 2 pencil.*

*Instruct students to bubble in the appropriate test window (Fall, Spring, Summer) on the Student Information Sheet located on the back of the answer sheet.*

*For students testing in Spring 2010 only, please fill in the FORM letter that corresponds to the student’s Test Book. The FORM letter must be included or scoring the assessment will be negatively impacted.*

**SAY**

**For the questions on this test, you will select an answer from a list of given choices. Do not write ANY answers in the test book. Remember to fill in the circle on the answer sheet that goes with the answer you chose. Your score on these questions will depend on how well you follow directions and show your understanding of what you read. You may choose to look over the questions before reading the passage. Read the passage and then answer the questions.**

**SAY**

**Open your test book to page 1 and read the directions. When you have finished reading the directions, turn to page 2.**

*Check to see that all students are on the correct page in their test books.*

**SAY**

**When you come to the word “STOP,” you have finished. You may go back over the test and check your answers. When you have finished checking your answers, close your test book and sit quietly until everyone has finished. Do you have any questions?**

*When you are sure that all students understand the directions, continue.*

**Figure 5.3: Example Script from the *Online Test Examiner’s Manual* for the Online English I EOC Assessment**

 For the questions in this session, you will select an answer from a list of given choices. Remember to check that the circle that goes with the answer you chose is filled in after you click it. Your score on these questions will depend on how well you follow directions and show your understanding of what you read. You may choose to look over the questions before reading the passage. You may NOT use a dictionary, thesaurus, or grammar handbook during this session of the test. See the Help button for instructions on how to use the system tools.

There are several important things to remember:

1. Read each question carefully and think about the answer. Then choose the one answer that you think is best.
2. If you do not know the answer to a question, mark it for review, skip it, and go on. You may return to it later.
3. When you finish the test, you may check over your work.

When you have finished checking your answers, click the End button, Exit the browser, and sit quietly until everyone has finished. Are there any questions?

## 5.8 Accommodations and Modifications

A student’s IEP team has the responsibility and authority to determine individual accommodations to support and ensure his or her participation in the EOC Assessments. Allowable accommodations are intended to assist the student by reducing the effects of his or her disability without reducing performance expectations. Allowable accommodations for the EOC Assessments include the following:

- A student may receive a modified version of the testing materials, such as the Braille or Large Print edition.
- A teacher may present the test content to a student in a nonstandard way, such as by reading it aloud in English or in the student’s native language, paraphrasing it, or using sign language. For the Phase II, English I Assessment, this will result in the lowest obtainable scale score (LOSS).
- A student may be allowed additional time to complete one or more sessions of the assessment.
- A student may use an assistive communicative device.
- A student may be tested individually or in a small group.
- A student may be allowed to use a computer, another word-processing device, or a teacher scribe to record his or her responses.
- A student may use other assistive materials such a calculator (on the Algebra II Assessment) or a bilingual dictionary.

*Modifications* are alterations in the test that change construct-related requirements. The resulting information may not be equal to the information that might be obtained without modifications. While modifications invalidate the use of student scores for No Child Left Behind Act (NCLB) accountability determinations, the following modifications for the EOC Assessments can be provided:

- Oral reading of the assessment, including paraphrasing questions
- Oral reading in native language
- Use of a bilingual dictionary for the English I Assessment

As noted above, the modifications listed may result in the lowest obtainable scale score (LOSS) on the EOC Assessments. For more information on accommodations and modifications and their effects on the interpretation of the EOC Assessment scores, see the Appendix to the *Test Examiner’s Manual*.

In accordance with Standard 5.2,<sup>7</sup> Test Examiners indicate an accommodation, when allowed by a student’s IEP and used for the EOC Assessment, by filling in the bubble corresponding to the accommodation on page 1 of the answer sheet.

Table 5.1 contains information about the percentage of students who received each type of allowable accommodation for each EOC Assessment. The most prevalent type of accommodation across all five Phase II EOC Assessments was testing in a small group (provided to between 0.92% and 4.99% of students across assessments).

**Table 5.1: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the EOC Assessments**

Accommodation	English I		Algebra II		Geometry		Government		Am. History	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Braille	4	0.01	0	0.00	1	0.00	4	0.01	5	0.01
Large Print	18	0.04	1	0.00	9	0.03	18	0.05	5	0.01
Oral Reading	12	0.03	78	0.34	177	0.62	1,197	3.06	721	2.10
Oral Reading— Blind/Partial Sight	1	0.00	0	0.00	2	0.01	30	0.08	16	0.05
Signing of Assessment	0	0.00	7	0.03	4	0.01	7	0.02	5	0.01
Paraphrasing	1	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Other Administrations	2	0.00	2	0.01	0	0.00	4	0.01	0	0.00
Oral Reading in Native Language	0	0.00	3	0.01	5	0.02	8	0.02	7	0.02
Extended Time	725	1.66	118	0.52	309	1.08	797	2.04	609	1.77
Administered Using More Than Allotted Periods	306	0.70	22	0.10	74	0.26	248	0.63	199	0.58
Other Timing	14	0.03	4	0.02	7	0.02	23	0.06	19	0.06
Use of Scribe	64	0.15	3	0.01	9	0.03	58	0.15	33	0.10

<sup>7</sup> **Standard 5.2:** Modifications or disruptions of standardized test administration procedures or scoring should be documented (p. 63).

**Table 5.1: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the EOC Assessments (continued)**

Accommodation	English I		Algebra II		Geometry		Government		Am. History	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Use of Calculator, Math Tables, etc.	32	0.07	58	0.25	142	0.50	61	0.16	38	0.11
Using Bilingual Dictionary	0	0.00	4	0.02	18	0.06	21	0.05	42	0.12
Other Response	7	0.01	1	0.00	0	0.00	3	0.01	2	0.01
Testing Individually	126	0.29	22	0.10	24	0.08	165	0.42	90	0.26
Testing in Small Group	1,833	4.20	211	0.92	538	1.89	1,948	4.99	1,410	4.10
Other Setting	97	0.22	10	0.04	14	0.05	71	0.18	106	0.31

## 5.9 Materials Handling and Return

The *Test Coordinator's Manual* and *Test Examiner's Manual* contain detailed instructions for how schools and districts should collect and package the paper-and-pencil testing materials at the end of the test administration. For Test Examiners, these activities include, but are not limited to, the following:

- Collecting test books and answer sheets from the students
- Counting the test books and answer sheets and comparing the number to the totals from pretesting
- Returning all used and unused test books and answer sheets to the Test Coordinator
- Collecting all scratch paper used during testing
- Properly handling all contaminated test books (i.e., books having contact with bodily fluids such as blood or with any potentially hazardous material)
- Verifying that the barcode labels are affixed properly to the answer sheets
- Verifying that the information contained on the Student Information Sheet (SIS) is accurate and complete

For School Test Coordinators, these activities include, but are not limited to, the following:

- Collecting testing materials from the Test Examiners
- Counting all test books and verifying against the pretesting total
- Completing Group Identification Sheet for each class
- Verifying that the Building Identification Sheets are correct or completing new Building Identification Sheets if incorrect
- Returning all answer sheets and test books (scorable and nonscorable) to the District Test Coordinator
- Destroying all unused answer sheets and other nonsecure testing materials

After receiving the answer sheets and scorable and nonscorable test books from the School Test Coordinators, District Test Coordinators complete the following steps:

- Verify 100% return of test books
- Complete the Test Book Accountability Form and fax it to Riverside Publishing
- Verify that each group of scorable materials is accompanied by a Group Identification Sheet
- Verify that Group Identification Sheets are used consistently for session scorables

For the online system, the student needs to click the End button once he or she has finished testing to submit the test for scoring. No additional information is needed from the Test Examiner after the student has completed the test. All demographic information is edited or added by the test administrator before the student starts the assessment.

### **5.10 Summary**

The distribution, administration, and collection of the EOC Assessments are carefully communicated and executed in the detailed *Test Examiner's Manual* and *Test Coordinator's Manual*. All standards related to test security, administration, and accommodations are adhered to throughout the process. The most important steps and procedures have been covered in this chapter. Readers interested in further detail should consult the *Test Examiner's Manual* and *Test Coordinator's Manual* for the EOC Assessments.

## CHAPTER 6: SCANNING, SCORING, AND QUALITY CONTROL PROCEDURES

### 6.1 Introduction

This chapter describes the processes used to scan and score and to ensure quality control for the Missouri End-of-Course (MO EOC) Assessments. The Phase II EOC Assessment forms contained only selected response (SR) items and were processed and scored by Riverside Publishing. Sections 6.2 through 6.4 of this chapter describe the Riverside Publishing scanning, scoring, and quality control processes for the SR items.

### 6.2 Quality Control Overview

Riverside Publishing adheres to the guidelines listed in the SCASS/TILSA *Quality Control Checklist for Processing, Scoring, and Reporting* provided by the Council of Chief State School Officers (2003). Quality assurance in processing, scoring, and reporting is the highest consideration in all stages of score report delivery. Additionally, Standard 5.8<sup>8</sup> of the Standards (AERA, APA, and NCME 1999) specifically addresses the issue of quality control in the scoring process. To comply with this standard, Riverside Publishing employed a set of checks at each stage in the process of scoring and reporting the SR items to ensure a zero error rate for the MO EOC Assessments. Riverside Publishing documented the various quality control procedures through a variety of reports and checklists during both the preproduction and post-production phases. Documentation took the form of issues logs and quality audit reports.

### 6.3 Preparation and Materials Check-In

#### 6.3.1 Preparation for Processing

Before any MO EOC Assessment answer documents were processed for the field test or operational testing, Riverside Publishing programming staff conducted a complete check of scanning programs using the program specifications and a transfer file. A test set of documents was gridded to include all response ranges, ID ranges, blanks, double grids, all correct responses, all incorrect responses, and other scenarios, depending on the specified scoring rules. These mock data were then processed through the scanning program, the editing programs, and the scoring system. The resulting file was thoroughly hand checked to ensure that the machine was scanning correctly, that the pre-edit program was picking up the proper errors, that the post-edit program was accepting corrections properly, and that the scoring system was applying the answer keys correctly. If any errors were found in the programs, the programmer was notified to make the corrections, and quality control checks were run again.

Once the programs were found to be functioning correctly, a batch of live data was processed. This pilot run involved test results from one Missouri district. The resulting data file was put through the same quality control procedures described above, and documents were hand checked against the transfer file created. Riverside Publishing

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<sup>8</sup> **Standard 5.8:** Test scoring services should document the procedures that were followed to assure accuracy of scoring. The frequency of scoring errors should be monitored and reported to users of the service on reasonable request. Any systematic source of scoring errors should be corrected (p. 64).

quality control staff checked and verified the live data. All quality control checks were completed successfully before the rest of the live documents were released for processing. This procedure ensured that the scanning programs were accurate and reliable.

When the MO EOC Assessment documents were first checked in at the Riverside Scoring Service<sup>®</sup> (RSS), they were issued a barcode number and a color-coded sheet that included vital information about the school. The documents were put into barcoded containers that were scanned at each stage of processing to constantly track the location of a client's documents in the Scoring Center.

Next, RSS staff checked that document counts matched the Return Packing Form and that all submitted materials were complete and included fully completed header sheets. If not, the documents were tagged to alert the Scoring Project Manager and Riverside Publishing Customer Service that resolution was necessary.

### ***6.3.2 Materials Check-In***

When a shipment of MO EOC Assessment documents was delivered to the Riverside Publishing Scoring Center, the arrival date, time, carrier type, and number of boxes delivered was immediately recorded in the RSS database, thus starting the clock for processing and delivering score reports. As an additional quality step, one of Riverside Publishing's trained receiving clerks hand counted the boxes and entered the number into the RSS tracking system. Any discrepancies were entered into the alert system for resolution.

Box contents (answer sheets) were verified against the order for Scoring Services forms, and any discrepancies were entered into the RSS alert resolution system. Each order was issued a unique barcoded number that enabled the order to be tracked as it was processed through the RSS.

## **6.4 Materials Scanning**

All documents were scanned using Scan Optics 9000M scanners, which use four mounted cameras (two on top and two on the bottom) to capture both the grayscale and the bitonal images of each page. As each document was scanned, a Print After Scan (PAS) number was printed on the edge of the document. The first six digits in the PAS number were identical to the numbers identifying the container in which the documents moved through the Scoring Center. The last digits represented the order of the document in the stack. The PAS number was used by RSS staff to identify the location of an answer document in the processing system. The scanner read preprinted codes at the top of the page to determine which document code should be used for editing and scoring. Image scanners captured the entire test page as if it were a photocopy.

### ***6.4.1 Handling of Unscannable Documents***

The scanner is programmed to detect anchor points and zones to capture the image. Occasionally, a page cannot be scanned and is automatically sent by the scanner to the rejection bin. When this occurs, the scanner stops. The scanning operator follows procedures to either scan the document correctly or insert an Unscannable Document Header along with the document or page that is unscannable. Some reasons that a

document might be unscannable include manipulation during the test administration or pages missing or removed from the answer document before it was submitted for scoring. Photocopied documents are also unscannable.

#### ***6.4.2 Resolution of n-Count Discrepancies***

Throughout the scanning of the MO EOC Assessment documents, the scanning station was monitored to ensure that images were gathered for all answer documents submitted with each school's or district's materials. A Scan Integrity Report compared the scanned *n*-count with the expected *n*-count on each Group/Class Header Sheet. Any discrepancies were logged into the system and resolved through a physical check of the documents before the container passed to the next station. If a resolution could not be reached, the order was entered into the alert system.

#### ***6.4.3 Application of Editing Rules***

Riverside Publishing has numerous quality control procedures in place to ensure the accuracy of the scanning of the MO EOC Assessment answer documents. The scoring process applied editing rules to each document as it completed the scanning stage. The editing rules identified conflicts caused either by the student or by the scanner. Examples of these conflicts are double marks, excessive omits, or light marks. Based on these rules, documents were placed in the editing queue for an editor to resolve the conflicts. To ensure that the scanners and the editing rules were working properly, a small percentage of documents from each batch was randomly selected to go to editing, even without any mistakes or errors. If an issue could not be resolved in the editing process, an alert was sent, and a Riverside Publishing alerts specialist contacted the MO EOC Assessments program manager, who worked with the particular school or district to resolve the issue as soon as possible.

Documents that could not be read by the scanner (for instance, because the images were too light, pages were bent, etc.) were manually entered. In these instances, the first editor manually key-entered the student responses. A different editor then manually keyed the student responses a second time. The second editor was not able to see the work of the first editor. Upon completion of the two separate key entries, the system notified the second editor if there were differences in the two entries. If discrepancies were identified, the document was reviewed to determine the correct response.

### **6.5 Summary**

Quality assurance in processing, scoring, and reporting is the highest consideration in all stages of score report delivery. To comply with Standard 5.8 of the Standards, Riverside Publishing employed a set of checks at each stage in the process of scoring and reporting the SR items to ensure a zero error rate for the MO EOC Assessments. Riverside Publishing documented the various quality control procedures through a variety of reports and checklists during both the preproduction and post-production phases. Documentation took the form of issues logs and quality audit reports.



## CHAPTER 7: SCALING AND EQUATING

### 7.1 Introduction

This chapter details the scaling and equating procedures implemented by Riverside Publishing for the 2010 Missouri End-of-Course (MO EOC) Assessments. A pre-equating model (Kolen and Brennan, 2004) was used to produce equated forms for each EOC Assessment. The equating methods described in this chapter will serve to maintain consistency of the EOC Assessments score scales over time and ensure that the achievement levels are applied consistently from year to year.

This chapter begins with an overview of the equating design. Then the item response theory (IRT) model used for equating is described, and the model assumptions are examined. This is followed by a description of the steps used to carry out the scaling and equating for the 2009–2010 operational assessments.

### 7.2 Item Response Theory

WINSTEPS software (Linacre, 2006b) was used to accomplish the scaling and equating for the Missouri EOC Assessments. WINSTEPS is designed to produce a single scale by jointly analyzing data from students' responses. Items were calibrated using the Rasch model (Rasch, 1960; Wright and Stone, 1979).

Rasch scaling is “a method for obtaining objective, fundamental, linear measures from stochastic observations of ordered category responses” (Linacre 2006a, p. 10). One feature of the Rasch model that distinguishes it from classical test theory is the placement of estimates of a person's ability and the item difficulty on the same scale. The Rasch model expresses the probability of a correct response to an item as a function of the ability of the person and the difficulty of the item. In the Rasch model, the probability of a correct response to item  $i$ , given  $\theta$ , is

$$P_i(\theta) = \frac{e^{(\theta-b_i)}}{1 + e^{(\theta-b_i)}},$$

where  $\theta$  = latent trait, or ability, level and  $b_i$  = the difficulty parameter for item  $i$ .

### 7.3 Scaling and Equating

IRT pre-equating involves scaling item parameters and equating test forms based on field-test (FT) data before the forms are administered operationally. Note, however, that for the 2009–2010 year, the forms were pre-equated retroactively (after the Spring 2010 operational administration) to allow for a one-time recentering of the pools using Spring 2010 operational data. The approach used for pre-equating the EOC Assessments is described in the following steps:

1. Calibrate all 2009 standalone field-test forms concurrently without constraint.
2. Establish the base scale through calibration of the Spring 2010 operational forms without constraint.
3. Examine the stability of the common items from the two calibrations (i.e., the operational form items).
4. Recenter the 2009 item bank to the 2010 base scale.
5. Place the 2010 embedded field test (EFT) items onto the 2010 operational scale.

#### 7.3.1 Step 1: Concurrent Calibration of 2009 Field-Test Forms

Table 7.1 shows the number of field-test forms and their composition for the Spring 2009 standalone field test. For each content area, forms contained only selected response (SR) items and were spiraled within each classroom. Assuming randomly equivalent groups, the complete pool of items for each content area was concurrently calibrated using the WINSTEPS software program, placing all items on a common scale.

**Table 7.1: Spring 2009 Standalone Field Test**

Assessment	Number of Forms	Number of Items Per Form
English I	14	36
Algebra II	10	36
Geometry	10	36
Government	10	36
American History	10	36

#### 7.3.2 Step 2: Establishing the Base Scale

Three operational forms were constructed for the 2009–2010 test administrations. The forms were built to be consistent with the test blueprint using classical and IRT item statistics from the initial concurrent calibration. Figures 7.1 to 7.5 show the test characteristic curves (TCCs) for the three operational forms (Fall, Spring, and Summer) for each content area. The TCCs generally show the three forms to be similar across the full range of ability. In fact, all differences were within 5% of the range of test scores.

Figure 7.1: TCCs for Three Operational Forms for English I

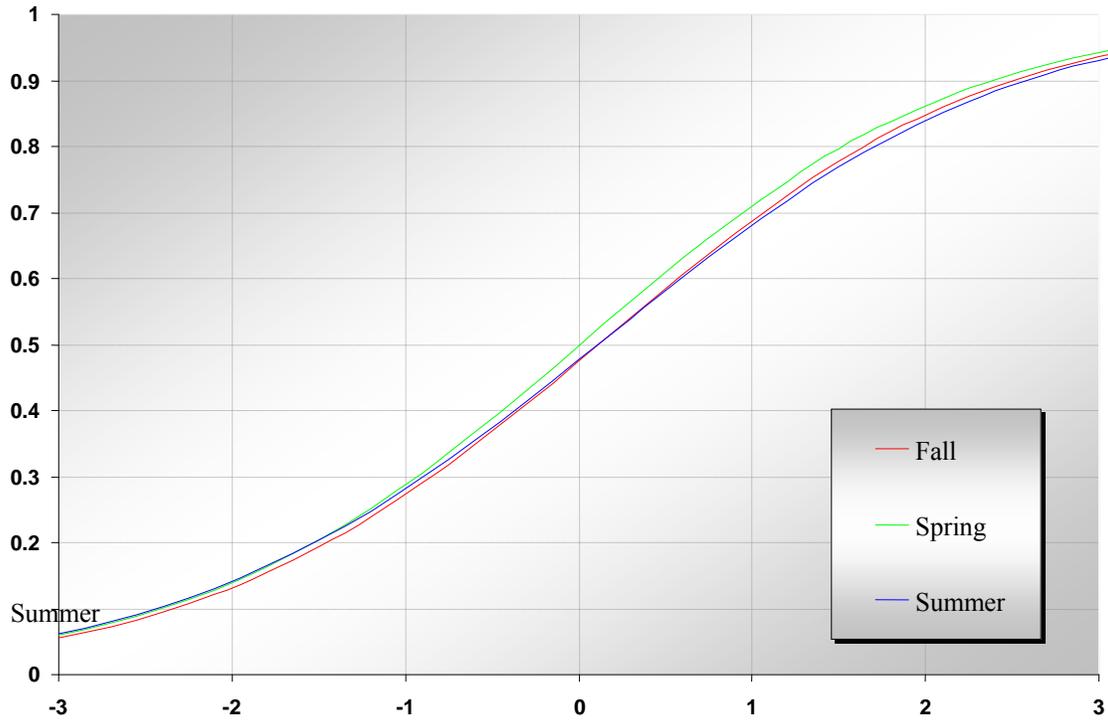


Figure 7.2: TCCs for Three Operational Forms for Algebra II

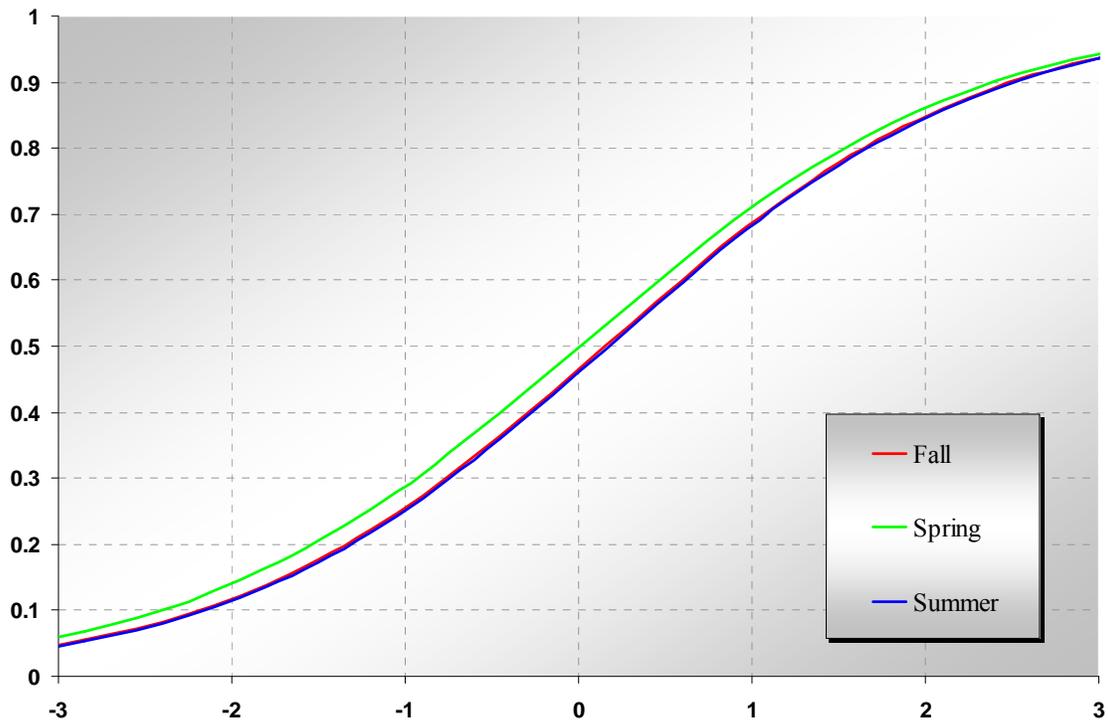


Figure 7.3: TCCs for Three Operational Forms for Geometry

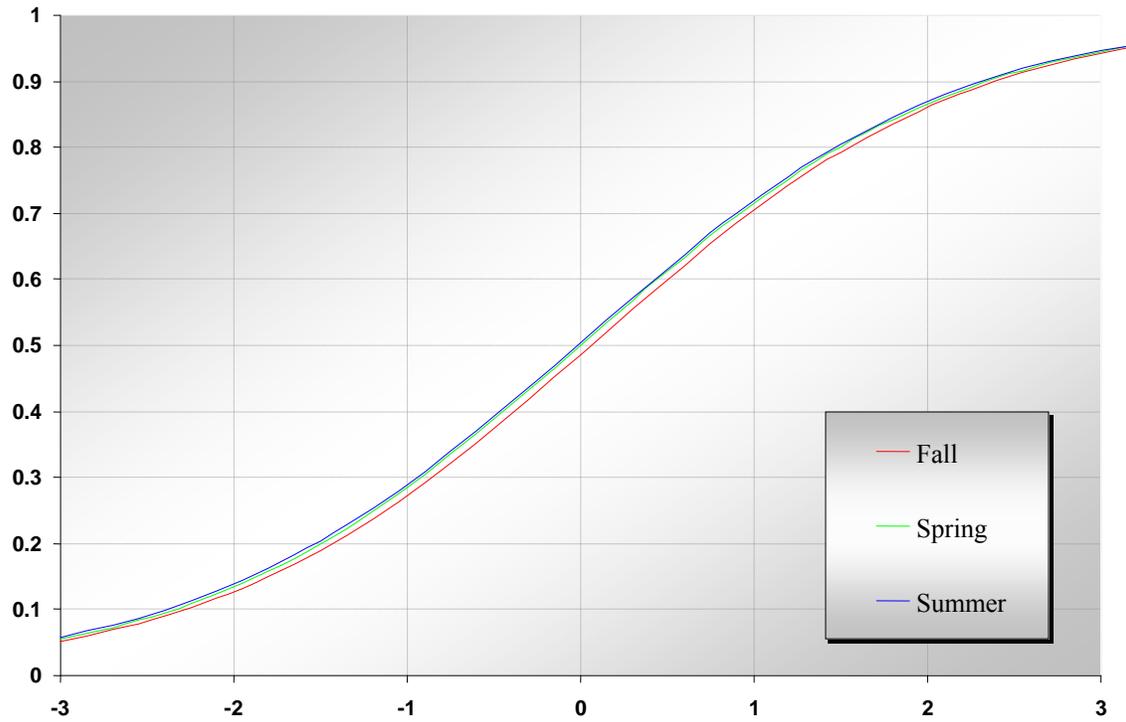
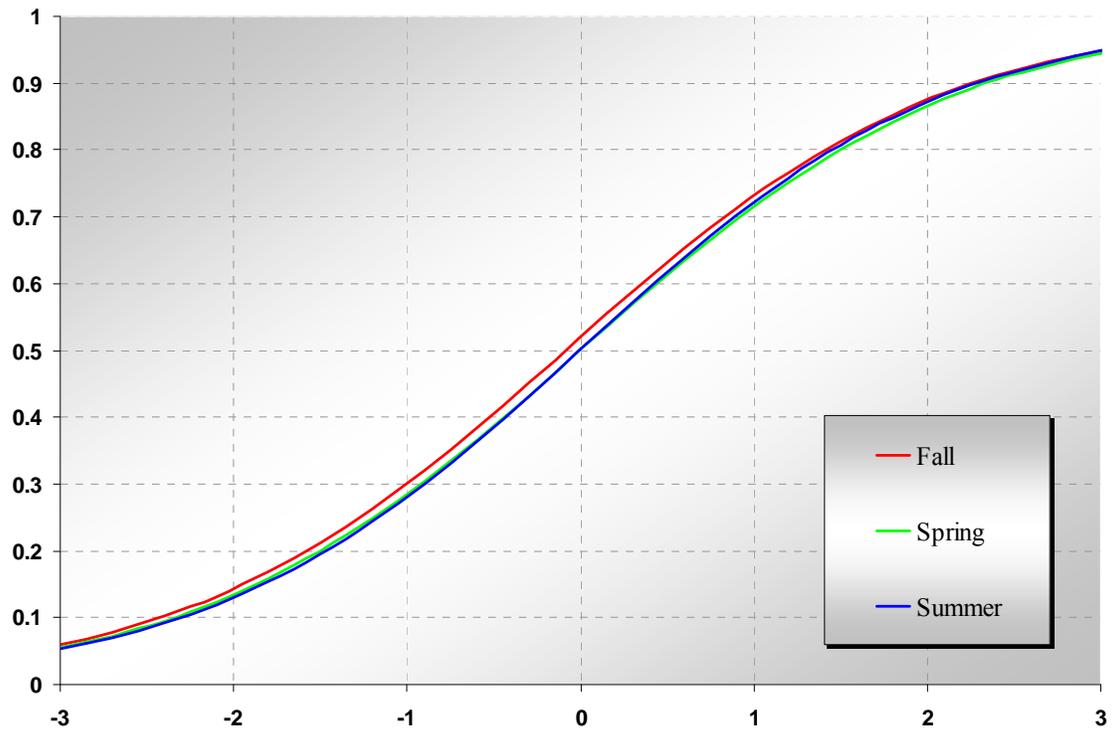
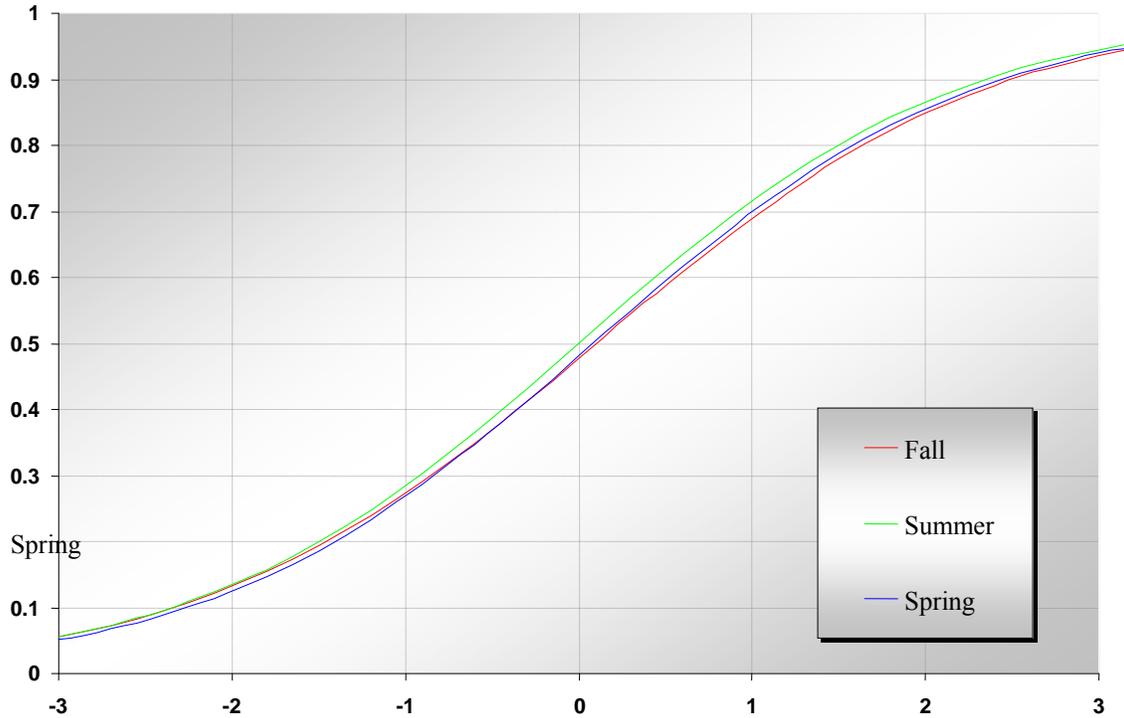


Figure 7.4: TCCs for Three Operational Forms for Government



**Figure 7.5: TCCs for Three Operational Forms for American History**



The three forms were used for the Fall 2009, Spring 2010, and Summer 2010 administrations. The Spring 2010 form also contained new items embedded for field testing. No field-test items were included on the Fall and Summer forms due to the small sample sizes participating in those administrations. However, the Fall and Summer forms each contained one set of 12 additional items for English I and 10 additional items for the remaining subjects, making the test length the same across all three administrations. Table 7.2 shows the composition of the operational tests.

**Table 7.2: Operational Test Design for Core Assessments**

Content	Number of items	
	OP	EFT
English I	40	12
Algebra II	40	10
Geometry	40	10
Government	40	10
American History	40	10

OP = operational items; EFT = embedded field test items

To establish the base scale for each content area test, calibrations of the Spring 2010 operational forms were executed freely, without constraint. These calibrations had to be performed before a complete set of data was available. Tables 7.3 through 7.7 provide a comparison of the calibration set and complete set of data for the Spring 2010 operational test forms. Inspection of these tables shows that the demographics for the calibration samples were very similar to the census, or complete set of data.

**Table 7.3: Comparison of the Calibration and Census Data for the Spring 2010 Operational Test Forms, English I**

	English I				
	Calibration Sample		Census Data		Difference (calibration minus census)
	N	%	N	%	
<b>All Students</b>	39,825		42,317		
<b>Gender</b>					
Male	20,297	50.99	21,410	50.81	0.18
Female	19,509	49.01	20,730	49.19	-0.18
<b>Race/Ethnicity</b>					
White	33,695	84.67	34,827	82.66	2.01
Black	4,076	10.24	4,936	11.72	-1.47
Hispanic	1,242	3.12	1,515	3.60	-0.48
Asian	567	1.42	632	1.50	-0.08
Native American	216	0.54	221	0.52	0.02

**Table 7.4: Comparison of the Calibration and Census Data for the Spring 2010 Operational Test Forms, Algebra II**

	Algebra II				
	Calibration Sample		Census Data		Difference (calibration minus census)
	N	%	N	%	
<b>All Students</b>	20,490		21,824		
<b>Gender</b>					
Male	9,439	46.08	9,982	45.90	0.18
Female	11,044	53.92	11,766	54.10	-0.18
<b>Race/Ethnicity</b>					
White	16,907	82.57	17,474	80.37	2.20
Black	2,567	12.54	3,067	14.11	-1.57
Hispanic	571	2.79	717	3.30	-0.51
Asian	316	1.54	367	1.69	-0.14
Native American	116	0.57	117	0.54	0.03

**Table 7.5: Comparison of the Calibration and Census Data for the Spring 2010 Operational Test Forms, Geometry**

	Geometry				
	Calibration Sample		Census Data		Difference (calibration minus census)
	<i>N</i>	%	<i>N</i>	%	
<b>All Students</b>	25,112		26,858		
<b>Gender</b>					
Male	11,999	47.80	12,771	47.75	0.05
Female	13,101	52.20	13,974	52.25	-0.05
<b>Race/Ethnicity</b>					
White	20,120	80.17	20,884	78.10	2.07
Black	3,623	14.44	4,224	15.80	-1.36
Hispanic	822	3.28	1,048	3.92	-0.64
Asian	390	1.55	435	1.63	-0.07
Native American	143	0.57	150	0.56	0.01

**Table 7.6: Comparison of the Calibration and Census Data for the Spring 2010 Operational Test Forms, Government**

	Government				
	Calibration Sample		Census Data		Difference (calibration minus census)
	<i>N</i>	%	<i>N</i>	%	
<b>All Students</b>	35,856		36,930		
<b>Gender</b>					
Male	18,053	50.38	18,550	50.46	-0.09
Female	17,783	49.62	18,210	49.54	0.09
<b>Race/Ethnicity</b>					
White	30,026	83.78	30,589	83.21	0.58
Black	3,992	11.14	4,263	11.60	-0.46
Hispanic	1,034	2.89	1,106	3.01	-0.12
Asian	582	1.62	597	1.62	0.00
Native American	203	0.57	207	0.56	0.00

**Table 7.7: Comparison of the Calibration and Census Data for the Spring 2010 Operational Test Forms, American History**

	American History				
	Calibration Sample		Census Data		Difference (calibration minus census)
	N	%	N	%	
<b>All Students</b>	30,578		32,636		
<b>Gender</b>					
Male	15,329	50.18	16,295	50.13	0.05
Female	15,220	49.82	16,209	49.87	-0.05
<b>Race/Ethnicity</b>					
White	25,894	84.77	26,838	82.58	2.19
Black	3,118	10.21	3,820	11.75	-1.55
Hispanic	978	3.20	1,198	3.69	-0.48
Asian	390	1.28	475	1.46	-0.18
Native American	165	0.54	167	0.51	0.03

Table 7.8 provides a comparison of classical item statistics for the item pool, based on 2009 field-test data, and for the Fall 2009, Spring 2010, and Summer 2010 operational forms, based on the Spring 2010 operational test administration for each content area. The comparison includes the percentage of items with  $p$ -values less than 0.3 and point-biserial correlations less than 0.1. Items with values below these criteria are typically considered low performing and are excluded from operational forms. However, such items may be included if the item pool is limited or if content considerations justify keeping an item. For example, an item may have poor field-test statistics because of examinee motivational issues or because content is not currently being taught. Examination of the summary statistics in Table 7.8 generally supports test development efforts in selecting the highest-quality items for inclusion in each operational form. Summary statistics for the Spring 2010 operational administration are provided in Table 7.9.

**Table 7.8: Comparison of 2009 Item Pool with 2009–2010 Operational Test Forms**

Subject	Item Set	% $p$ -Value < 0.3	% Point-Biserial < 1.0
English I	Phase II FT	3.4%	6.9%
	Fall	0.0%	0.0%
	Spring	0.0%	2.5%
	Summer	0.0%	0.0%
Algebra II	Phase II FT	16.1%	20.0%
	Fall	2.5%	0.0%
	Spring	0.0%	2.5%
	Summer	2.5%	5.0%
Geometry	Phase II FT	10.3%	13.3%
	Fall	0.0%	0.0%
	Spring	0.0%	0.0%
	Summer	0.0%	0.0%

**Table 7.8: Comparison of 2009 Item Pool with 2009–2010 Operational Test Forms (continued)**

Subject	Item Set	% <i>p</i> -Value < 0.3	% Point-Biserial < 1.0
Government	Phase II FT	8.6%	9.7%
	Fall	0.0%	2.5%
	Spring	0.0%	0.0%
	Summer	0.0%	0.0%
American History	Phase II FT	9.4%	20.8%
	Fall	0.0%	0.0%
	Spring	0.0%	0.0%
	Summer	0.0%	0.0%

**Table 7.9: Summary Statistics for the Spring 2010 Operational Administration**

Content	Total Items	Total Points	Minimum	Maximum	Mean (Raw Score)	<i>SD</i> (Raw Score)
English I	40	40	1	40	24.98	7.334
Algebra II	40	40	1	40	22.24	7.239
Geometry	40	40	1	40	23.69	7.391
Government	40	40	1	40	24.36	7.871
American History	40	40	1	40	22.45	7.237

Because the Rasch model is the basis of all scoring and scaling analyses associated with the EOC Assessments, the utility of the results from the Spring 2010 administration depends on the degree to which the assumptions of the model are met, as well as the degree to which the test data fit the model. The assumptions of the Rasch model are that (1) the data are unidimensional and (2) the data have the quality of local independence, meaning that responses to one item do not depend on responses to another item. The sections that follow address these assumptions and include evaluations of the dimensionality and local independence of the data, as well as fit indices.

### 7.3.2.1 Assessing Unidimensionality of the Data

WINSTEPS provides a residual-based, unrotated principal components analysis (PCA) that can be used to assess the unidimensionality assumption of the Rasch model. The purpose of the analysis is to reveal contrasts between opposing factors by showing the variance explained by factors not accounted for by the Rasch model. That is, the Rasch dimension is removed first, and the residual variance is then analyzed. Consequently, with this analysis, one does not want to identify a second dimension that accounts for a practically significant amount of residual variance.

Ideally, additional factors will be at the “noise” level, implying that there are no other shared dimensions in the data. Because the WINSTEPS standardized residuals are modeled to have unit normal distributions, which are independent, a PCA of these residuals should look similar to a PCA of random normal deviates. Simulation studies (such as Smith and Miao, 1994) indicate that the largest component in a set of random normal deviates would have an eigenvalue of about 1.4, which represents a small percentage of variance explained (i.e., less than 5%).

Table 7.10 shows the results of the PCA for the Spring 2010 operational form for each content area. For each analysis, the secondary dimension has an eigenvalue representing fewer than two items (less than 5% of the total variance) and, therefore, is of little practical importance.

**Table 7.10: Results of the PCA for the Spring 2010 Operational Tests**

<b>Content</b>	<b>Total Units (Items)</b>	<b>Second Dimension Eigenvalue</b>	<b>Second Dimension % of Total Variance Explained</b>	<b>% of Unexplained Variance</b>	<b>Second Dimension % of Unexplained Variance</b>
English I	40	1.6	4.1	65.4	2.7
Algebra II	40	1.6	3.9	65.1	2.6
Geometry	40	1.6	4.1	58.1	2.4
Government	40	1.7	4.1	64.2	2.7
American History	40	1.7	4.4	71.1	3.1

### 7.3.2.2 Assessing Local Independence of the Data

Based on the PCA, WINSTEPS also provides standardized residual correlations that can be used to assess the local independence assumption of the Rasch model. The purpose of the analysis is to detect dependency between pairs of items. Figures 7.6 to 7.10 provide screen shots from WINSTEPS Table 23.99 (Linacre, 2006b) for each content area from the Spring 2010 operational test administration. Results of these analyses generally support the assumption of local independence. More specifically, values for standardized residual correlations were generally low (i.e., had absolute values below 0.10), indicating little dependency between pairs of items.

**Figure 7.6: Standardized Residual Correlations from the Spring 2010 Administration for English I**

```

TABLE 23.99 MO EOC Spring 2010 Phase II English I Loc EngI.OUT Oct 27 16:53 2010
INPUT: 39825 PERSONS  52 ITEMS  MEASURED: 39825 PERSONS  40 ITEMS  2 CATS  3.64.2
-----
LARGEST STANDARDIZED RESIDUAL CORRELATIONS
USED TO IDENTIFY DEPENDENT ITEMS
-----+
RESIDUL| ENTRY          | ENTRY          |
CORRELN|NUMBER ITEM      |NUMBER ITEM      |
-----+-----+-----+
.15 | 41 100082935 | 43 100083198 |
.13 | 39 100083339 | 41 100082935 |
.08 | 39 100083339 | 43 100083198 |
-----+-----+-----+
-.09 | 37 100082717 | 52 100082518 |
-.08 | 35 100083840 | 36 100083846 |
-.08 | 6 100083425  | 37 100082717 |
-.08 | 6 100083425  | 29 100083847 |
-.08 | 29 100083847 | 52 100082518 |
-.08 | 7 100083423  | 29 100083847 |
-.08 | 30 100083843 | 37 100082717 |
-----+-----+-----+

```

**Figure 7.7: Standardized Residual Correlations from the Spring 2010 Administration for Algebra II**

```

TABLE 23.99 MO EOC Spring 2010 Phase II Algebra II Lo Alg2.OUT Oct 27 16:54 2010
INPUT: 20490 PERSONS  50 ITEMS  MEASURED: 20490 PERSONS  40 ITEMS  2 CATS  3.64.2
-----
LARGEST STANDARDIZED RESIDUAL CORRELATIONS
USED TO IDENTIFY DEPENDENT ITEMS
-----+
RESIDUL| ENTRY          | ENTRY          |
CORRELN|NUMBER ITEM    |NUMBER ITEM    |
-----+-----+-----+
.11 | 18 100081455 | 27 100081001 |
.09 | 25 100080755 | 34 100082279 |
.08 | 27 100081001 | 32 100081231 |
.07 | 2 100081442  | 32 100081231 |
-----+-----+-----+
-.11 | 43 100080575 | 44 100081200 |
-.10 | 20 100080606 | 21 100082090 |
-.09 | 6 100082174  | 34 100082279 |
-.08 | 4 100081208  | 6 100082174  |
-.08 | 30 100082120 | 34 100082279 |
-.08 | 3 100082102  | 46 100082108 |
-----+-----+-----+

```

**Figure 7.8: Standardized Residual Correlations from the Spring 2010 Administration for Geometry**

```

TABLE 23.99 MO EOC Spring 2010 Phase II Geometry Loca Geom.OUT Oct 27 16:54 2010
INPUT: 25112 PERSONS  50 ITEMS  MEASURED: 25112 PERSONS  40 ITEMS  2 CATS  3.64.2
-----
LARGEST STANDARDIZED RESIDUAL CORRELATIONS
USED TO IDENTIFY DEPENDENT ITEMS
-----+
RESIDUL| ENTRY          | ENTRY          |
CORRELN|NUMBER ITEM    |NUMBER ITEM    |
-----+-----+-----+
.16 | 2 100080848  | 8 100080850  |
.10 | 3 100080502  | 19 100080894 |
-----+-----+-----+
-.10 | 8 100080850  | 21 100081710 |
-.10 | 5 100082148  | 21 100081710 |
-.09 | 2 100080848  | 46 100082382 |
-.08 | 8 100080850  | 30 100080539 |
-.08 | 8 100080850  | 47 100081007 |
-.08 | 5 100082148  | 30 100080539 |
-.08 | 8 100080850  | 46 100082382 |
-.08 | 2 100080848  | 21 100081710 |
-----+-----+-----+

```

**Figure 7.9: Standardized Residual Correlations from the Spring 2010 Administration for Government**

```

TABLE 23.99 MO EOC Spring 2010 Phase II Government Lo Govt.OUT Oct 27 16:55 2010
INPUT: 35856 PERSONS  50 ITEMS  MEASURED: 35856 PERSONS  40 ITEMS  2 CATS  3.64.2
-----
LARGEST STANDARDIZED RESIDUAL CORRELATIONS
USED TO IDENTIFY DEPENDENT ITEMS
-----+
RESIDUL| ENTRY          | ENTRY          |
CORRELN|NUMBER ITEM    |NUMBER ITEM    |
-----+-----+
.16 |    9 100081163 |    19 100080740 |
.08 |    9 100081163 |    16 100080952 |
-----+-----+
-.11 |    4 100081116 |    48 100080969 |
-.10 |    4 100081116 |    9 100081163 |
-.09 |    4 100081116 |    19 100080740 |
-.08 |   34 100081738 |    48 100080969 |
-.08 |   29 100081656 |    48 100080969 |
-.08 |   46 100081806 |    48 100080969 |
-.08 |    9 100081163 |   43 100081961 |
-.08 |    4 100081116 |    16 100080952 |
-----+-----

```

**Figure 7.10: Standardized Residual Correlations from the Spring 2010 Administration for American History**

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TABLE 23.99 MO EOC Spring 2010 Phase II History Local Hist.OUT Oct 27 16:56 2010
INPUT: 30578 PERSONS  50 ITEMS  MEASURED: 30578 PERSONS  40 ITEMS  2 CATS  3.64.2
-----
LARGEST STANDARDIZED RESIDUAL CORRELATIONS
USED TO IDENTIFY DEPENDENT ITEMS
-----+
RESIDUL| ENTRY          | ENTRY          |
CORRELN|NUMBER ITEM    |NUMBER ITEM    |
-----+-----+
.14 |   19 100081110 |   45 100081327 |
-----+-----+
-.09 |    4 100081397 |   10 100081287 |
-.09 |   10 100081287 |   22 100080574 |
-.09 |   10 100081287 |   48 100080826 |
-.08 |    4 100081397 |   26 100080849 |
-.08 |   10 100081287 |   16 100080873 |
-.08 |   16 100080873 |   46 100081124 |
-.08 |    4 100081397 |   28 100080683 |
-.08 |   28 100080683 |   48 100080826 |
-.08 |   18 100081502 |   48 100080826 |
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### ***7.3.2.3 Assessing Data Fit to the Model***

WINSTEPS provides two statistics for indicating how well the data fit the Rasch model. Infit (inlier-sensitive or information-weighted fit) is sensitive to aberrations in item response patterns at the examinee's ability level. High infit statistics indicate unexpected responses to items that are well targeted to the examinee's ability. Low infit statistics, while not a threat to measurement, may indicate over-fit of the data to the model (resulting in Guttman-like patterns) that may result in artificially inflated reliability statistics. Outfit (outlier-sensitive fit) is sensitive to outliers (in other words, to aberrant responses to items with difficulty far from a person's ability). High outfit values may indicate lucky guessing or careless mistakes. Relatively speaking, extremely high infit values are believed to be a greater threat to the measurement process than extreme outfit values.

Infit and outfit can be expressed as a mean square (MS) statistic or on a standardized metric ( $z$ ). Both should be considered because they provide different perspectives: MS values are more oriented toward practical significance, while standardized values are more oriented toward statistical significance. Fit statistics expressed as mean squares (statistically, a chi-square statistic divided by its degrees of freedom) show the degree of practical distortion in the measurement. The expected value is 1.0, with values less than 1.0 indicating overfitting items (too predictable) and values greater than 1.0 indicating underfitting items (unpredictability, too much noise). Rules of thumb regarding "practically significant" MS fit values vary. Wright and Linacre (1994) suggest that reasonable MS fit values range from 0.8 to 1.2 for SR items. Others believe that reasonable test results can be achieved with values from 0.5 to 1.5. Riverside Publishing has typically considered values outside the range of 0.7 to 1.3 to be outside the range of acceptable fit.

Fit statistics expressed as  $z$ -scores (standardized unit normal deviates) offer a means to statistically test model fit. Standardized fit statistics show the degree of statistical improbability in the data (i.e., its significance) if the data actually do fit the model. The expected value of standardized fit statistics is 0.0, with values significantly less than 0.0 indicating too much predictability and values significantly greater than 0.0 indicating lack of predictability. Also,  $z$ -scores may be affected by sample sizes. For example, in a large sample, the test of interest might show a statistically significant difference. In practice, the difference might not be important.

Tables 7.11 to 7.15 provide summary statistics, including summary fit statistics, for the Spring 2010 operational test calibrations, which were used to establish the base scale for the EOC Assessments. The evaluation of fit values, specifically MS infit, yielded these results: Infit values for English I ranged from 0.87 to 1.20, values for Algebra II ranged from 0.89 to 1.15, values for Geometry ranged from 0.83 to 1.27, values for Government ranged from 0.79 to 1.27, and values for American History ranged from 0.86 to 1.18. The fit values and output files are based on the local runs using WINSTEPS version 3.6.4 (Linacre, 2006b). Tables 7.16 to 7.20 provide Rasch difficulties and item fit statistics.

**Table 7.11: Summary Statistics for the Spring 2010 Operational Test Calibrations for English I**

Statistic	Rasch Difficulty Estimate	<i>p</i> -value	Infit		Outfit		Point-Biserial
			<i>MS</i>	Standardized	<i>MS</i>	Statistic	
# of Items	40	40	40	40	40	40	40
Mean	0.00	0.63	1.00	-1.61	0.98	-1.47	0.34
<i>SD</i>	0.72	0.13	0.09	8.78	0.15	8.84	0.09
Minimum	-1.98	0.34	0.87	-9.90	0.64	-9.90	0.14
Percentiles							
10	-0.93	0.44	0.90	-9.90	0.83	-9.90	0.20
25	-0.35	0.55	0.93	-9.90	0.87	-9.90	0.28
50	0.09	0.62	0.97	-6.02	0.96	-6.50	0.36
75	0.45	0.70	1.06	9.90	1.07	9.61	0.40
90	0.97	0.79	1.14	9.90	1.20	9.90	0.45
Maximum	1.44	0.91	1.20	9.90	1.28	9.90	0.49

**Table 7.12: Summary Statistics for the Spring 2010 Operational Test Calibrations for Algebra II**

Statistic	Rasch Difficulty Estimate	<i>p</i> -value	Infit		Outfit		Point-Biserial
			<i>MS</i>	Standardized	<i>MS</i>	Standardized	
# of Items	40	40	40	40	40	40	40
Mean	0.00	0.56	1.00	-0.49	1.00	0.06	0.32
<i>SD</i>	0.73	0.14	0.06	7.13	0.09	7.15	0.06
Minimum	-1.53	0.29	0.89	-9.90	0.80	-9.90	0.16
Percentiles							
10	-0.87	0.36	0.92	-9.90	0.89	-9.90	0.23
25	-0.47	0.47	0.96	-6.57	0.94	-6.54	0.28
50	0.13	0.54	1.00	-0.24	1.01	0.79	0.32
75	0.44	0.66	1.03	6.36	1.07	5.88	0.35
90	0.97	0.73	1.08	9.90	1.11	9.90	0.40
Maximum	1.36	0.83	1.15	9.90	1.21	9.90	0.44

**Table 7.13: Summary Statistics for the Spring 2010 Operational Test Calibrations for Geometry**

Statistic	Rasch Difficulty Estimate	<i>p</i> -value	Infit		Outfit		Point-Biserial
			<i>MS</i>	Standardized	<i>MS</i>	Statistic	
# of Items	40	40	40	40	40	40	40
Mean	0.00	0.60	1.00	-0.82	1.00	-0.05	0.34
<i>SD</i>	0.89	0.17	0.09	7.54	0.15	7.86	0.09
Minimum	-1.64	0.21	0.83	-9.90	0.73	-9.90	0.08
Percentiles							
10	-1.12	0.39	0.89	-9.90	0.80	-9.90	0.24
25	-0.67	0.46	0.95	-8.59	0.92	-8.44	0.30
50	0.05	0.60	1.00	-0.62	0.99	-1.82	0.34
75	0.69	0.73	1.04	5.55	1.09	9.36	0.40
90	1.07	0.80	1.11	9.90	1.15	9.90	0.44
Maximum	2.12	0.86	1.27	9.90	1.43	9.90	0.51

**Table 7.14: Summary Statistics for the Spring 2010 Operational Test Calibrations for Government**

Statistic	Rasch Difficulty Estimate	<i>p</i> -value	Infit		Outfit		Point-Biserial
			<i>MS</i>	Standardized	<i>MS</i>	Statistic	
# of Items	40	40	40	40	40	40	40
Mean	0.00	0.61	1.00	-0.63	1.00	-0.40	0.36
<i>SD</i>	0.62	0.12	0.10	8.65	0.14	8.28	0.09
Minimum	-1.21	0.41	0.79	-9.90	0.69	-9.90	0.13
Percentiles							
10	-0.76	0.44	0.89	-9.90	0.83	-9.90	0.27
25	-0.48	0.51	0.94	-9.90	0.89	-9.35	0.30
50	-0.05	0.63	0.99	-2.50	1.00	0.15	0.35
75	0.52	0.70	1.06	9.90	1.11	9.90	0.41
90	0.88	0.75	1.12	9.90	1.17	9.90	0.47
Maximum	1.05	0.82	1.27	9.90	1.37	9.90	0.57

**Table 7.15: Summary Statistics for the Spring 2010 Operational Test Calibrations for American History**

Statistic	Rasch Difficulty Estimate	<i>p</i> -value	Infit		Outfit		Point-Biserial
			<i>MS</i>	Standardized	<i>MS</i>	Statistic	
# of Items	40	40	40	40	40	40	40
Mean	0.00	0.56	1.00	-0.70	1.00	-0.49	0.31
<i>SD</i>	0.62	0.12	0.09	8.69	0.13	8.75	0.10
Minimum	-1.63	0.32	0.86	-9.90	0.79	-9.90	0.11
Percentiles							
10	-0.84	0.39	0.88	-9.90	0.84	-9.90	0.19
25	-0.38	0.50	0.93	-9.90	0.91	-9.90	0.22
50	-0.13	0.59	1.00	-1.09	1.00	-0.71	0.32
75	0.32	0.64	1.07	9.90	1.12	9.90	0.39
90	0.84	0.73	1.12	9.90	1.16	9.90	0.43
Maximum	1.21	0.84	1.18	9.90	1.29	9.90	0.48

**Table 7.16: Item Statistics for the Spring 2010 Operational Test Calibrations for English I**

Item Number	Item Type	Rasch Difficulty Estimate	N	MS Infit	Standardized Infit	MS Outfit	Standardized Outfit
1	SR	-1.3956	39811	0.90	-9.90	0.74	-9.90
2	SR	-0.6399	39809	0.93	-9.90	0.86	-9.90
3	SR	0.3593	39804	1.13	9.90	1.17	9.90
4	SR	-0.8964	39809	0.93	-9.65	0.87	-9.90
5	SR	-1.2006	39811	0.97	-3.32	1.04	2.96
6	SR	0.1967	39808	1.20	9.90	1.28	9.90
7	SR	0.3054	39807	1.18	9.90	1.25	9.90
8	SR	-1.9762	39808	0.88	-9.52	0.64	-9.90
9	SR	-0.3833	39808	1.11	9.90	1.21	9.90
10	SR	-1.3200	39809	0.94	-6.90	0.89	-7.16
11	SR	0.0920	39809	0.99	-1.38	1.01	1.47
12	SR	0.6556	39806	1.02	4.65	1.02	3.36
13	SR	0.1465	39810	1.01	2.83	1.01	1.71
14	SR	-0.5039	39808	0.93	-9.90	0.88	-9.90
15	SR	0.4834	39810	1.14	9.90	1.18	9.90
16	SR	1.0580	39811	0.97	-7.47	0.99	-1.12
29	SR	0.9608	39808	0.89	-9.90	0.87	-9.90
30	SR	1.4378	39809	1.16	9.90	1.26	9.90
31	SR	-0.3286	39809	0.99	-1.90	0.95	-5.83
32	SR	0.1502	39810	0.93	-9.90	0.90	-9.90
33	SR	0.5709	39808	1.08	9.90	1.10	9.90
34	SR	0.5039	39807	1.10	9.90	1.13	9.90
35	SR	0.0798	39809	0.98	-5.13	0.95	-7.89
36	SR	0.1548	39808	1.11	9.90	1.16	9.90
37	SR	-0.3048	39808	0.88	-9.90	0.79	-9.90
38	SR	-0.6072	39808	0.93	-9.90	0.86	-9.90
39	SR	0.0861	39804	0.90	-9.90	0.86	-9.90
40	SR	-0.0458	39803	0.92	-9.90	0.88	-9.90
41	SR	-0.0398	39804	0.87	-9.90	0.82	-9.90
42	SR	-0.1524	39803	1.05	9.18	1.04	5.27
43	SR	-0.3417	39808	0.90	-9.90	0.85	-9.90
44	SR	1.0289	39808	1.03	6.12	1.05	7.72
45	SR	0.5862	39809	0.96	-9.01	0.96	-7.88
46	SR	0.2307	39807	0.95	-9.90	0.93	-9.90
47	SR	-0.1086	39810	0.93	-9.90	0.90	-9.90
48	SR	0.4361	39808	1.04	9.90	1.05	8.50
49	SR	-0.1746	39808	0.96	-8.26	0.92	-9.90
50	SR	1.1192	39805	1.02	5.20	1.06	9.51
51	SR	-0.4773	39808	0.91	-9.90	0.83	-9.90
52	SR	0.2545	39809	1.14	9.90	1.20	9.90

**Table 7.17: Item Statistics for the Spring 2010 Operational Test Calibrations for Algebra II**

Item Number	Item Type	Rasch Difficulty Estimate	N	MS Infit	Standardized Infit	MS Outfit	Standardized Outfit
1	SR	-0.1882	20466	0.98	-4.49	0.96	-3.90
2	SR	-1.0812	20466	1.01	1.43	1.11	6.36
3	SR	-0.1088	20466	0.93	-9.90	0.89	-9.90
4	SR	0.4120	20466	1.09	9.90	1.11	9.90
5	SR	-1.5292	20465	0.98	-1.40	1.12	5.34
6	SR	-0.4679	20463	0.91	-9.90	0.86	-9.90
7	SR	-0.4696	20463	0.97	-5.58	0.93	-6.07
8	SR	0.3892	20464	1.12	9.90	1.17	9.90
9	SR	-0.2054	20466	0.97	-5.45	0.94	-6.61
10	SR	-0.0183	20465	1.03	6.49	1.07	7.47
16	SR	-1.4977	20463	1.00	0.24	1.11	5.01
17	SR	0.9853	20464	1.04	5.26	1.05	5.65
18	SR	-0.7837	20465	0.94	-8.56	0.91	-6.51
19	SR	-0.8425	20466	0.98	-2.32	0.96	-2.98
20	SR	-0.1494	20465	1.04	7.76	1.05	5.62
21	SR	0.2881	20465	1.02	4.06	1.02	1.97
22	SR	-0.4692	20464	1.04	6.71	1.09	7.46
23	SR	0.5696	20466	0.94	-9.90	0.94	-7.76
24	SR	1.0514	20465	1.05	6.56	1.08	8.46
25	SR	-0.0837	20464	1.03	6.32	1.03	3.66
26	SR	0.9663	20463	0.96	-6.14	0.96	-4.20
27	SR	-1.4854	20463	0.91	-7.87	0.80	-9.90
28	SR	0.4058	20464	0.97	-5.36	0.96	-4.81
29	SR	0.6459	20466	1.03	5.96	1.05	5.72
30	SR	-0.6569	20465	0.96	-5.44	0.94	-4.85
31	SR	1.3606	20465	1.09	9.90	1.15	9.90
32	SR	-0.7378	20465	0.89	-9.90	0.84	-9.90
33	SR	0.2795	20466	0.90	-9.90	0.88	-9.90
34	SR	0.0531	20466	1.01	0.97	0.98	-2.35
35	SR	0.2259	20466	1.00	-0.43	1.01	1.32
41	SR	-0.4284	20466	0.92	-9.90	0.90	-9.52
42	SR	0.2527	20460	1.15	9.90	1.21	9.90
43	SR	-0.5280	20464	0.98	-3.00	0.99	-0.98
44	SR	1.1885	20462	1.00	0.32	1.03	3.27
45	SR	0.2424	20466	0.96	-8.61	0.94	-7.79
46	SR	0.2144	20463	1.08	9.90	1.10	9.90
47	SR	0.5188	20466	1.00	-0.05	1.00	0.25
48	SR	0.5422	20466	1.02	2.80	1.02	2.83
49	SR	0.8043	20465	0.94	-9.71	0.93	-9.11
50	SR	0.3354	20466	1.05	9.71	1.07	9.43

**Table 7.18: Item Statistics for the Spring 2010 Operational Test Calibrations for Geometry**

Item Number	Item Type	Rasch Difficulty Estimate	N	MS Infit	Standardized Infit	MS Outfit	Standardized Outfit
1	SR	-0.6577	25070	0.98	-2.18	0.99	-0.52
2	SR	-0.6541	25068	0.85	-9.90	0.77	-9.90
3	SR	-1.1856	25069	0.88	-9.90	0.75	-9.90
4	SR	-0.5380	25069	0.95	-8.38	0.93	-5.61
5	SR	-0.7843	25068	0.85	-9.90	0.76	-9.90
6	SR	-1.4586	25068	0.95	-4.33	0.92	-3.60
7	SR	-0.9609	25070	0.96	-4.75	0.91	-5.58
8	SR	-0.6126	25068	0.83	-9.90	0.73	-9.90
9	SR	-0.8342	25069	0.94	-7.81	0.87	-9.31
10	SR	0.6845	25068	0.99	-1.92	1.00	-0.43
16	SR	0.8564	25070	0.92	-9.90	0.92	-9.90
17	SR	-0.3062	25069	1.01	1.63	0.97	-2.91
18	SR	-0.2183	25069	1.00	0.74	1.02	2.41
19	SR	-0.6096	25069	0.89	-9.90	0.80	-9.90
20	SR	-0.7819	25069	0.92	-9.90	0.84	-9.90
21	SR	0.0319	25067	1.27	9.90	1.43	9.90
22	SR	-1.6370	25069	1.03	2.58	1.15	5.92
23	SR	-1.3667	25069	0.99	-1.06	1.07	3.48
24	SR	-0.4611	25070	1.01	0.84	0.97	-2.13
25	SR	-1.1131	25068	1.03	2.79	1.15	8.36
26	SR	0.1683	25069	0.96	-8.05	0.93	-8.51
27	SR	-0.7225	25070	0.98	-2.79	0.96	-3.08
28	SR	0.2777	25065	0.95	-9.90	0.93	-8.42
29	SR	-0.0839	25068	1.05	8.77	1.10	9.90
30	SR	1.5519	25070	1.17	9.90	1.34	9.90
31	SR	0.0616	25068	1.00	0.24	0.98	-2.02
32	SR	1.1880	25067	1.00	-0.17	1.03	3.15
33	SR	1.1779	25069	0.94	-9.22	0.98	-2.30
34	SR	0.0953	25066	1.00	0.42	0.99	-1.62
35	SR	0.9121	25070	0.93	-9.90	0.90	-9.90
41	SR	0.7258	25070	1.05	9.47	1.08	9.81
42	SR	1.0628	25066	1.04	7.09	1.08	9.21
43	SR	0.3219	25068	1.08	9.90	1.10	9.90
44	SR	0.6177	25069	1.05	9.90	1.08	9.90
45	SR	0.4112	25070	0.96	-6.99	0.96	-5.78
46	SR	0.6539	25068	1.11	9.90	1.14	9.90
47	SR	0.7605	25069	1.12	9.90	1.17	9.90
48	SR	2.1171	25067	1.05	5.04	1.26	9.90
49	SR	0.7622	25068	1.11	9.90	1.15	9.90
50	SR	0.5474	25069	1.03	4.99	1.06	7.65

**Table 7.19: Item Statistics for the Spring 2010 Operational Test Calibrations for Government**

Item Number	Item Type	Rasch Difficulty Estimate	N	MS Infit	Standardized Infit	MS Outfit	Standardized Outfit
1	SR	0.1269	35757	1.11	9.90	1.16	9.90
2	SR	-0.1356	35758	0.96	-8.04	0.95	-5.88
3	SR	-0.2627	35757	1.03	6.53	1.05	5.51
4	SR	0.7774	35758	1.27	9.90	1.37	9.90
5	SR	0.5263	35758	1.08	9.90	1.10	9.90
6	SR	-0.9780	35757	0.92	-9.90	0.81	-9.90
7	SR	-0.6879	35755	0.94	-9.90	0.89	-9.04
8	SR	-0.0242	35757	1.05	9.90	1.04	4.72
9	SR	1.0453	35757	0.79	-9.90	0.75	-9.90
10	SR	-0.3737	35758	0.96	-6.68	0.92	-7.68
16	SR	0.2590	35758	0.88	-9.90	0.83	-9.90
17	SR	-0.7565	35755	0.94	-8.85	0.89	-9.20
18	SR	0.1736	35758	1.05	9.90	1.04	4.96
19	SR	1.0018	35757	0.82	-9.90	0.80	-9.90
20	SR	-1.1050	35757	0.98	-2.84	1.02	1.08
21	SR	-1.2140	35756	0.95	-5.60	0.92	-4.82
22	SR	0.0945	35758	0.91	-9.90	0.87	-9.90
23	SR	-0.7984	35756	1.02	2.60	1.02	1.65
24	SR	-0.2505	35756	0.93	-9.90	0.87	-9.90
25	SR	-0.5955	35758	1.00	0.22	1.00	-0.05
26	SR	0.8950	35758	1.12	9.90	1.17	9.90
27	SR	-0.2134	35756	0.89	-9.90	0.83	-9.90
28	SR	-0.4741	35757	0.98	-3.40	1.05	4.35
29	SR	0.9891	35755	1.12	9.90	1.17	9.90
30	SR	-0.2267	35757	1.07	9.90	1.18	9.90
31	SR	0.1382	35754	0.99	-2.03	0.98	-2.70
32	SR	-0.0846	35754	0.99	-2.15	0.97	-3.06
33	SR	0.5816	35754	1.14	9.90	1.18	9.90
34	SR	0.8751	35757	1.12	9.90	1.17	9.90
35	SR	0.1113	35756	0.94	-9.90	0.93	-9.57
41	SR	0.5215	35757	1.06	9.90	1.06	9.47
42	SR	-0.5641	35755	1.01	2.47	1.01	0.72
43	SR	-0.3817	35755	1.04	7.86	1.13	9.90
44	SR	0.3003	35758	0.91	-9.90	0.87	-9.90
45	SR	0.8722	35757	1.08	9.90	1.12	9.90
46	SR	0.7853	35758	1.12	9.90	1.16	9.90
47	SR	0.3169	35757	0.97	-7.25	0.95	-7.28
48	SR	-0.4919	35755	0.82	-9.90	0.69	-9.90
49	SR	-0.5342	35754	0.95	-8.10	1.00	0.35
50	SR	-0.2389	35758	0.95	-9.81	0.92	-9.28

**Table 7.20: Item Statistics for the Spring 2010 Operational Test Calibrations for American History**

Item Number	Item Type	Rasch Difficulty Estimate	N	MS Infit	Standardized Infit	MS Outfit	Standardized Outfit
1	SR	-0.3904	30559	0.98	-4.91	0.97	-3.87
2	SR	-0.1664	30558	0.98	-3.84	0.97	-4.25
3	SR	-0.1470	30558	0.97	-7.18	0.94	-8.65
4	SR	-0.9185	30557	0.88	-9.90	0.79	-9.90
5	SR	0.8304	30559	1.00	0.98	1.02	2.28
6	SR	-0.5065	30558	0.95	-9.90	0.94	-7.01
7	SR	-0.4506	30559	0.99	-1.60	0.99	-1.09
8	SR	0.1599	30557	1.00	-0.58	1.00	-0.33
9	SR	-0.2907	30556	0.92	-9.90	0.88	-9.90
10	SR	0.9512	30558	1.18	9.90	1.25	9.90
16	SR	0.2358	30559	0.88	-9.90	0.85	-9.90
17	SR	-0.1502	30557	0.92	-9.90	0.88	-9.90
18	SR	-0.1149	30558	1.12	9.90	1.18	9.90
19	SR	0.5970	30557	1.09	9.90	1.13	9.90
20	SR	0.0625	30559	1.12	9.90	1.15	9.90
21	SR	-1.6272	30557	1.05	4.81	1.29	9.90
22	SR	-0.1575	30559	0.86	-9.90	0.81	-9.90
23	SR	0.2767	30557	1.12	9.90	1.16	9.90
24	SR	0.7518	30559	1.13	9.90	1.17	9.90
25	SR	0.2177	30558	1.02	5.32	1.02	3.92
26	SR	0.4653	30557	1.10	9.90	1.12	9.90
27	SR	-0.2126	30556	1.01	2.72	1.01	2.06
28	SR	0.4333	30558	1.11	9.90	1.14	9.90
29	SR	1.0423	30559	1.05	9.67	1.09	9.90
30	SR	0.2388	30558	1.02	5.05	1.02	3.27
31	SR	-0.9839	30559	0.93	-9.64	0.89	-9.31
32	SR	-0.2831	30557	1.08	9.90	1.14	9.90
33	SR	1.1009	30555	1.05	8.79	1.11	9.90
34	SR	0.6910	30559	1.00	0.53	1.01	1.58
35	SR	0.0928	30559	0.96	-9.27	0.94	-9.90
41	SR	-0.3818	30559	0.93	-9.90	0.88	-9.90
42	SR	-0.8593	30558	0.94	-9.05	0.91	-8.16
43	SR	1.2084	30557	1.07	9.90	1.14	9.90
44	SR	-0.3774	30557	0.89	-9.90	0.84	-9.90
45	SR	-0.1355	30557	0.94	-9.90	0.91	-9.90
46	SR	-0.4042	30556	1.07	9.90	1.11	9.90
47	SR	0.2773	30557	0.93	-9.90	0.91	-9.90
48	SR	-0.5150	30557	0.87	-9.90	0.81	-9.90
49	SR	0.2750	30557	0.93	-9.90	0.92	-9.90
50	SR	-0.8356	30558	0.88	-9.90	0.80	-9.90

### 7.3.2.4 Establish Scaling Transformations

Total scores for the EOC Assessments were reported in scale scores with a range of 100–250. A scale score of 200 represents the cut point between Basic and Proficient, and a scale score of 225 represents the cut point between Proficient and Advanced. The scale score ranges are displayed in Table 7.21.

**Table 7.21: Scale Score Ranges for EOC Assessment Achievement Levels**

EOC Assessment	Achievement Level	Scale Score Range
English I	Below Basic	100 to 176
	Basic	177 to 199
	Proficient	200 to 224
	Advanced	225 to 250
Algebra II	Below Basic	100 to 181
	Basic	182 to 199
	Proficient	200 to 224
	Advanced	225 to 250
Geometry	Below Basic	100 to 181
	Basic	182 to 199
	Proficient	200 to 224
	Advanced	225 to 250
Government	Below Basic	100 to 178
	Basic	179 to 199
	Proficient	200 to 224
	Advanced	225 to 250
American History	Below Basic	100 to 181
	Basic	182 to 199
	Proficient	200 to 224
	Advanced	225 to 250

To produce these scale score ranges, linear transformations were applied to theta estimates and scale scores. The following formula was used to obtain the slopes and intercepts for the transformation functions:

$$sc(y) = \left[ \frac{sc(y_2) - sc(y_1)}{\theta_2 - \theta_1} \right] y + \left\{ (sc(y_1) - \left[ \frac{sc(y_2) - sc(y_1)}{\theta_2 - \theta_1} \right] \theta_1) \right\},$$

where  $\theta_1$  and  $\theta_2$  are person parameter estimates that correspond to the cut score points, and  $sc(y_1)$  and  $sc(y_2)$  are scale score points. This formula was adopted from Kolen and Brennan (2004, p, 337). For the Spring 2010 base scale,  $sc(y_1)$  was 200 and  $sc(y_2)$  was 225. Slopes and intercepts of the transformation functions are summarized in Table 7.22. These same slopes and intercepts will be applied to all future forms for each content area.

**Table 7.22: Summary of Slopes and Intercepts of Theta to Scale Score Transformation Functions by Content Area**

	Basic			Proficient			Advanced			Slope	Intercept
	Raw Score	Theta	Scale Score	Raw Score	Theta	Scale Score	Raw Score	Theta	Scale Score		
English I	16	-0.44	177	25	0.58	200	33	1.70	225	22.24	187.17
Algebra II	16	-0.45	182	24	0.46	200	33	1.71	225	20.06	190.76
Geometry	17	-0.36	182	24	0.47	200	32	1.60	225	22.12	189.57
Government	15	-0.56	179	25	0.56	200	34	1.86	225	19.11	189.37
Am. History	19	-0.11	182	25	0.56	200	32	1.49	225	26.64	185.19

In addition to the above scaling transformation, the following rules were applied for the Fall 2009 operational tests:

- The raw score cut (e.g., for Proficient) was selected as the lowest raw score associated with a rounded scale score of 200. The same strategy was also followed for a scale score of 225.
- If there was no raw score associated with a rounded scale score of 200, the raw score with the highest scale score below 200 was selected as the cut score and assigned a scale score of 200. For example, if two consecutive raw scores were associated with rounded scale scores of 198 and 201, the scale score of 198 was moved up to 200. The same strategy was also followed for a scale score of 225.
- Scale scores below 100 were rounded up to 100.
- Scale scores above 250 were rounded down to 250.
- For each test, for a perfect raw score, the scale score was set to 250.

### ***7.3.3 Step 3: Examine Stability of the Common Items***

While the concurrent calibrations following the 2009 standalone field test were sufficient for developing a common scale for the item pools and for building alternate forms (see Step 2), the Spring 2010 operational administration of the EOC Assessments was chosen as the base form. To equate or recenter the Spring 2009 item pool to the Spring 2010 base scale, the Rasch values for the common items (i.e., the Spring 2010 operational items) were fixed to the 2010 parameter estimates. Next, using the Spring 2009 standalone field-test data, the concurrent calibration with the complete pool of items was repeated, this time with the 2010 operational item parameters fixed to their Spring 2010 values. Before completion of the concurrent calibrations, the stability of the common items was assessed for each content area.

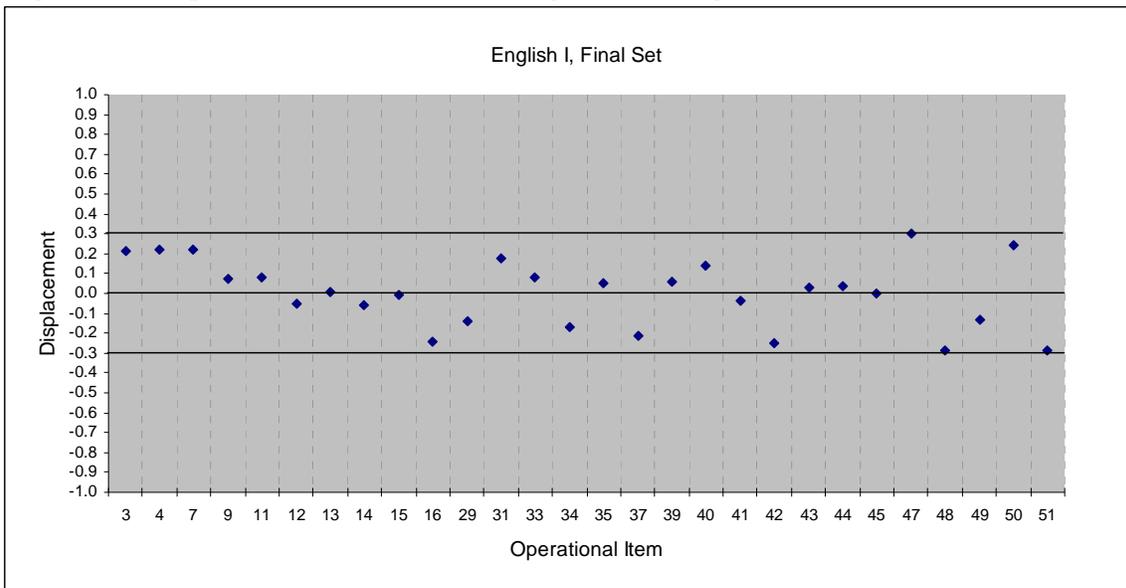
The stability of common items should be examined visually and statistically (Kolen and Brennan 2004). For example, scatterplots can be used to check visually for outlier common items. The scatter points for items that function similarly should line up along a straight line. Outlier items will not fall on the straight line and thus can be seen visually. In addition to a visual examination, an analytical study of the stability of common items may be performed. A 0.30-logistic unit should be applied as a cut criterion for removing “unstable” common items (Miller, Rotou, and Twing 2004).

To study the stability of the common items, the displacement value for each operational item (i.e., the common items) was evaluated after calibrating the items with the operational items fixed, or anchored, to their Spring 2010 difficulty values. Any common item with a displacement greater than 0.30 logits was removed from the common item set and treated as a new item. The fixed calibration was then performed again with the unstable common item free to be estimated. The displacement value for each of the remaining common items was then re-evaluated. As with the previous step, any outlier items identified during this procedure were removed from the rescaling process. Table 7.23 shows the number of items dropped from the set of operationally administered items (i.e., the common set of items) for instability. Figures 7.11 to 7.15 show displacement plots for the final set of common items used to recenter each content area's item bank or pool of items.

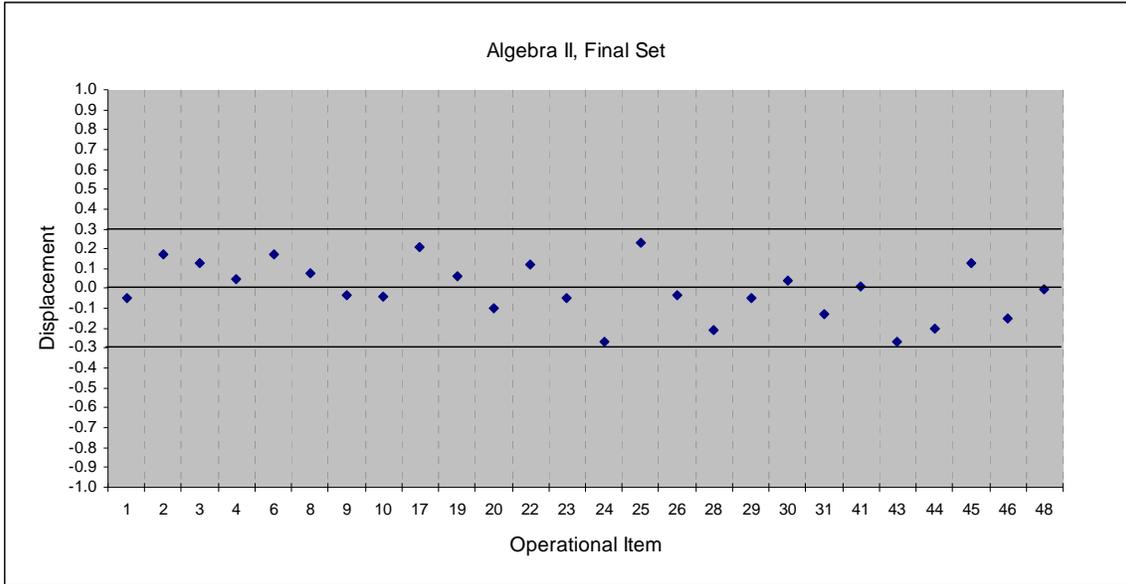
**Table 7.23: Number of Items Dropped from the Common Set of Operational Items**

Subject	Number of Items Dropped
English I	12
Algebra II	14
Geometry	12
Government	3
American History	7

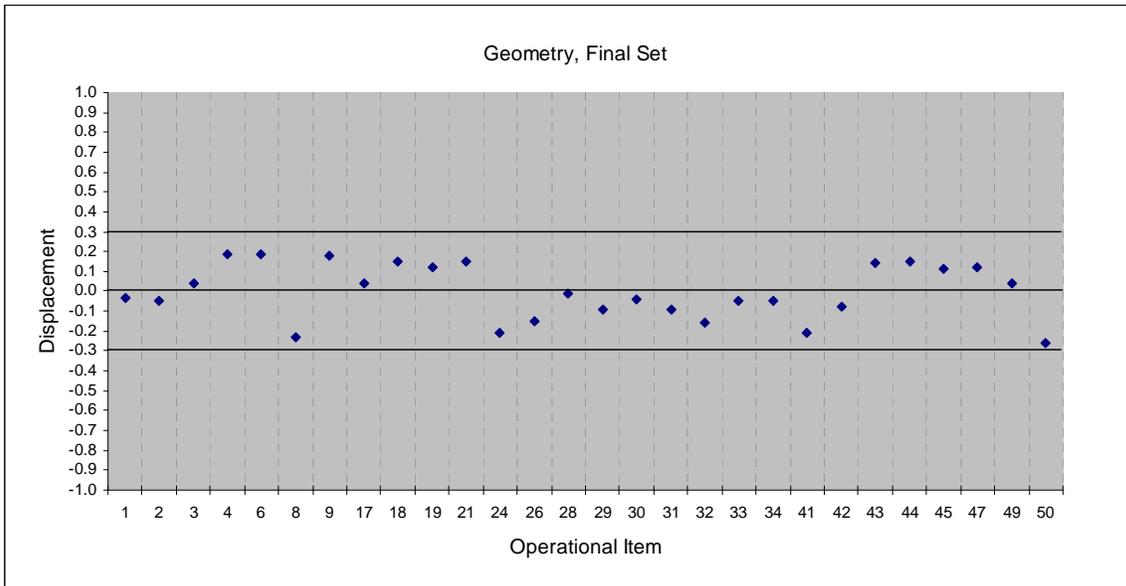
**Figure 7.11: Displacement Plot of Stable Linking Items for English I**



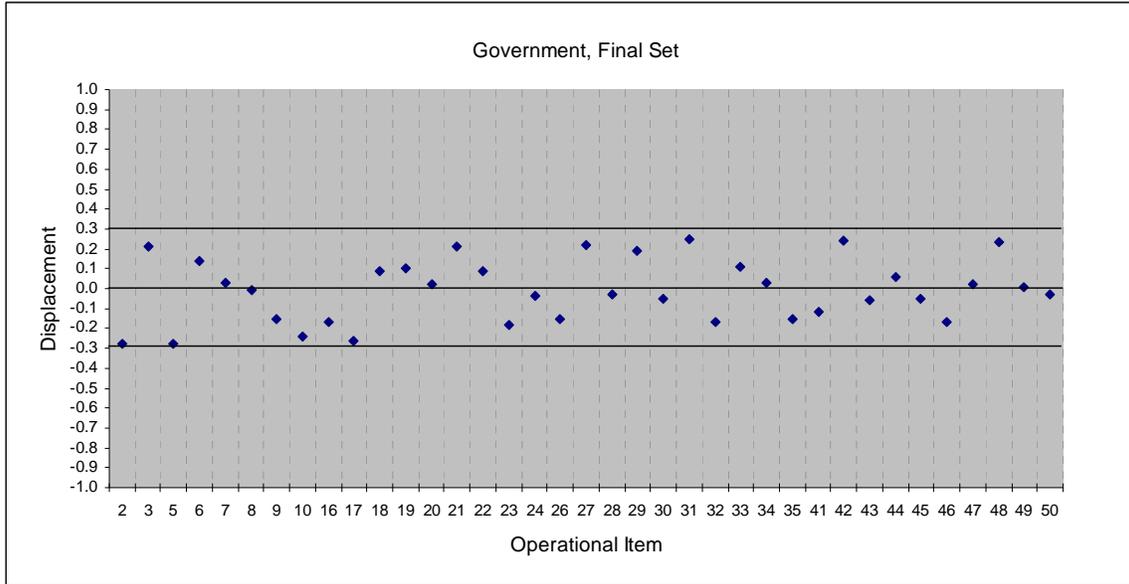
**Figure 7.12: Displacement Plot of Stable Linking Items for Algebra II**



**Figure 7.13: Displacement Plot of Stable Linking Items for Geometry**



**Figure 7.14: Displacement Plot of Stable Linking Items for Government**



**Figure 7.15: Displacement Plot of Stable Linking Items for American History**

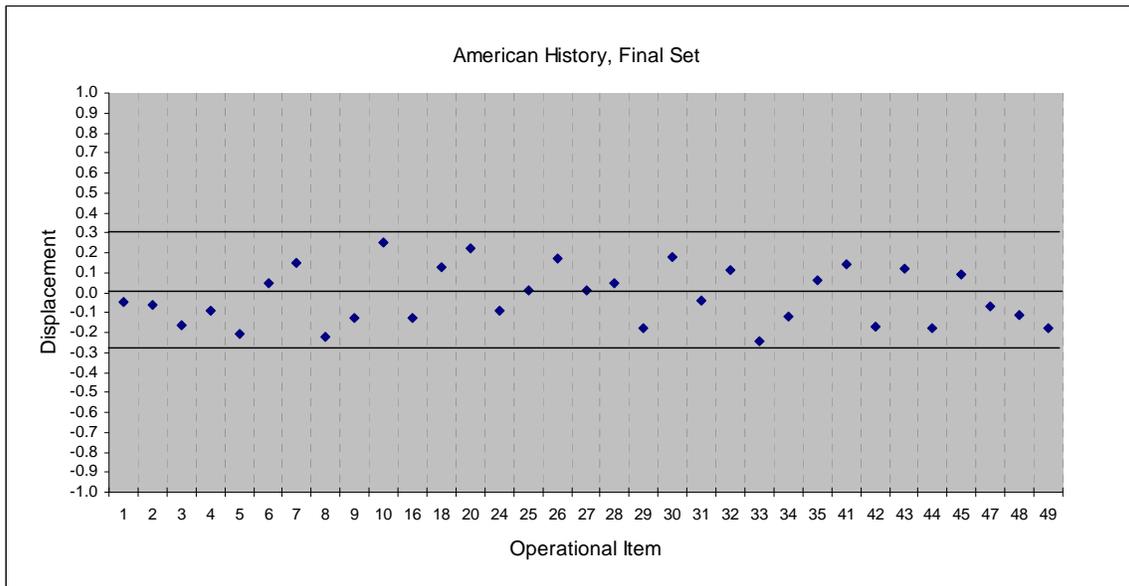


Table 7.24 summarizes displacement statistics for the common items generated with the anchored calibrations. Linacre (2006a) suggests that “random displacements of less than 0.50 logits are unlikely to have much impact in a test instrument” (p. 203). However, as discussed above, the 0.30 criteria for removing unstable items was used. Table 7.24 shows that all displacement statistics for the common items are smaller than 0.30, indicating that the anchored calibrations converged well.

**Table 7.24: Displacement Statistics for the Spring 2010 Recentering of the Item Pool**

English I		Algebra II		Geometry		Government		American History	
2010 Operational Item	Displacement								
3	0.21	1	-0.05	1	-0.03	2	-0.28	1	-0.05
4	0.22	2	0.17	2	-0.05	3	0.21	2	-0.06
7	0.22	3	0.13	3	0.04	5	-0.28	3	-0.16
9	0.07	4	0.05	4	0.19	6	0.14	4	-0.09
11	0.08	6	0.17	6	0.19	7	0.03	5	-0.21
12	-0.05	8	0.08	8	-0.23	8	-0.01	6	0.05
13	0.01	9	-0.03	9	0.18	9	-0.15	7	0.15
14	-0.06	10	-0.04	17	0.04	10	-0.24	8	-0.22
15	-0.01	17	0.21	18	0.15	16	-0.17	9	-0.13
16	-0.24	19	0.06	19	0.12	17	-0.26	10	0.25
29	-0.14	20	-0.10	21	0.15	18	0.09	16	-0.13
31	0.18	22	0.12	24	-0.21	19	0.10	18	0.13
33	0.08	23	-0.05	26	-0.15	20	0.02	20	0.22
34	-0.17	24	-0.27	28	-0.01	21	0.21	24	-0.09
35	0.05	25	0.23	29	-0.09	22	0.09	25	0.01
37	-0.21	26	-0.03	30	-0.04	23	-0.18	26	0.17
39	0.06	28	-0.21	31	-0.09	24	-0.04	27	0.01
40	0.14	29	-0.05	32	-0.16	26	-0.15	28	0.05
41	-0.04	30	0.04	33	-0.05	27	0.22	29	-0.18
42	-0.25	31	-0.13	34	-0.05	28	-0.03	30	0.18
43	0.03	41	0.01	41	-0.21	29	0.19	31	-0.04
44	0.04	43	-0.27	42	-0.08	30	-0.05	32	0.11
45	0.00	44	-0.20	43	0.14	31	0.25	33	-0.24
47	0.30	45	0.13	44	0.15	32	-0.17	34	-0.12
48	-0.29	46	-0.15	45	0.11	33	0.11	35	0.06
49	-0.13	48	0.00	47	0.12	34	0.03	41	0.14
50	0.24			49	0.04	35	-0.15	42	-0.17
51	-0.29			50	-0.26	41	-0.12	43	0.12
						42	0.24	44	-0.18
						43	-0.06	45	0.09
						44	0.06	47	-0.07
						45	-0.05	48	-0.11
						46	-0.17	49	-0.18
						47	0.02		
						48	0.23		
						49	0.01		
						50	-0.03		

#### ***7.3.4: Step 4: Recenter the 2009 Item Bank***

To equate or recenter the 2009 item pool to the 2010 base scale, the Rasch values for the stable common items (i.e., the stable Spring operational items) were fixed to the 2010 parameter estimates. With the Spring 2010 operational item parameters fixed, the rest of the item pool was equated to the Spring 2010 base scale. Note that it was assumed that the latent traits measured by the 2010 operational tests and the 2009 field tests were the same. Given the common items used across the two testing events and given that the blueprint and item specifications were the same, it is reasonable to assume that the underlying latent trait or construct measured by each assessment was the same. The above procedure was a one-time-only activity occurring after the first operational administration. With the pool recentered, the Fall 2009 forms were retroactively equated to the Spring 2009 forms. Although pre-equating occurred after the administration of the Fall 2009 forms, the results were not reported until after the Spring 2010 administration and the item pool recentering. Tables 7.25 to 7.34 provide the raw score to scale score conversions for Fall 2009 and Spring 2010, respectively.

**Table 7.25: Raw Score to Scale Score Conversions for Fall 2009, English I**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	41
1	101	23
2	118	16
3	128	14
4	135	12
5	141	11
6	146	10
7	151	10
8	155	9
9	159	9
10	162	9
11	165	8
12	168	8
13	171	8
14	174	8
15	177	8
16	179	8
17	182	8
18	185	8
19	187	8
20	190	7
21	192	7
22	195	8
23	197	8
24	200	8
25	202	8
26	205	8
27	208	8
28	211	8
29	214	8
30	217	8
31	220	9
32	225	9
33	228	10
34	232	10
35	237	11
36	243	12
37	250	14
38	250	16
39	250	23
40	250	41

**Table 7.26: Raw Score to Scale Score Conversions for Fall 2009, Algebra II**

<b>Raw Score</b>	<b>Scale Score</b>	<b>CSEM</b>
0	100	37
1	117	20
2	132	15
3	140	12
4	147	11
5	152	10
6	157	9
7	160	9
8	164	8
9	167	8
10	170	8
11	173	7
12	175	7
13	178	7
14	182	7
15	183	7
16	185	7
17	187	7
18	189	7
19	192	7
20	194	7
21	196	7
22	198	7
23	200	7
24	203	7
25	205	7
26	207	7
27	210	7
28	212	7
29	215	7
30	218	8
31	221	8
32	225	8
33	227	9
34	231	9
35	236	10
36	241	11
37	247	12
38	250	15
39	250	20
40	250	37

**Table 7.27: Raw Score to Scale Score Conversions for Fall 2009, Geometry**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	41
1	106	23
2	122	16
3	132	13
4	139	12
5	145	11
6	150	10
7	154	9
8	158	9
9	161	9
10	165	8
11	168	8
12	171	8
13	173	8
14	176	8
15	179	8
16	182	7
17	184	7
18	186	7
19	188	7
20	191	7
21	193	7
22	196	7
23	200	7
24	201	7
25	203	7
26	206	8
27	208	8
28	211	8
29	214	8
30	217	8
31	220	9
32	225	9
33	228	9
34	232	10
35	237	11
36	242	12
37	250	13
38	250	16
39	250	22
40	250	41

**Table 7.28: Raw Score to Scale Score Conversions for Fall 2009, Government**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	35
1	114	19
2	128	14
3	137	12
4	143	10
5	148	9
6	152	9
7	156	8
8	159	8
9	162	7
10	165	7
11	168	7
12	170	7
13	173	7
14	175	7
15	177	6
16	179	6
17	181	6
18	184	6
19	186	6
20	188	6
21	190	6
22	192	6
23	194	6
24	196	6
25	200	7
26	201	7
27	203	7
28	205	7
29	208	7
30	210	7
31	213	7
32	216	8
33	220	8
34	225	9
35	228	9
36	233	10
37	239	12
38	247	14
39	250	19
40	250	35

**Table 7.29: Raw Score to Scale Score Conversions for Fall 2009, American History**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	49
1	100	27
2	102	20
3	114	16
4	123	14
5	130	13
6	136	12
7	142	12
8	146	11
9	151	11
10	155	10
11	159	10
12	162	10
13	166	10
14	169	9
15	173	9
16	176	9
17	179	9
18	182	9
19	185	9
20	188	9
21	191	9
22	194	9
23	197	9
24	200	9
25	203	9
26	206	9
27	210	9
28	213	10
29	217	10
30	221	10
31	225	11
32	229	11
33	234	11
34	239	12
35	245	13
36	250	14
37	250	16
38	250	20
39	250	27
40	250	49

**Table 7.30: Raw Score to Scale Score Conversions for Spring 2010, English I**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	41
1	100	23
2	116	16
3	126	14
4	134	12
5	140	11
6	145	10
7	149	10
8	153	9
9	157	9
10	160	9
11	163	8
12	166	8
13	169	8
14	172	8
15	175	8
16	177	8
17	180	8
18	182	7
19	185	7
20	187	7
21	190	7
22	192	7
23	195	7
24	197	8
25	200	8
26	203	8
27	205	8
28	208	8
29	211	8
30	214	8
31	218	9
32	221	9
33	225	10
34	229	10
35	234	11
36	240	12
37	247	14
38	250	16
39	250	23
40	250	41

**Table 7.31: Raw Score to Scale Score Conversions for Spring 2010, Algebra II**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	37
1	112	20
2	127	15
3	136	12
4	143	11
5	148	10
6	152	9
7	156	9
8	160	8
9	163	8
10	166	8
11	169	7
12	172	7
13	175	7
14	177	7
15	179	7
16	182	7
17	184	7
18	186	7
19	189	7
20	191	7
21	193	7
22	195	7
23	198	7
24	200	7
25	202	7
26	205	7
27	207	7
28	210	7
29	212	7
30	215	8
31	218	8
32	221	8
33	225	9
34	229	9
35	233	10
36	239	11
37	245	12
38	250	15
39	250	20
40	250	37

**Table 7.32: Raw Score to Scale Score Conversions for Spring 2010, Geometry**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	41
1	101	23
2	117	16
3	127	14
4	135	12
5	141	11
6	146	10
7	150	10
8	154	9
9	158	9
10	161	9
11	164	8
12	168	8
13	171	8
14	173	8
15	176	8
16	179	8
17	182	8
18	184	8
19	187	8
20	189	8
21	192	8
22	195	8
23	197	8
24	200	8
25	203	8
26	206	8
27	208	8
28	211	8
29	215	8
30	218	9
31	221	9
32	225	9
33	229	10
34	234	10
35	239	11
36	245	12
37	250	14
38	250	16
39	250	23
40	250	41

**Table 7.33: Raw Score to Scale Score Conversions for Spring 2010, Government**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	35
1	116	19
2	130	14
3	138	12
4	145	10
5	150	9
6	154	9
7	157	8
8	161	8
9	164	7
10	167	7
11	169	7
12	172	7
13	174	7
14	176	7
15	179	7
16	181	6
17	183	6
18	185	6
19	187	6
20	189	6
21	191	6
22	194	6
23	196	6
24	198	6
25	200	7
26	202	7
27	205	7
28	207	7
29	209	7
30	212	7
31	215	7
32	218	8
33	221	8
34	225	9
35	229	9
36	234	10
37	240	12
38	249	14
39	250	19
40	250	35

**Table 7.34: Raw Score to Scale Score Conversions for Spring 2010, American History**

<b>Raw Score</b>	<b>Scale Score</b>	<b><i>CSEM</i></b>
0	100	49
1	100	27
2	102	20
3	114	16
4	123	14
5	130	13
6	136	12
7	141	11
8	145	11
9	150	10
10	154	10
11	157	10
12	161	10
13	164	9
14	167	9
15	170	9
16	173	9
17	176	9
18	179	9
19	182	9
20	185	9
21	188	9
22	191	9
23	194	9
24	197	9
25	200	9
26	203	9
27	206	9
28	210	10
29	213	10
30	217	10
31	221	10
32	225	11
33	230	11
34	235	12
35	241	13
36	248	14
37	250	16
38	250	20
39	250	27
40	250	49

### ***7.3.5 Step 5: Place the 2010 Embedded Field Test Items onto the 2010 Scale***

The 2010 EFT test items were treated separately in this process to avoid having them influence calibration of the operational items and the establishment of the base scale. To bring the field-test items onto the base scale, a second calibration of the Spring data, fixing the 2010 operational parameter estimates, was conducted.

For the 2010–2011 operational administrations, three new forms will be built for each content area from the calibrated and recentered item pools (one each for Fall, Spring, and Summer). These new forms will be pre-equated to the base form because, after the recentering of the pool, all previously field-tested items are on the operational scale. For all subsequent years, one new form will be built from the calibrated pool for the Spring administration. A form reuse plan will be implemented for the Fall and Summer administrations. Each Fall and Summer form from the 2009–2010 and 2010–2011 administrations will be used in alternating years and in alternating administrations.

For the new Spring form in 2011, new items will be field tested and scaled to the pool, using a calibration in which the operational test item parameters are fixed and the new field-test items are free to be estimated. This process will allow all new items for all Spring form administrations to be placed on the same EOC Assessment scale as the other items in the pool.

As outlined above, not only can the pre-equating model be used to annually build alternate test forms, but by using the embedded field testing approach, the Missouri Department of Elementary and Secondary Education (DESE) will also be able to maintain its item pools.

## CHAPTER 8: REPORTING

### 8.1 Introduction

The purpose of reporting assessment data is to communicate test results to students, their parents, and their teachers. The Missouri End-of-Course (MO EOC) Assessment reports provide useful information for determining the performance of students in a particular school and classroom. These reports help describe students' knowledge of a given set of expectations, allowing educators to determine specific instructional needs, measure student mastery toward post-secondary readiness, provide evidence of accountability for Missouri and national programs, and evaluate educational programs. Additionally, districts may use locally designed assessments aligned to the Show-Me Standards and Course-Level Expectations (CLEs) to provide more detailed information for each student in specific test areas.

Paper reports are generated for all assessment windows following the Spring administration; therefore, for the Fall 2009 and Spring 2010 assessments, the paper reports were generated and distributed following the Spring 2010 operational administration. However, teachers may access their students' raw scores for selected response items through an online interface shortly after the district's testing materials have been received for processing in each assessment window.

For each testing event, Riverside Publishing converts each student's raw score points earned into an EOC scale score, as described in Chapter 7: Scaling and Equating. A student receives an EOC scale score when he or she has made a valid attempt for the session. EOC scale scores range in value from 100 to 250. The EOC scale score determines the student's achievement level. For all content areas, a scale score of 200 to 224 is considered Proficient, and a scale score of 225 and above is considered Advanced. Each achievement level represents standards of performance for each assessed content area (English I, Algebra II, Geometry, Government, and American History). Achievement-level scores describe what students can do in terms of the content and skills assessed. These scores provide a way to compare test results with standards of academic performance. Panels drawn from Missouri's educational, business, and professional communities recommended the raw score cuts (based on the Spring 2010 test forms) to be used for each achievement level. These cuts were then reviewed and adopted by the Missouri State Board of Education. For more information on how the achievement levels were set, refer to Chapter 3: Achievement-Level Setting.

No test provides a perfect measure of a student's ability. This situation is expected because all tests have a known standard error of measurement (*SEM*). The *SEM* represents the amount of variability that can be expected in a student's test score because of the inherent imprecision of the test. For example, if the student were tested again, he or she would likely obtain a slightly different score. The range for this new score is provided as a standard error (*SE*) and gives an indication of the margin of error for the reported scale score.

## 8.2 Individual Student Report

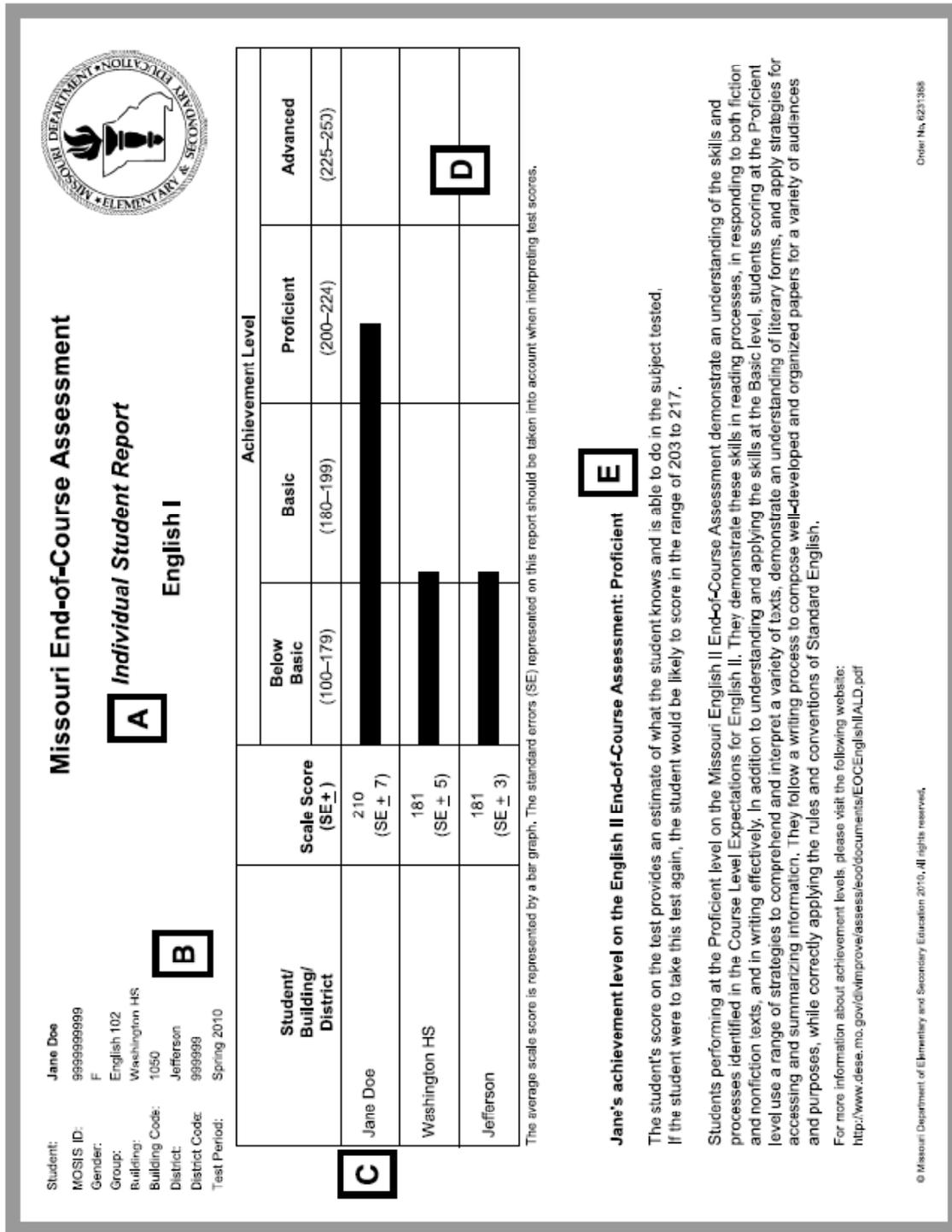
The Individual Student Report provides information about performance on the EOC Assessment, describing the results in terms of four levels of achievement in a content area. It is used for measuring and reflecting an individual student's mastery toward post-secondary readiness for the content area. It is also used in instructional planning as a point of reference during a parent-teacher conference and for permanent record keeping. Teachers are informed that other sources of information should be used along with this report when determining the student's areas of strength or need.

On the report, achievement-level scores describe what students can do in terms of the CLEs for the content and skills assessed by the EOC Assessment. A student at the Proficient or Advanced level has met the standard.

A sample of the Individual Student Report appears in Figure 8.1. A brief description of selected parts of the report is as follows:

- A. The heading of the Individual Student Report includes the content area for the results being presented. A separate report is produced for each content area tested.
- B. The Student Information section contains the biographic data for the individual student taking the assessment. Identifying information, including the MOSIS ID, gender, building, and district, is listed, followed by the test period.
- C. The individual student's results are presented numerically as a three-digit scale score with the *SE*. An accompanying bar graph to the right of the scale score illustrates the achievement level obtained by the student. Achievement levels (whether Advanced, Proficient, Basic, or Below Basic) are based on the scale score ranges listed beneath the Achievement Level heading in the table.
- D. The mean scale scores for the student's building and district are displayed in the two rows below the student's individual results. The mean scale score, with an associated *SE*, and the bar graph provide a way to view the individual's results in contrast to the group's results for the content area during the same test period.
- E. The narrative describes the student performance characteristics corresponding to the obtained level of achievement. The text is specific to the content area tested. At the bottom of the narrative is a URL for a website that provides additional information for all of the achievement levels for the content area.

Figure 8.1: Individual Student Report



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Order No. 6231388

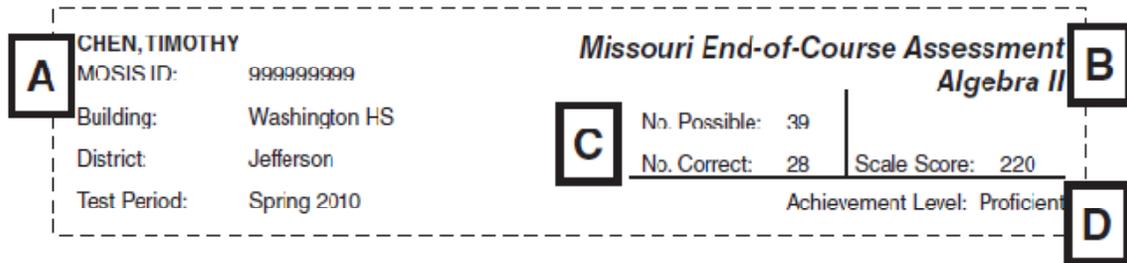
### 8.3 Student Score Label

The Student Score Label provides a summary of a student's results on the EOC Assessment. A separate label is produced for each content area tested. The individual label provides the student's biographic data, raw score, scale score, and achievement level. The labels have adhesive backing so they can be easily transferred onto the student record folders.

A sample label is shown below in Figure 8.2. A brief description of selected parts of the label is as follows:

- A. The student's name and identifying information are provided on the left side of the label.
- B. The upper right side of the label shows the content area tested. If a student has results for more than one content area, the next label is printed below the first one.
- C. The middle of the label has the Number Possible and the student's raw score (Number Correct). A corresponding column to the right of these data contains the raw score's associated Scale Score.
- D. The student's achievement level is displayed in the lower right corner below the scores.

Figure 8.2: Student Score Label



### 8.4 Online Crystal Reports

Schools and districts are able to access summary level reports through the online Crystal Reports tool. This tool allows district and school administrators to create on-the-fly reports containing information relevant to their data needs. There are several reporting options available through the Crystal Reports tool, including administrative reports, adequate yearly progress (AYP) reports, achievement level reports, content standard reports, and item analysis reports.

For each subreport, a user selects various filters such as year, grade/content area, and level of reporting (state, district, or school) to create the desired report. For the Content Standard Reports, the user may also disaggregate results by various subgroups (e.g., race, disability).

A detailed discussion of all available reports is beyond the scope of this document. Only those reports that are first-level analyses of MO EOC data will be discussed. The Achievement Level 5 reports will not be discussed as these are summaries of the pre-No Child Left Behind Act (NCLB) testing program. In addition, the AYP reports and some of the administrative reports, including the High School Career Education Student Summary and Level Not Determined, will not be discussed.

The Crystal Reports tool is accessed through the Missouri Department of Elementary and Secondary Education (DESE) website. Each school and/or district is assigned a user name and password to access the site.

#### ***8.4.1 Administrative Reports***

These reports provide student-level test data. Based on only the MO EOC Assessment results, four reports are generated: MO EOC Scale Score Summary, MO EOC Student Demographic, Student Achievement Level, and Student Report.

*MO EOC Scale Score Summary:* This report lists each student in the school or district along with his or her MOSIS ID, testing year, content area, grade level, MO EOC scale score, and achievement level.

*MO EOC Student Demographic:* This report lists all students in the school or district along with their date of birth (DOB), content area, MOSIS ID, district ID, and relevant demographic information, including if the student has been in the district for less than a year, if the student has been in the building for less than a year, if the student is limited English proficient (LEP), the student's race, if the student qualifies for free and reduced lunch (SES), if the student has an Individualized Education Program (IEP), if the student is an English-language learner (ELL)/LEP who has been in the school for less than one year and in the country for less than three years, if the student is an LEP/ELL Title 3, the number of months the LEP/ELL student has been in the United States, the student's disability diagnosis, and if the student is Title 1.

*Student Achievement Level:* This report lists all students in a school or district along with the year of testing, content area, grade-level, achievement level, and MOSIS ID.

*Student Report:* For each school or district, this report contains the following information: student name, DOB, district student number, MOSIS ID, content area testing, grade level, achievement level, and scale score for each content area tested.

#### ***8.4.2 Achievement Level 4 Levels***

These reports contain summary information on school or district performance in terms of the four MO EOC achievement levels. There are two types of achievement level reports: Achievement Level 4 Charts and Achievement Level 4 Report.

*Achievement Level 4 Chart:* This report charts the percentage of students classified as Proficient or Advanced on each MO EOC Assessment. State-level, district-level, and/or school-level performance may be displayed on the chart.

*Achievement Level 4 Report:* This report summarizes the number and percentage of students in each achievement level. This report is comprised of 10 columns: Total, content area, grade, year, number of accountable (ACC) students, number of reportable

(REP) students, number and percentage of students classified in the Basic (B) achievement level, number and percentage of students classified in the Proficient (P) achievement level, number and percentage of students classified in the Advanced (A) achievement level, and mean MO EOC scale score. The first column, Total, shows if aggregate or disaggregated information is being shown. A key to the abbreviations is found in the bottom left corner.

### ***8.4.3 Content Standard***

The content standard reports summarize information about the content standards.

*Content Standards Report:* This report has 14 columns: content area, grade level, category/type, year, percentage of points earned on content standard 1 (CS-1), points possible (PP) on CS-1, percentage of points earned on CS-2, PP on CS-2, percentage of points earned on CS-3, PP on CS-3, percentage of points earned on CS-4, PP on CS-4, percentage of points earned on CS-5, and PP on CS-5. The category/type column indicates if the data are aggregated or disaggregated.

*Content Standards Detail:* This report shows the percentage of points each student achieved on each content standard within a particular content area.

### ***8.4.4 Item Analysis Expanded***

This set of reports provides detailed item-level results for the school or district, aggregated by either the content or the process standard.

*Content Standard IBD EX:* The Content Standard Benchmark Descriptor (IBD) Extended (EX) report contains item-level detail aggregated by content standard. The report is comprised of 11 columns: school code (SC), grade level (GR), standard number and description (desc.), code for the CLE, description of the CLE, depth of knowledge (DOK) of the item, session/item number where the item was in the operational test, question type (QT), points possible for the item, the average points (avg pts) earned by students in the district on that item, and percentage of points earned by students in the district on that item.

## CHAPTER 9: SUMMARY STATISTICS

### 9.1 Introduction

This chapter provides descriptive statistics for the number correct raw score and for scale scores for each of the five Phase II Missouri End-of-Course (MO EOC) Assessments from the Fall 2009 and Spring 2010 administrations. Statistics include  $N$  counts, means, standard deviations ( $SD$ ), minimum and maximum values, and a variety of data disaggregations.

### 9.2 Descriptive Statistics for Total Raw Score

Descriptive statistics for total raw score are summarized in Table 9.1 by test administration and content area.

**Table 9.1: Descriptive Statistics for Total Raw Score**

Test Period	Subject	$N$	Minimum	Maximum	Mean	$SD$
Fall 2009	English I	318	5	40	23.46	7.562
	Algebra II	525	7	40	24.12	7.335
	Geometry	591	4	40	27.00	7.558
	Government	21,168	2	40	24.30	7.750
	Am. History	698	4	40	23.20	7.194
Spring 2010	English I	42,317	1	40	24.98	7.334
	Algebra II	21,824	1	40	22.24	7.239
	Geometry	26,858	1	40	23.69	7.391
	Government	36,930	1	40	24.36	7.871
	Am. History	32,636	1	40	22.45	7.237

### 9.3 Descriptive Statistics for Total Raw Score by Cluster

Table 9.2 summarizes the number correct raw score by test administration, content area, and cluster.

**Table 9.2: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster**

Test Period	Subject		<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
Fall 2009	English I	Reading	318	5	40	23.46	7.562
		Algebraic Relationships	525	2	22	12.99	4.509
	Algebra II	Data and Probability	525	0	10	5.91	2.063
		Numbers and Operations	525	1	8	5.22	1.723
	Geometry	Algebraic Relationships	591	0	8	4.96	1.953
		Geometric and Spatial Relationships	591	2	24	16.46	4.659
		Measurement	591	0	8	5.58	1.846
	Government	Principles and Processes of Governance Systems	21,168	0	20	11.93	4.064
		Principles of Constitutional Democracy	21,168	0	20	12.38	4.160
	Am. History	Missouri, United States, and World History	698	4	40	23.20	7.194
Spring 2010	English I	Reading	42,317	1	40	24.98	7.334
		Algebraic Relationships	21,824	0	22	11.44	4.147
	Algebra II	Data and Probability	21,824	0	10	6.12	2.256
		Numbers and Operations	21,824	0	8	4.68	1.883
	Geometry	Algebraic Relationships	26,858	0	8	4.19	1.750
		Geometric and Spatial Relationships	26,858	0	24	14.58	4.574
		Measurement	26,858	0	8	4.92	2.030
	Government	Principles and Processes of Governance Systems	36,930	0	20	11.87	4.175
		Principles of Constitutional Democracy	36,930	0	20	12.48	4.153
	Am. History	Missouri, United States, and World History	32,636	1	40	22.45	7.237

## 9.4 Descriptive Statistics for Scale Scores by Test Period and Subject

Descriptive statistics of scale scores and percentage distributions of students' achievement levels are summarized in Tables 9.3 and 9.4. Table 9.3 summarizes student scale scores by each Phase II EOC Assessment for the Fall 2009 and Spring 2010 administrations. Table 9.4 lists the percentage and frequency of students in each achievement level.

**Table 9.3: Scale Score Distributions for Each End-of-Course Assessment**

Descriptive Statistics						
Test Period	Subject	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
Fall 2009	English I	318	141	250	199.93	22.382
	Algebra II	525	160	250	204.55	18.900
	Geometry	591	139	250	211.47	22.757
	Government	21,168	128	250	199.08	20.214
	Am. History	698	123	250	198.85	24.453
Spring 2010	English I	42,317	100	250	201.65	21.529
	Algebra II	21,824	112	250	196.94	18.986
	Geometry	26,858	101	250	200.77	22.430
	Government	36,930	116	250	200.64	20.315
	Am. History	32,636	100	250	193.44	24.082

Scale scores range from a minimum of 100 to a maximum of 250 for the five Phase II content areas administered in Fall 2009 and Spring 2010. For English I, a minimum scale score of 177 is required to earn an achievement level of Basic. For Government, a minimum scale score of 179 is required to earn an achievement level of Basic. For Algebra II, Geometry, and American History, a minimum scale score of 182 is required to earn an achievement level of Basic. For all content areas, a scale score of 200 represents the minimum score to earn an achievement level of Proficient, and a scale score of 225 represents the minimum score to earn an achievement level of Advanced.

**Table 9.4: Achievement-Level Distributions for Each End-of-Course Assessment**

Test Period	Subject	Achievement Level	Frequency	Percentage
Fall 2009	English I	Below Basic	42	13.2
		Basic	118	37.1
		Proficient	105	33.0
		Advanced	53	16.7
		Total	318	100.0
	Algebra II	Below Basic	48	9.1
		Basic	174	33.1
		Proficient	201	38.3
		Advanced	102	19.4
		Total	525	100.0
	Geometry	Below Basic	48	8.1
		Basic	121	20.5
		Proficient	234	39.6
		Advanced	188	31.8
		Total	591	100.0
	Government	Below Basic	3,179	15.0
		Basic	7,501	35.4
		Proficient	7,470	35.3
		Advanced	3,018	14.3
		Total	21,168	100.0
Am. History	Below Basic	166	23.8	
	Basic	176	25.2	
	Proficient	235	33.7	
	Advanced	121	17.3	
	Total	698	100.0	

**Table 9.4: Achievement-Level Distributions for Each End-of-Course Assessment (continued)**

Test Period	Subject	Achievement Level	Frequency	Percentage
Spring 2010	English I	Below Basic	5,283	12.5
		Basic	13,254	31.3
		Proficient	16,699	39.5
		Advanced	7,081	16.7
		Total	42,317	100.0
	Algebra II	Below Basic	4,266	19.5
		Basic	8,470	38.8
		Proficient	6,909	31.7
		Advanced	2,179	10.0
		Total	21,824	100.0
	Geometry	Below Basic	5,151	19.2
		Basic	7,913	29.5
		Proficient	9,246	34.4
		Advanced	4,548	16.9
		Total	26,858	100.0
	Government	Below Basic	4,628	12.5
		Basic	13,710	37.1
		Proficient	13,144	35.6
		Advanced	5,448	14.8
		Total	36,930	100.0
Am. History	Below Basic	10,385	31.8	
	Basic	9,047	27.7	
	Proficient	9,275	28.4	
	Advanced	3,929	12.0	
	Total	32,636	100.0	

### 9.5 Descriptive Statistics by Demographic Group

Descriptive statistics of scale scores and percentage distributions of students' achievement levels by demographic groups are summarized in Tables 9.5 through 9.20.

The demographic variables included are gender (Tables 9.5 and 9.13), ethnicity (Tables 9.6 and 9.14), migrant status (Tables 9.7 and 9.15), free and reduced lunch (FRL) (Tables 9.8 and 9.16), limited English proficient (LEP) (Tables 9.9 and 9.17), Title I (Tables 9.10 and 9.18), Individualized Education Program (IEP) (Tables 9.11 and 9.19), and accommodations (Tables 9.12 and 9.20).

**Table 9.5: Scale Score Distributions by Demographic Group—Gender**

Test Period	Subject	Gender	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
Fall 2009	English I	Female	141	146	250	204.90	23.215
		Male	169	141	250	196.58	21.018
	Algebra II	Female	273	160	250	203.05	19.279
		Male	243	164	250	206.31	18.365
	Geometry	Female	305	139	250	208.77	22.248
		Male	282	161	250	214.77	22.860
	Government	Female	10,356	128	250	197.32	19.219
		Male	10,507	128	250	201.10	20.956
	Am. History	Female	334	136	250	193.37	22.843
		Male	351	123	250	204.45	24.662
Spring 2010	English I	Female	20,730	100	250	203.69	21.233
		Male	21,410	100	250	199.76	21.604
	Algebra II	Female	11,766	136	250	195.43	18.159
		Male	9,982	112	250	198.85	19.742
	Geometry	Female	13,974	101	250	199.04	21.898
		Male	12,771	117	250	202.71	22.842
	Government	Female	18,210	116	250	199.18	19.809
		Male	18,550	116	250	202.17	20.679
	Am. History	Female	16,209	100	250	190.52	22.908
		Male	16,295	100	250	196.45	24.830

**Table 9.6: Scale Score Distributions by Demographic Group—Ethnicity**

Test Period	Subject	Ethnicity	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
Fall 2009	English I	Native American	N/A	N/A	N/A	N/A	N/A
		Asian/Pacific Islander	N/A	N/A	N/A	N/A	N/A
		Black (not Hispanic)	N/A	N/A	N/A	N/A	N/A
		Hispanic	N/A	N/A	N/A	N/A	N/A
		White (not Hispanic)	256	146	250	202.01	22.498
	Algebra II	Native American	N/A	N/A	N/A	N/A	N/A
		Asian/Pacific Islander	N/A	N/A	N/A	N/A	N/A
		Black (not Hispanic)	59	173	250	198.05	13.892
		Hispanic	30	160	236	190.97	20.394
		White (not Hispanic)	410	160	250	206.36	19.001
	Geometry	Native American	N/A	N/A	N/A	N/A	N/A
		Asian/Pacific Islander	N/A	N/A	N/A	N/A	N/A
		Black (not Hispanic)	51	171	242	203.65	18.395
		Hispanic	N/A	N/A	N/A	N/A	N/A
		White (not Hispanic)	492	139	250	212.71	22.708
	Government	Native American	130	143	233	193.95	16.354
		Asian/Pacific Islander	505	156	250	208.51	24.158
		Black (not Hispanic)	4,842	128	250	187.38	16.025
		Hispanic	721	148	250	192.28	17.932
		White (not Hispanic)	14,635	143	250	203.27	19.718
Am. History	Native American	N/A	N/A	N/A	N/A	N/A	
	Asian/Pacific Islander	N/A	N/A	N/A	N/A	N/A	
	Black (not Hispanic)	84	151	250	195.51	22.793	
	Hispanic	N/A	N/A	N/A	N/A	N/A	
	White (not Hispanic)	567	123	250	199.97	24.352	

**Table 9.6: Scale Score Distributions by Demographic Group—Ethnicity (continued)**

Test Period	Subject	Ethnicity	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
Spring 2010	English I	Native American	221	140	250	200.81	21.839
		Asian/Pacific Islander	632	100	250	203.30	23.216
		Black (not Hispanic)	4,936	116	250	190.34	19.972
		Hispanic	1,515	116	250	195.05	21.496
		White (not Hispanic)	34,827	100	250	203.57	21.135
	Algebra II	Native American	117	160	245	194.93	17.129
		Asian/Pacific Islander	367	152	250	203.12	20.311
		Black (not Hispanic)	3,067	112	250	184.03	15.475
		Hispanic	717	112	250	191.44	18.428
		White (not Hispanic)	17,474	143	250	199.39	18.553
	Geometry	Native American	150	161	250	199.44	23.201
		Asian/Pacific Islander	435	141	250	208.48	25.009
		Black (not Hispanic)	4,224	101	250	184.94	19.298
		Hispanic	1,048	127	250	194.01	21.249
		White (not Hispanic)	20,884	135	250	204.19	21.526
	Government	Native American	207	157	250	200.10	20.313
		Asian/Pacific Islander	597	157	250	202.40	22.26
		Black (not Hispanic)	4,263	116	250	188.46	17.127
		Hispanic	1,106	150	250	193.85	19.237
		White (not Hispanic)	30,589	116	250	202.60	20.069
	Am. History	Native American	167	141	241	190.95	21.402
		Asian/Pacific Islander	475	100	250	194.71	25.828
		Black (not Hispanic)	3,820	100	250	183.34	22.648
		Hispanic	1,198	123	250	186.21	24.282
		White (not Hispanic)	26,838	102	250	195.26	23.827

**Table 9.7: Scale Score Distributions by Demographic Group—Migrant Status**

Test Period	Subject	Migrant	N	Minimum	Maximum	Mean	SD
Fall 2009	English I	No	309	141	250	200.38	22.43
		Yes	N/A	N/A	N/A	N/A	N/A
	Algebra II	No	515	160	250	204.65	18.863
		Yes	N/A	N/A	N/A	N/A	N/A
	Geometry	No	587	139	250	211.65	22.724
		Yes	N/A	N/A	N/A	N/A	N/A
	Government	No	20,881	128	250	199.22	20.205
		Yes	N/A	N/A	N/A	N/A	N/A
	Am. History	No	685	123	250	199.05	24.413
		Yes	N/A	N/A	N/A	N/A	N/A
Spring 2010	English I	No	42,114	100	250	201.70	21.512
		Yes	39	153	229	187.36	16.823
	Algebra II	No	21,740	112	250	197.00	18.98
		Yes	N/A	N/A	N/A	N/A	N/A
	Geometry	No	26,735	101	250	200.79	22.432
		Yes	N/A	N/A	N/A	N/A	N/A
	Government	No	36,759	116	250	200.69	20.31
		Yes	N/A	N/A	N/A	N/A	N/A
	Am. History	No	32,495	100	250	193.50	24.077
		Yes	N/A	N/A	N/A	N/A	N/A

**Table 9.8: Scale Score Distributions by Demographic Group—Free and Reduced Lunch**

Test Period	Subject	FRL	N	Minimum	Maximum	Mean	SD
Fall 2009	English I	No	184	146	250	204.21	22.979
		Yes	126	141	250	194.75	20.333
	Algebra II	No	393	164	250	207.08	18.734
		Yes	123	160	231	196.62	17.238
	Geometry	No	446	139	250	214.78	22.060
		Yes	141	150	250	201.74	22.008
	Government	No	12,332	143	250	205.18	20.111
		Yes	8,559	128	250	190.63	16.991
	Am. History	No	455	123	250	203.69	23.460
		Yes	230	136	250	189.85	23.689
Spring 2010	English I	No	24,693	100	250	206.66	20.715
		Yes	17,460	100	250	194.66	20.642
	Algebra II	No	14,416	112	250	199.82	19.073
		Yes	7,335	112	250	191.44	17.508
	Geometry	No	16,581	135	250	204.76	22.039
		Yes	10,168	101	250	194.32	21.543
	Government	No	23,718	116	250	204.92	20.150
		Yes	13,064	116	250	192.97	18.227
	Am. History	No	19,402	100	250	198.37	23.702
		Yes	13,122	100	250	186.24	22.776

**Table 9.9: Scale Score Distributions by Demographic Group—Limited English Proficient**

Test Period	Subject	LEP	N	Minimum	Maximum	Mean	SD
Fall 2009	English I	No	300	141	250	200.98	22.377
		Yes	N/A	N/A	N/A	N/A	N/A
	Algebra II	No	508	160	250	204.76	18.866
		Yes	N/A	N/A	N/A	N/A	N/A
	Geometry	No	585	139	250	211.64	22.753
		Yes	N/A	N/A	N/A	N/A	N/A
	Government	No	20,470	128	250	199.51	20.177
		Yes	421	156	239	185.05	16.097
	Am. History	No	672	123	250	199.46	24.153
		Yes	N/A	N/A	N/A	N/A	N/A
Spring 2010	English I	No	41,607	100	250	201.93	21.446
		Yes	546	134	240	183.16	18.247
	Algebra II	No	21,505	112	250	197.12	18.965
		Yes	246	148	250	186.48	17.161
	Geometry	No	26,353	101	250	201.03	22.383
		Yes	396	135	250	185.14	19.951
	Government	No	36,315	116	250	200.89	20.277
		Yes	467	150	250	183.81	15.239
	Am. History	No	32,021	100	250	193.76	24.029
		Yes	503	130	241	175.40	20.087

**Table 9.10: Scale Score Distributions by Demographic Group—Title I**

Test Period	Subject	Title I	N	Minimum	Maximum	Mean	SD
Fall 2009	English I	No	308	141	250	200.55	22.336
		Yes	N/A	N/A	N/A	N/A	N/A
	Algebra II	No	516	160	250	204.59	18.906
		Yes	N/A	N/A	N/A	N/A	N/A
	Geometry	No	586	139	250	211.60	22.709
		Yes	N/A	N/A	N/A	N/A	N/A
	Government	No	20,070	128	250	199.76	20.149
		Yes	821	128	250	185.86	16.652
	Am. History	No	680	123	250	199.23	24.366
		Yes	N/A	N/A	N/A	N/A	N/A
Spring 2010	English I	No	40,581	100	250	202.15	21.433
		Yes	1,572	134	250	189.85	20.119
	Algebra II	No	20,810	112	250	197.70	18.802
		Yes	941	143	250	181.38	15.895
	Geometry	No	25,607	101	250	201.58	22.176
		Yes	1,142	117	250	183.10	20.760
	Government	No	35,644	116	250	201.15	20.229
		Yes	1,138	145	249	186.01	17.190
	Am. History	No	31,065	100	250	194.30	23.914
		Yes	1,459	123	250	176.07	20.799

**Table 9.11: Scale Score Distributions by Demographic Group—Students with IEPs**

Test Period	Subject	IEP	N	Minimum	Maximum	Mean	SD
Fall 2009	English I	No	271	141	250	202.60	21.790
		Yes	39	155	243	184.85	20.547
	Algebra II	No	505	160	250	204.99	18.776
		Yes	N/A	N/A	N/A	N/A	N/A
	Geometry	No	569	139	250	212.05	22.468
		Yes	N/A	N/A	N/A	N/A	N/A
	Government	No	19,019	128	250	200.64	19.920
		Yes	1,872	128	250	184.72	17.127
	Am. History	No	637	123	250	200.42	23.852
		Yes	48	136	239	180.83	24.704
Spring 2010	English I	No	38,398	100	250	203.86	20.508
		Yes	3,755	116	250	179.47	18.762
	Algebra II	No	21,171	112	250	197.36	18.867
		Yes	580	136	250	183.55	18.152
	Geometry	No	25,540	101	250	201.62	22.174
		Yes	1,209	141	250	183.25	20.561
	Government	No	34,014	116	250	201.92	19.978
		Yes	2,768	116	250	185.37	18.010
	Am. History	No	30,317	100	250	194.66	23.734
		Yes	2,207	100	250	177.19	22.848

**Table 9.12 Scale Score Distributions by Demographic Group—Students with Accommodations**

Test Period	Subject	Accom.	N	Minimum	Maximum	Mean	SD
Fall 2009	English I	No	290	141	250	201.92	22.086
		Yes	N/A	N/A	N/A	N/A	N/A
	Algebra II	No	515	160	250	204.62	18.909
		Yes	N/A	N/A	N/A	N/A	N/A
	Geometry	No	579	139	250	211.91	22.576
		Yes	N/A	N/A	N/A	N/A	N/A
	Government	No	20,165	128	250	199.79	20.096
		Yes	726	143	250	183.33	16.373
	Am. History	No	663	123	250	199.76	24.215
		Yes	N/A	N/A	N/A	N/A	N/A
Spring 2010	English I	No	40,193	100	250	202.88	20.948
		Yes	1,960	116	250	177.27	18.142
	Algebra II	No	21,600	112	250	197.09	18.958
		Yes	151	136	239	183.48	17.059
	Geometry	No	26,389	101	250	201.03	22.372
		Yes	360	141	250	183.39	19.705
	Government	No	35,739	116	250	201.17	20.186
		Yes	1,043	145	250	183.76	17.108
	Am. History	No	31,663	100	250	194.03	23.893
		Yes	861	100	250	173.03	21.907

**Table 9.13: Achievement-Level Distributions by Gender**

Test Period	Subject	Gender	Achievement Level	Frequency	Percentage
Fall 2009	English I	Female	Below Basic	13	9.2
			Basic	47	33.3
			Proficient	48	34
			Advanced	33	23.4
	Total		141	100	
	Male	Below Basic	27	16	
		Basic	67	39.6	
		Proficient	55	32.5	
		Advanced	20	11.8	
		Total	169	100	
	Algebra II	Female	Below Basic	29	10.6
			Basic	101	37
			Proficient	90	33
			Advanced	53	19.4
	Total		273	100	
	Male	Below Basic	19	7.8	
		Basic	68	28	
		Proficient	108	44.4	
Advanced		48	19.8		
Total		243	100		
Geometry	Female	Below Basic	28	9.2	
		Basic	70	23	
		Proficient	119	39	
		Advanced	88	28.9	
Total		305	100		
Male	Below Basic	19	6.7		
	Basic	48	17		
	Proficient	115	40.8		
	Advanced	100	35.5		
	Total	282	100		
Government	Female	Below Basic	1,619	15.6	
		Basic	4,017	38.8	
		Proficient	3,513	33.9	
		Advanced	1,207	11.7	
Total		10,356	100		
Male	Below Basic	1,468	14		
	Basic	3,360	32		
	Proficient	3,885	37		
	Advanced	1,794	17.1		
	Total	10,507	100		
Am. History	Female	Below Basic	102	30.5	
		Basic	94	28.1	
		Proficient	106	31.7	
		Advanced	32	9.6	
Total		334	100		
Male	Below Basic	60	17.1		
	Basic	78	22.2		
	Proficient	125	35.6		
	Advanced	88	25.1		
	Total	351	100		

**Table 9.13: Achievement-Level Distributions by Gender (continued)**

Test Period	Subject	Gender	Achievement Level	Frequency	Percentage
Spring 2010	English I	Female	Below Basic	2,096	10.1
			Basic	6,290	30.3
			Proficient	8,408	40.6
			Advanced	3,936	19.0
			Total	20,730	100.0
		Male	Below Basic	3,141	14.7
	Basic	6,908	32.3		
	Proficient	8,233	38.5		
	Advanced	3,128	14.6		
	Total	21,410	100.0		
	Algebra II	Female	Below Basic	2,476	21.0
			Basic	4,806	40.8
			Proficient	3,528	30.0
			Advanced	956	8.1
			Total	11,766	100.0
		Male	Below Basic	1,752	17.6
	Basic	3,636	36.4		
	Proficient	3,371	33.8		
	Advanced	1,223	12.3		
	Total	9,982	100.0		
Geometry	Female	Below Basic	2,919	20.9	
		Basic	4,298	30.8	
		Proficient	4,750	34.0	
		Advanced	2,007	14.4	
		Total	13,974	100.0	
	Male	Below Basic	2,202	17.2	
Basic	3,579	28.0			
Proficient	4,461	34.9			
Advanced	2,529	19.8			
Total	12,771	100.0			
Government	Female	Below Basic	2,416	13.3	
		Basic	7,236	39.7	
		Proficient	6,210	34.1	
		Advanced	2,348	12.9	
		Total	18,210	100.0	
	Male	Below Basic	2,162	11.7	
Basic	6,407	34.5			
Proficient	6,890	37.1			
Advanced	3,091	16.7			
Total	18,550	100.0			
Am. History	Female	Below Basic	5,787	35.7	
		Basic	4,780	29.5	
		Proficient	4,196	25.9	
		Advanced	1,446	8.9	
		Total	16,209	100.0	
	Male	Below Basic	4,526	27.8	
Basic	4,238	26.0			
Proficient	5,054	31.0			
Advanced	2,477	15.2			
Total	16,295	100.0			

**Table 9.14: Achievement-Level Distributions by Ethnicity**

Test Period	Subject	Ethnicity	Achievement Level	Frequency	Percentage
Fall 2009	English I	Native American	Below Basic	N/A	N/A
			Basic	N/A	N/A
			Proficient	N/A	N/A
			Advanced	N/A	N/A
			Total	N/A	N/A
		Asian/Pacific Islander	Below Basic	N/A	N/A
			Basic	N/A	N/A
			Proficient	N/A	N/A
			Advanced	N/A	N/A
			Total	N/A	N/A
	Black (not Hispanic)	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
Hispanic	Below Basic	N/A	N/A		
	Basic	N/A	N/A		
	Proficient	N/A	N/A		
	Advanced	N/A	N/A		
	Total	N/A	N/A		
White (not Hispanic)	Below Basic	31	12.1		
	Basic	86	33.6		
	Proficient	91	35.5		
	Advanced	48	18.8		
	Total	256	100.0		
Algebra II	Native American	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
	Asian/Pacific Islander	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Total	N/A	N/A	
Black (not Hispanic)	Below Basic	3	5.1		
	Basic	31	52.5		
	Proficient	21	35.6		
	Total	59	100.0		

**Table 9.14: Achievement-Level Distributions by Ethnicity (continued)**

Test Period	Subject	Ethnicity	Achievement Level	Frequency	Percentage
Fall 2009	Algebra II	Hispanic	Below Basic	10	33.3
			Basic	10	33.3
			Proficient	7	23.3
			Advanced	3	10.0
	Total		30	100.0	
	White (not Hispanic)	Below Basic	35	8.5	
		Basic	122	29.8	
		Proficient	163	39.8	
		Advanced	90	22.0	
		Total	410	100.0	
	Geometry	Native American	Below Basic	N/A	N/A
			Basic	N/A	N/A
			Proficient	N/A	N/A
			Advanced	N/A	N/A
			Total	N/A	N/A
		Asian/Pacific Islander	Below Basic	N/A	N/A
			Basic	N/A	N/A
			Proficient	N/A	N/A
			Advanced	N/A	N/A
		Black (not Hispanic)	Below Basic	4	7.8
Basic			17	33.3	
Proficient			22	43.1	
Advanced	8		15.7		
Total	51		100.0		
Hispanic	Below Basic	N/A	N/A		
	Basic	N/A	N/A		
	Proficient	N/A	N/A		
	Advanced	N/A	N/A		
	Total	N/A	N/A		
White (not Hispanic)	Below Basic	38	7.7		
	Basic	92	18.7		
	Proficient	196	39.8		
	Advanced	166	33.7		
	Total	492	100.0		
Government	Native American	Below Basic	24	18.5	
		Basic	51	39.2	
		Proficient	47	36.2	
		Advanced	8	6.2	
		Total	130	100.0	

**Table 9.14: Achievement-Level Distributions by Ethnicity (continued)**

Test Period	Subject	Ethnicity	Achievement Level	Frequency	Percentage
Fall 2009	Government	Asian/Pacific Islander	Below Basic	51	10.1
			Basic	136	26.9
			Proficient	164	32.5
			Advanced	154	30.5
			Total	505	100.0
		Black (not Hispanic)	Below Basic	1,463	30.2
			Basic	2,245	46.4
			Proficient	989	20.4
			Advanced	145	3.0
			Total	4,842	100.0
		Hispanic	Below Basic	168	23.3
			Basic	289	40.1
			Proficient	217	30.1
			Advanced	47	6.5
			Total	721	100.0
		White (not Hispanic)	Below Basic	1,360	9.3
	Basic		4,646	31.7	
	Proficient		5,981	40.9	
	Advanced		2,648	18.1	
	Total		14,635	100.0	
Am. History	Native American	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
	Asian/Pacific Islander	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
	Black (not Hispanic)	Below Basic	24	28.6	
		Basic	22	26.2	
		Proficient	28	33.3	
		Advanced	10	11.9	
Total		84	100.0		
Hispanic	Below Basic	N/A	N/A		
	Basic	N/A	N/A		
	Proficient	N/A	N/A		
	Advanced	N/A	N/A		
	Total	N/A	N/A		
White (not Hispanic)	Below Basic	125	22.0		
	Basic	145	25.6		
	Proficient	193	34.0		
	Advanced	104	18.3		
	Total	567	100.0		

**Table 9.14: Achievement-Level Distributions by Ethnicity (continued)**

Test Period	Subject	Ethnicity	Achievement Level	Frequency	Percentage
Spring 2010	English I	Native American	Below Basic	33	14.9
			Basic	67	30.3
			Proficient	88	39.8
			Advanced	33	14.9
			Total	221	100.0
		Asian/Pacific Islander	Below Basic	79	12.5
			Basic	179	28.3
			Proficient	237	37.5
			Advanced	137	21.7
			Total	632	100.0
	Black (not Hispanic)	Below Basic	1,221	24.7	
		Basic	2,057	41.7	
		Proficient	1,386	28.1	
		Advanced	272	5.5	
		Total	4,936	100.0	
Hispanic	Below Basic	289	19.1		
	Basic	572	37.8		
	Proficient	502	33.1		
	Advanced	152	10.0		
	Total	1,515	100.0		
White (not Hispanic)	Below Basic	3,614	10.4		
	Basic	10,318	29.6		
	Proficient	14,425	41.4		
	Advanced	6,470	18.6		
	Total	34,827	100.0		
Algebra II	Native American	Below Basic	25	21.4	
		Basic	47	40.2	
		Proficient	36	30.8	
		Advanced	9	7.7	
		Total	117	100.0	
	Asian/Pacific Islander	Below Basic	50	13.6	
		Basic	114	31.1	
		Proficient	141	38.4	
		Advanced	62	16.9	
Total		367	100.0		
Black (not Hispanic)	Below Basic	1,409	45.9		
	Basic	1,167	38.1		
	Proficient	437	14.2		
	Advanced	54	1.8		
	Total	3,067	100.0		

**Table 9.14: Achievement-Level Distributions by Ethnicity (continued)**

Test Period	Subject	Ethnicity	Achievement Level	Frequency	Percentage
Spring 2010	Algebra II	Hispanic	Below Basic	208	29.0
			Basic	278	38.8
			Proficient	189	26.4
			Advanced	42	5.9
	Total		717	100.0	
	White (not Hispanic)	Below Basic	2,532	14.5	
		Basic	6,835	39.1	
		Proficient	6,096	34.9	
		Advanced	2,011	11.5	
		Total	17,474	100.0	
	Geometry	Native American	Below Basic	33	22.0
			Basic	51	34.0
			Proficient	40	26.7
			Advanced	26	17.3
			Total	150	100.0
		Asian/Pacific Islander	Below Basic	65	14.9
			Basic	95	21.8
			Proficient	146	33.6
			Advanced	129	29.7
			Total	435	100.0
Black (not Hispanic)		Below Basic	1,902	45.0	
		Basic	1,362	32.2	
	Proficient	800	18.9		
	Advanced	160	3.8		
	Total	4,224	100.0		
Hispanic	Below Basic	298	28.4		
	Basic	340	32.4		
	Proficient	305	29.1		
	Advanced	105	10.0		
	Total	1,048	100.0		
White (not Hispanic)	Below Basic	2,820	13.5		
	Basic	6,028	28.9		
	Proficient	7,919	37.9		
	Advanced	4,117	19.7		
	Total	20,884	100.0		
Government	Native American	Below Basic	24	11.6	
		Basic	77	37.2	
		Proficient	79	38.2	
		Advanced	27	13.0	
		Total	207	100.0	

**Table 9.14: Achievement-Level Distributions by Ethnicity (continued)**

Test Period	Subject	Ethnicity	Achievement Level	Frequency	Percentage
Spring 2010	Government	Asian/Pacific Islander	Below Basic	85	14.2
			Basic	197	33.0
			Proficient	197	33.0
			Advanced	118	19.8
			Total	597	100.0
		Black (not Hispanic)	Below Basic	1,208	28.3
			Basic	1,953	45.8
			Proficient	947	22.2
	Advanced		155	3.6	
	Total	4,263	100.0		
	Hispanic	Below Basic	217	19.6	
		Basic	503	45.5	
		Proficient	288	26.0	
		Advanced	98	8.9	
	Total	1,106	100.0		
	White (not Hispanic)	Below Basic	3,045	10.0	
Basic		10,917	35.7		
Proficient		11,586	37.9		
Advanced		5,041	16.5		
Total	30,589	100.0			
Am. History	Native American	Below Basic	55	32.9	
		Basic	53	31.7	
		Proficient	45	26.9	
		Advanced	14	8.4	
		Total	167	100.0	
	Asian/Pacific Islander	Below Basic	152	32.0	
		Basic	114	24.0	
		Proficient	139	29.3	
Advanced		70	14.7		
Total	475	100.0			
Black (not Hispanic)	Below Basic	1,834	48.0		
	Basic	1,037	27.1		
	Proficient	761	19.9		
	Advanced	188	4.9		
Total	3,820	100.0			
Hispanic	Below Basic	536	44.7		
	Basic	325	27.1		
	Proficient	236	19.7		
	Advanced	101	8.4		
Total	1,198	100.0			
White (not Hispanic)	Below Basic	7,733	28.8		
	Basic	7,486	27.9		
	Proficient	8,069	30.1		
	Advanced	3,550	13.2		
Total	26,838	100.0			

**Table 9.15: Achievement-Level Distributions—Migrant**

Test Period	Subject	Migrant	Achievement Level	Frequency	Percentage
Fall 2009	English I	No	Below Basic	40	12.9
			Basic	113	36.6
			Proficient	103	33.3
			Advanced	53	17.2
	Total		309	100.0	
	Yes	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
	Algebra II	No	Below Basic	47	9.1
			Basic	169	32.8
			Proficient	198	38.4
			Advanced	101	19.6
	Total		515	100.0	
	Yes	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
Geometry	No	Below Basic	47	8.0	
		Basic	118	20.1	
		Proficient	234	39.9	
		Advanced	188	32.0	
Total		587	100.0		
Yes	Below Basic	N/A	N/A		
	Basic	N/A	N/A		
	Proficient	N/A	N/A		
	Advanced	N/A	N/A		
	Total	N/A	N/A		
Government	No	Below Basic	3,093	14.8	
		Basic	7,381	35.3	
		Proficient	7,403	35.5	
		Advanced	3,004	14.4	
Total		20,881	100.0		
Yes	Below Basic	N/A	N/A		
	Basic	N/A	N/A		
	Proficient	N/A	N/A		
	Advanced	N/A	N/A		
	Total	N/A	N/A		
Am. History	No	Below Basic	162	23.6	
		Basic	172	25.1	
		Proficient	231	33.7	
		Advanced	120	17.5	
Total		685	100.0		
Yes	Below Basic	40	12.9		
	Basic	113	36.6		
	Proficient	103	33.3		
	Advanced	53	17.2		
	Total	309	100.0		

**Table 9.15: Achievement-Level Distributions—Migrant (continued)**

Test Period	Subject	Migrant	Achievement Level	Frequency	Percentage	
Spring 2010	English I	No	Below Basic	5,231	12.4	
			Basic	13,181	31.3	
			Proficient	16,639	39.5	
			Advanced	7,063	16.8	
				Total	42,114	100.0
	English I	Yes	Below Basic	10	25.6	
			Basic	20	51.3	
			Proficient	8	20.5	
			Advanced	1	2.6	
				Total	39	100.0
	Algebra II	No	Below Basic	4,226	19.4	
			Basic	8,440	38.8	
			Proficient	6,895	31.7	
			Advanced	2,179	10.0	
				Total	21,740	100.0
	Algebra II	Yes	Below Basic	N/A	N/A	
			Basic	N/A	N/A	
			Proficient	N/A	N/A	
			Advanced	N/A	N/A	
				Total	N/A	N/A
Geometry	No	Below Basic	5,122	19.2		
		Basic	7,874	29.5		
		Proficient	9,204	34.4		
		Advanced	4,535	17.0		
			Total	26,735	100.0	
Geometry	Yes	Below Basic	N/A	N/A		
		Basic	N/A	N/A		
		Proficient	N/A	N/A		
		Advanced	N/A	N/A		
			Total	N/A	N/A	
Government	No	Below Basic	4,580	12.5		
		Basic	13,638	37.1		
		Proficient	13,101	35.6		
		Advanced	5,440	14.8		
			Total	36,759	100.0	
Government	Yes	Below Basic	N/A	N/A		
		Basic	N/A	N/A		
		Proficient	N/A	N/A		
		Advanced	N/A	N/A		
			Total	N/A	N/A	
Am. History	No	Below Basic	10,308	31.7		
		Basic	9,014	27.7		
		Proficient	9,249	28.5		
		Advanced	3,924	12.1		
			Total	32,495	100.0	
Am. History	Yes	Below Basic	N/A	N/A		
		Basic	N/A	N/A		
		Proficient	N/A	N/A		
		Advanced	N/A	N/A		
			Total	N/A	N/A	

**Table 9.16: Achievement-Level Distributions—FRL**

Test Period	Subject	FRL	Achievement Level	Frequency	Percentage	
Fall 2009	English I	No	Below Basic	21	11.4	
			Basic	54	29.3	
			Proficient	69	37.5	
			Advanced	40	21.7	
				Total	184	100
	English I	Yes	Below Basic	19	15.1	
			Basic	60	47.6	
			Proficient	34	27	
			Advanced	13	10.3	
				Total	126	100
	Algebra II	No	Below Basic	29	7.4	
			Basic	116	29.5	
			Proficient	159	40.5	
			Advanced	89	22.6	
				Total	393	100
	Algebra II	Yes	Below Basic	19	15.4	
			Basic	53	43.1	
			Proficient	39	31.7	
			Advanced	12	9.8	
				Total	123	100
Geometry	No	Below Basic	27	6.1		
		Basic	77	17.3		
		Proficient	177	39.7		
		Advanced	165	37		
			Total	446	100	
Geometry	Yes	Below Basic	20	14.2		
		Basic	41	29.1		
		Proficient	57	40.4		
		Advanced	23	16.3		
			Total	141	100	
Government	No	Below Basic	1,009	8.2		
		Basic	3,612	29.3		
		Proficient	5,114	41.5		
		Advanced	2,597	21.1		
			Total	12,332	100	
Government	Yes	Below Basic	2,086	24.4		
		Basic	3,776	44.1		
		Proficient	2,290	26.8		
		Advanced	407	4.8		
			Total	8,559	100	
Am. History	No	Below Basic	78	17.1		
		Basic	117	25.7		
		Proficient	158	34.7		
		Advanced	102	22.4		
			Total	455	100	
Am. History	Yes	Below Basic	84	36.5		
		Basic	55	23.9		
		Proficient	73	31.7		
		Advanced	18	7.8		
			Total	230	100	

**Table 9.16: Achievement-Level Distributions—FRL (continued)**

Test Period	Subject	FRL	Achievement Level	Frequency	Percentage	
Spring 2010	English I	No	Below Basic	1,928	7.8	
			Basic	6,478	26.2	
			Proficient	10,775	43.6	
			Advanced	5,512	22.3	
				Total	24,693	100.0
	English I	Yes	Below Basic	3,313	19.0	
			Basic	6,723	38.5	
			Proficient	5,872	33.6	
			Advanced	1,552	8.9	
				Total	17,460	100.0
	Algebra II	No	Below Basic	2,168	15.0	
			Basic	5,390	37.4	
			Proficient	5,058	35.1	
			Advanced	1,800	12.5	
				Total	14,416	100.0
	Algebra II	Yes	Below Basic	2,061	28.1	
			Basic	3,054	41.6	
			Proficient	1,841	25.1	
			Advanced	379	5.2	
				Total	7,335	100.0
Geometry	No	Below Basic	2,273	13.7		
		Basic	4,592	27.7		
		Proficient	6,201	37.4		
		Advanced	3,515	21.2		
			Total	16,581	100.0	
Geometry	Yes	Below Basic	2,850	28.0		
		Basic	3,286	32.3		
		Proficient	3,010	29.6		
		Advanced	1,022	10.1		
			Total	10,168	100.0	
Government	No	Below Basic	1,889	8.0		
		Basic	7,803	32.9		
		Proficient	9,437	39.8		
		Advanced	4,589	19.3		
			Total	23,718	100.0	
Government	Yes	Below Basic	2,699	20.7		
		Basic	5,848	44.8		
		Proficient	3,666	28.1		
		Advanced	851	6.5		
			Total	13,064	100.0	
Am. History	No	Below Basic	4,643	23.9		
		Basic	5,312	27.4		
		Proficient	6,390	32.9		
		Advanced	3,057	15.8		
			Total	19,402	100.0	
Am. History	Yes	Below Basic	5,682	43.3		
		Basic	3,711	28.3		
		Proficient	2,862	21.8		
		Advanced	867	6.6		
			Total	13,122	100.0	

**Table 9.17: Achievement-Level Distributions—LEP**

Test Period	Subject	LEP	Achievement Level	Frequency	Percentage	
Fall 2009	English I	No	Below Basic	38	12.7	
			Basic	107	35.7	
			Proficient	102	34.0	
			Advanced	53	17.7	
				Total	300	100.0
		Yes	Below Basic	N/A	N/A	
			Basic	N/A	N/A	
			Proficient	N/A	N/A	
			Advanced	N/A	N/A	
				Total	N/A	N/A
	Algebra II	No	Below Basic	46	9.1	
			Basic	166	32.7	
Proficient			196	38.6		
Advanced			100	19.7		
			Total	508	100.0	
	Yes	Below Basic	N/A	N/A		
		Basic	N/A	N/A		
		Proficient	N/A	N/A		
		Advanced	N/A	N/A		
			Total	N/A	N/A	
Geometry	No	Below Basic	47	8.0		
		Basic	118	20.2		
		Proficient	233	39.8		
		Advanced	187	32.0		
			Total	585	100.0	
	Yes	Below Basic	N/A	N/A		
		Basic	N/A	N/A		
		Proficient	N/A	N/A		
		Advanced	N/A	N/A		
			Total	N/A	N/A	
Government	No	Below Basic	2,934	14.3		
		Basic	7,223	35.3		
		Proficient	7,319	35.8		
		Advanced	2,994	14.6		
			Total	20,470	100.0	
	Yes	Below Basic	161	38.2		
		Basic	165	39.2		
		Proficient	85	20.2		
		Advanced	10	2.4		
			Total	421	100.0	
Am. History	No	Below Basic	153	22.8		
		Basic	171	25.4		
		Proficient	229	34.1		
		Advanced	119	17.7		
			Total	672	100.0	
	Yes	Below Basic	N/A	N/A		
		Basic	N/A	N/A		
		Proficient	N/A	N/A		
		Advanced	N/A	N/A		
			Total	N/A	N/A	

**Table 9.17: Achievement-Level Distributions—LEP (continued)**

Test Period	Subject	LEP	Achievement Level	Frequency	Percentage	
Spring 2010	English I	No	Below Basic	5,049	12.1	
			Basic	12,964	31.2	
			Proficient	16,537	39.7	
			Advanced	7,057	17.0	
				Total	41,607	100.0
	English I	Yes	Below Basic	192	35.2	
			Basic	237	43.4	
			Proficient	110	20.1	
			Advanced	7	1.3	
				Total	546	100.0
	Algebra II	No	Below Basic	4,123	19.2	
			Basic	8,357	38.9	
			Proficient	6,854	31.9	
			Advanced	2,171	10.1	
				Total	21,505	100.0
	Algebra II	Yes	Below Basic	106	43.1	
			Basic	87	35.4	
			Proficient	45	18.3	
			Advanced	8	3.3	
				Total	246	100.0
Geometry	No	Below Basic	4,938	18.7		
		Basic	7,757	29.4		
		Proficient	9,138	34.7		
		Advanced	4,520	17.2		
			Total	26,353	100.0	
Geometry	Yes	Below Basic	185	46.7		
		Basic	121	30.6		
		Proficient	73	18.4		
		Advanced	17	4.3		
			Total	396	100.0	
Government	No	Below Basic	4,411	12.1		
		Basic	13,433	37.0		
		Proficient	13,038	35.9		
		Advanced	5,433	15.0		
			Total	36,315	100.0	
Government	Yes	Below Basic	177	37.9		
		Basic	218	46.7		
		Proficient	65	13.9		
		Advanced	7	1.5		
			Total	467	100.0	
Am. History	No	Below Basic	10,004	31.2		
		Basic	8,909	27.8		
		Proficient	9,198	28.7		
		Advanced	3,910	12.2		
			Total	32,021	100.0	
Am. History	Yes	Below Basic	321	63.8		
		Basic	114	22.7		
		Proficient	54	10.7		
		Advanced	14	2.8		
			Total	503	100.0	

**Table 9.18: Achievement-Level Distributions—Title I**

Test Period	Subject	Title I	Achievement Level	Frequency	Percentage
Fall 2009	English I	No	Below Basic	39	12.7
			Basic	113	36.7
			Proficient	103	33.4
			Advanced	53	17.2
			Total	308	100.0
		Yes	N/A	N/A	
	Algebra II	No	Below Basic	48	9.3
			Basic	169	32.8
			Proficient	198	38.4
			Advanced	101	19.6
			Total	516	100.0
		Yes	N/A	N/A	
	Geometry	No	Below Basic	47	8.0
			Basic	118	20.1
			Proficient	234	39.9
			Advanced	187	31.9
			Total	586	100.0
		Yes	N/A	N/A	
Government	No	Below Basic	2,802	14.0	
		Basic	7,051	35.1	
		Proficient	7,234	36.0	
		Advanced	2,983	14.9	
		Total	20,070	100.0	
	Yes	293	35.7		
Am. History	No	Below Basic	159	23.4	
		Basic	170	25.0	
		Proficient	231	34.0	
		Advanced	120	17.6	
		Total	680	100.0	
	Yes	N/A	N/A		

**Table 9.18: Achievement-Level Distributions—Title I (continued)**

Test Period	Subject	Title I	Achievement Level	Frequency	Percentage	
Spring 2010	English I	No	Below Basic	4,827	11.9	
			Basic	12,557	30.9	
			Proficient	16,224	40.0	
			Advanced	6,973	17.2	
				Total	40,581	100.0
	English I	Yes	Below Basic	414	26.3	
			Basic	644	41.0	
			Proficient	423	26.9	
			Advanced	91	5.8	
				Total	1,572	100.0
	Algebra II	No	Below Basic	3,712	17.8	
			Basic	8,153	39.2	
			Proficient	6,785	32.6	
			Advanced	2,160	10.4	
				Total	20,810	100.0
	Algebra II	Yes	Below Basic	517	54.9	
			Basic	291	30.9	
			Proficient	114	12.1	
			Advanced	19	2.0	
				Total	941	100.0
Geometry	No	Below Basic	4,542	17.7		
		Basic	7,555	29.5		
		Proficient	9,024	35.2		
		Advanced	4,486	17.5		
			Total	25,607	100.0	
Geometry	Yes	Below Basic	581	50.9		
		Basic	323	28.3		
		Proficient	187	16.4		
		Advanced	51	4.5		
			Total	1,142	100.0	
Government	No	Below Basic	4,189	11.8		
		Basic	13,148	36.9		
		Proficient	12,904	36.2		
		Advanced	5,403	15.2		
			Total	35,644	100.0	
Government	Yes	Below Basic	399	35.1		
		Basic	503	44.2		
		Proficient	199	17.5		
		Advanced	37	3.3		
			Total	1,138	100.0	
Am. History	No	Below Basic	9,431	30.4		
		Basic	8,664	27.9		
		Proficient	9,078	29.2		
		Advanced	3,892	12.5		
			Total	31,065	100.0	
Am. History	Yes	Below Basic	894	61.3		
		Basic	359	24.6		
		Proficient	174	11.9		
		Advanced	32	2.2		
			Total	1,459	100.0	

**Table 9.19: Achievement-Level Distributions—IEP**

Test Period	Subject	IEP	Achievement Level	Frequency	Percentage
Fall 2009	English I	No	Below Basic	27	10.0
			Basic	94	34.7
			Proficient	100	36.9
			Advanced	50	18.5
			Total	271	100.0
		Yes	Below Basic	13	33.3
	Basic	20	51.3		
	Proficient	3	7.7		
	Advanced	3	7.7		
	Total	39	100.0		
	Algebra II	No	Below Basic	44	8.7
			Basic	164	32.5
			Proficient	196	38.8
			Advanced	101	20.0
			Total	505	100.0
		Yes	Below Basic	N/A	N/A
	Basic	N/A	N/A		
	Proficient	N/A	N/A		
Advanced	N/A	N/A			
Total	N/A	N/A			
Geometry	No	Below Basic	42	7.4	
		Basic	114	20.0	
		Proficient	228	40.1	
		Advanced	185	32.5	
		Total	569	100.0	
	Yes	Below Basic	N/A	N/A	
Basic	N/A	N/A			
Proficient	N/A	N/A			
Advanced	N/A	N/A			
Total	N/A	N/A			
Government	No	Below Basic	2,345	12.3	
		Basic	6,651	35.0	
		Proficient	7,074	37.2	
		Advanced	2,949	15.5	
		Total	19,019	100.0	
	Yes	Below Basic	750	40.1	
Basic	737	39.4			
Proficient	330	17.6			
Advanced	55	2.9			
Total	1,872	100.0			
Am. History	No	Below Basic	133	20.9	
		Basic	164	25.7	
		Proficient	224	35.2	
		Advanced	116	18.2	
		Total	637	100.0	
	Yes	Below Basic	29	60.4	
Basic	8	16.7			
Proficient	7	14.6			
Advanced	4	8.3			
Total	48	100.0			

**Table 9.19: Achievement-Level Distributions—IEP (continued)**

Test Period	Subject	IEP	Achievement Level	Frequency	Percentage
Spring 2010	English I	No	Below Basic	3,502	9.1
			Basic	11,764	30.6
			Proficient	16,154	42.1
			Advanced	6,978	18.2
			Total	38,398	100.0
	English I	Yes	Below Basic	1,739	46.3
			Basic	1,437	38.3
			Proficient	493	13.1
			Advanced	86	2.3
			Total	3,755	100.0
	Algebra II	No	Below Basic	3,931	18.6
			Basic	8,256	39.0
			Proficient	6,825	32.2
			Advanced	2,159	10.2
			Total	21,171	100.0
	Algebra II	Yes	Below Basic	298	51.4
			Basic	188	32.4
			Proficient	74	12.8
			Advanced	20	3.4
			Total	580	100.0
Geometry	No	Below Basic	4,513	17.7	
		Basic	7,525	29.5	
		Proficient	9,022	35.3	
		Advanced	4,480	17.5	
		Total	25,540	100.0	
Geometry	Yes	Below Basic	610	50.5	
		Basic	353	29.2	
		Proficient	189	15.6	
		Advanced	57	4.7	
		Total	1,209	100.0	
Government	No	Below Basic	3,536	10.4	
		Basic	12,479	36.7	
		Proficient	12,680	37.3	
		Advanced	5,319	15.6	
		Total	34,014	100.0	
Government	Yes	Below Basic	1,052	38.0	
		Basic	1,172	42.3	
		Proficient	423	15.3	
		Advanced	121	4.4	
		Total	2,768	100.0	
Am. History	No	Below Basic	8,969	29.6	
		Basic	8,579	28.3	
		Proficient	8,933	29.5	
		Advanced	3,836	12.7	
		Total	30,317	100.0	
Am. History	Yes	Below Basic	1,356	61.4	
		Basic	444	20.1	
		Proficient	319	14.5	
		Advanced	88	4.0	
		Total	2,207	100.0	

**Table 9.20: Achievement-Level Distributions—Accommodations**

Test Period	Subject	Accommodations	Achievement Level	Frequency	Percentage
Fall 2009	English I	No	Below Basic	32	11.0
			Basic	103	35.5
			Proficient	102	35.2
			Advanced	53	18.3
			Total	290	100.0
	English I	Yes	Below Basic	N/A	N/A
			Basic	N/A	N/A
			Proficient	N/A	N/A
			Advanced	N/A	N/A
			Total	N/A	N/A
	Algebra II	No	Below Basic	48	9.3
			Basic	168	32.6
Proficient			198	38.4	
Advanced			101	19.6	
		Total	515	100.0	
Algebra II	Yes	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
Geometry	No	Below Basic	44	7.6	
		Basic	117	20.2	
		Proficient	231	39.9	
		Advanced	187	32.3	
		Total	579	100.0	
Geometry	Yes	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	
Government	No	Below Basic	2,777	13.8	
		Basic	7,104	35.2	
		Proficient	7,297	36.2	
		Advanced	2,987	14.8	
		Total	20,165	100.0	
Government	Yes	Below Basic	318	43.8	
		Basic	284	39.1	
		Proficient	107	14.7	
		Advanced	17	2.3	
		Total	726	100.0	
Am. History	No	Below Basic	148	22.3	
		Basic	167	25.2	
		Proficient	229	34.5	
		Advanced	119	17.9	
		Total	663	100.0	
Am. History	Yes	Below Basic	N/A	N/A	
		Basic	N/A	N/A	
		Proficient	N/A	N/A	
		Advanced	N/A	N/A	
		Total	N/A	N/A	

**Table 9.20: Achievement-Level Distributions—Accommodations (continued)**

Test Period	Subject	Accommodations	Achievement Level	Frequency	Percentage
Spring 2010	English I	No	Below Basic	4,244	10.6
			Basic	12,476	31.0
			Proficient	16,447	40.9
			Advanced	7,026	17.5
			Total	40,193	100.0
	English I	Yes	Below Basic	997	50.9
			Basic	725	37.0
			Proficient	200	10.2
			Advanced	38	1.9
			Total	1,960	100.0
	Algebra II	No	Below Basic	4,157	19.2
			Basic	8,386	38.8
			Proficient	6,882	31.9
			Advanced	2,175	10.1
			Total	21,600	100.0
	Algebra II	Yes	Below Basic	72	47.7
Basic			58	38.4	
Proficient			17	11.3	
Advanced			4	2.6	
		Total	151	100.0	
Geometry	No	Below Basic	4,943	18.7	
		Basic	7,767	29.4	
		Proficient	9,159	34.7	
		Advanced	4,520	17.1	
		Total	26,389	100.0	
Geometry	Yes	Below Basic	180	50.0	
		Basic	111	30.8	
		Proficient	52	14.4	
		Advanced	17	4.7	
		Total	360	100.0	
Government	No	Below Basic	4,151	11.6	
		Basic	13,223	37.0	
		Proficient	12,956	36.3	
		Advanced	5,409	15.1	
		Total	35,739	100.0	
Government	Yes	Below Basic	437	41.9	
		Basic	428	41.0	
		Proficient	147	14.1	
		Advanced	31	3.0	
		Total	1,043	100.0	
Am. History	No	Below Basic	9,735	30.7	
		Basic	8,864	28.0	
		Proficient	9,162	28.9	
		Advanced	3,902	12.3	
		Total	31,663	100.0	
Am. History	Yes	Below Basic	590	68.5	
		Basic	159	18.5	
		Proficient	90	10.5	
		Advanced	22	2.6	
		Total	861	100.0	



## CHAPTER 10: RELIABILITY

### 10.1 Introduction

The Missouri Department of Elementary and Secondary Education (DESE) is required by federal law to ensure that the instruments used to measure student achievement for school accountability provide reliable results. This chapter provides evidence that scores from the Missouri End-of-Course (EOC) Assessments measure student achievement in a reliable manner and that the size of the measurement error associated with reported test scores is reasonable, especially at the Proficient cut score.

### 10.2 Reliability and Measurement Error

#### 10.2.1 Defining Reliability

*Reliability* refers to the consistency of student test scores. *Measurement error* refers to the random variability in the test scores. Both are indicators of the degree of precision in a test score. In general, measurement error and reliability are inversely related. When measurement error is large, reliability is small. Increasing reliability by minimizing measurement error is an important goal in the construction of any test.

Estimating the size of the measurement error associated with a true score is the key to estimating reliability. Errors in measurement can result from any of a multitude of factors, including environmental factors (e.g., testing conditions) and examinee factors (e.g., fatigue, stress). Feldt and Brennan (1989) note that “Quantification of the consistency and inconsistency in examinee performance constitutes the essence of reliability analysis” (p. 105). Classical test theory (CTT) provides a means for this quantification of examinee inconsistency (i.e., measurement error). This approach builds on the notion of an ideal error-free, or true, measurement score. Any observed measurement, such as test score  $X$ , is defined as a composite of true score,  $T$ , and its associated error:

$$X = T + \text{error.}$$

The definitions or assumptions in CTT lead to several important properties. For example, it can be demonstrated that observed score variance equals the sum of true score variance plus error variance:

$$\sigma_x^2 = \sigma_t^2 + \sigma_e^2.$$

The relationship among variance terms (i.e.,  $\sigma_x^2$ ,  $\sigma_t^2$ ,  $\sigma_e^2$ ) is critical to a more thorough understanding of important CTT concepts, including reliability and the standard error of measurement (*SEM*). For example, CTT equivalence reliability is defined as the correlation between observed scores on parallel forms, which is equal to

$$\rho_{x_1 x_2} = \sigma_t^2 / \sigma_x^2.$$

Reliability in CTT is thus conceptualized as true score variance divided by observed score variance. With just a few algebraic steps, the CTT definition of the *SEM* can be derived:

$$\sigma_e = \sigma_x \sqrt{1 - \rho_{x_1 x_2}}.$$

Although the conceptualizations of reliability and *SEM* are relatively straightforward, issues underlying the estimation of reliability are not.

### **10.2.2 Estimating Reliability**

Reliability can be estimated via the correlation of scores on parallel forms (equivalence reliability) or from test-retest data (stability reliability), or it can be estimated from a single test administration (internal consistency reliability) using any one of a variety of techniques (e.g., Brown 1910; Cronbach 1951; Kuder and Richardson 1937). A very popular index for describing internal consistency reliability based on a single test administration is Cronbach's coefficient alpha, which provides an estimate of reliability that is mathematically equivalent to the average of all possible split-half reliability estimates.

### **10.2.3 Sources of Measurement Error**

As noted above, errors in measurement can result from environmental factors and examinee factors. To reduce other sources of measurement error, the scoring of student responses to selected response (SR) items was done electronically. Scoring error may result from improper coding or extraneous marks on scannable response sheets. The size of this sort of error is usually small and is controlled through standardized test administration procedures (including detailed instructions on how to fill out response sheets and how to erase extraneous markings) and quality control measures implemented during the scanning process.

### **10.3 Evidence of Raw-Score Internal Consistency**

Consistency of individual student performance was estimated using Cronbach's coefficient alpha. As previously noted, coefficient alpha provides an estimate of reliability that is mathematically equivalent to the average of all possible split-half reliability estimates. Alpha is an appropriate index of internal consistency for use on untimed tests such as the MO EOC Assessments. Cronbach's alpha can be interpreted as a lower bound to reliability and can be estimated using the following formula:

$$\alpha = \frac{n}{n-1} \left[ 1 - \frac{\sum_{i=1}^n \sigma_{Y_i}^2}{\sigma_X^2} \right],$$

where  $n$  is the number of items,  $\sigma_{Y_i}^2$  is the variance of item  $i$ , and  $\sigma_X^2$  is the variance of the total score. Following this, *SEM* can be interpreted as “the square root of the average of the person-specific error variances of all examinees who participated in the reliability

estimation experiment” (Traub 1994, p. 114). *SEMs* were calculated using the following formula:

$$SEM = S_x \sqrt{1 - \alpha},$$

where  $S_x$  is the standard deviation (*SD*) of observed total scores. Separate analyses were performed for each EOC content area. Tables 10.1 to 10.10 show the reliability coefficients (Cronbach’s alpha) and *SEMs* based on the raw-score metric for the total population and for select student subgroups.

**Table 10.1: Alpha Coefficients and Standard Errors of Measurement, English I, Fall 2009**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	23.61	7.55	310	0.86	2.80
<b>Gender</b>					
Female	25.09	7.70	141	0.87	2.75
Male	22.38	7.23	169	0.85	2.83
<b>Ethnicity</b>					
White	24.16	7.57	256	0.86	2.78
Black	N/A	N/A	N/A	N/A	N/A
Hispanic	N/A	N/A	N/A	N/A	N/A
Asian	N/A	N/A	N/A	N/A	N/A
Native American	N/A	N/A	N/A	N/A	N/A
<b>LEP</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.82	7.54	300	0.86	2.79
<b>IEP</b>					
Yes	18.00	7.05	39	0.83	2.94
No	24.42	7.29	271	0.85	2.78
<b>Migrant</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.61	7.57	309	0.86	2.80
<b>FRL</b>					
Yes	21.70	6.93	126	0.83	2.85
No	24.92	7.70	184	0.87	2.76
<b>Title I</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.68	7.53	308	0.86	2.80
<b>Accommodations</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	24.16	7.41	290	0.86	2.79

**Table 10.2: Alpha Coefficients and Standard Errors of Measurement, English I, Spring 2010**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	24.99	7.33	42,153	0.85	2.81
<b>Gender</b>					
Female	25.67	7.15	20,730	0.85	2.78
Male	24.35	7.44	21,410	0.85	2.83
<b>Ethnicity</b>					
White	25.65	7.14	34,827	0.85	2.79
Black	21.07	7.14	4,936	0.83	2.93
Hispanic	22.72	7.50	1,515	0.85	2.90
Asian	25.50	7.68	632	0.87	2.76
Native American	24.66	7.44	221	0.86	2.79
<b>LEP</b>					
Yes	18.52	6.64	546	0.80	2.97
No	25.08	7.30	41,607	0.85	2.81
<b>IEP</b>					
Yes	17.11	6.71	3,755	0.80	2.97
No	25.77	6.92	38,398	0.84	2.79
<b>Migrant</b>					
Yes	19.97	6.22	39	0.76	3.05
No	25.00	7.33	42,114	0.85	2.81
<b>FRL</b>					
Yes	22.60	7.27	17,460	0.84	2.90
No	26.69	6.88	24,693	0.84	2.74
<b>Title I</b>					
Yes	20.88	7.20	1,572	0.83	2.93
No	25.15	7.29	40,581	0.85	2.80
<b>Accommodations</b>					
Yes	16.31	6.44	1,960	0.79	2.97
No	25.42	7.10	40,193	0.84	2.80

**Table 10.3: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Fall 2009**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	24.14	7.35	516	0.85	2.87
<b>Gender</b>					
Female	23.47	7.50	273	0.85	2.88
Male	24.88	7.11	243	0.84	2.86
<b>Ethnicity</b>					
White	24.82	7.34	410	0.85	2.84
Black	21.64	5.67	59	0.71	3.04
Hispanic	18.67	8.21	30	0.88	2.85
Asian	N/A	N/A	N/A	N/A	N/A
Native American	N/A	N/A	N/A	N/A	N/A
<b>LEP</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	24.20	7.32	508	0.85	2.87
<b>IEP</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	24.29	7.29	505	0.85	2.87
<b>Migrant</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	24.16	7.33	515	0.85	2.87
<b>FRL</b>					
Yes	21.06	7.06	123	0.83	2.92
No	25.10	7.18	393	0.84	2.85
<b>Title I</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	24.14	7.35	516	0.85	2.87
<b>Accommodations</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	24.15	7.35	515	0.85	2.87

**Table 10.4: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Spring 2010**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	22.26	7.23	21,751	0.84	2.90
<b>Gender</b>					
Female	21.67	7.02	11,766	0.83	2.93
Male	22.95	7.42	9,982	0.85	2.87
<b>Ethnicity</b>					
White	23.20	7.00	17,474	0.83	2.89
Black	17.15	6.18	3,067	0.77	2.97
Hispanic	20.14	7.17	717	0.83	2.93
Asian	24.55	7.46	367	0.85	2.85
Native American	21.51	6.79	117	0.82	2.91
<b>LEP</b>					
Yes	18.12	6.80	246	0.81	2.98
No	22.30	7.23	21,505	0.84	2.90
<b>IEP</b>					
Yes	16.91	7.03	580	0.83	2.93
No	22.40	7.18	21,171	0.84	2.90
<b>Migrant</b>					
Yes					
No	22.26	7.24	21,740	0.84	2.90
<b>FRL</b>					
Yes	20.11	6.86	7,335	0.82	2.94
No	23.35	7.17	14,416	0.84	2.88
<b>Title I</b>					
Yes	16.07	6.26	941	0.78	2.97
No	22.54	7.15	20,810	0.84	2.90
<b>Accommodations</b>					
Yes	16.93	6.62	151	0.80	2.96
No	22.29	7.23	21,600	0.84	2.90

**Table 10.5: Alpha Coefficients and Standard Errors of Measurement, Geometry, Fall 2009**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	27.06	7.54	587	0.88	2.66
<b>Gender</b>					
Female	26.14	7.56	305	0.87	2.71
Male	28.05	7.41	282	0.88	2.61
<b>Ethnicity</b>					
White	27.42	7.50	492	0.88	2.64
Black	24.47	6.56	51	0.81	2.86
Hispanic	N/A	N/A	N/A	N/A	N/A
Asian	N/A	N/A	N/A	N/A	N/A
Native American	N/A	N/A	N/A	N/A	N/A
<b>LEP</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	27.05	7.55	585	0.88	2.66
<b>IEP</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	27.21	7.44	569	0.87	2.66
<b>Migrant</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	27.06	7.54	587	0.88	2.66
<b>FRL</b>					
Yes	23.67	7.66	141	0.86	2.82
No	28.13	7.19	446	0.87	2.61
<b>Title I</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	27.04	7.54	586	0.88	2.67
<b>Accommodations</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	27.15	7.48	579	0.87	2.66

**Table 10.6: Alpha Coefficients and Standard Errors of Measurement, Geometry, Spring 2010**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	23.70	7.39	26,749	0.86	2.77
<b>Gender</b>					
Female	23.14	7.28	13,974	0.85	2.80
Male	24.32	7.46	12,771	0.87	2.73
<b>Ethnicity</b>					
White	24.85	7.00	20,884	0.85	2.74
Black	18.33	6.67	4,224	0.81	2.87
Hispanic	21.44	7.20	1,048	0.84	2.84
Asian	26.13	7.99	435	0.89	2.67
Native American	23.15	7.64	150	0.87	2.78
<b>LEP</b>					
Yes	18.37	6.84	396	0.82	2.91
No	23.78	7.37	26,353	0.86	2.76
<b>IEP</b>					
Yes	17.71	7.04	1,209	0.84	2.85
No	23.98	7.29	25,540	0.86	2.76
<b>Migrant</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.70	7.39	26,735	0.86	2.77
<b>FRL</b>					
Yes	21.54	7.27	10,168	0.85	2.83
No	25.02	7.15	16,581	0.85	2.73
<b>Title I</b>					
Yes	17.67	7.08	1,142	0.84	2.86
No	23.97	7.29	25,607	0.86	2.76
<b>Accommodations</b>					
Yes	17.76	6.77	360	0.82	2.86
No	23.78	7.37	26,389	0.86	2.76

**Table 10.7: Alpha Coefficients and Standard Errors of Measurement, Government, Fall 2009**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	24.36	7.74	20,891	0.86	2.86
<b>Gender</b>					
Female	23.66	7.50	10,356	0.85	2.90
Male	25.05	7.90	10,507	0.87	2.83
<b>Ethnicity</b>					
White	25.98	7.35	14,635	0.85	2.81
Black	19.66	6.72	4,842	0.80	3.00
Hispanic	21.66	7.33	721	0.84	2.95
Asian	27.41	8.45	505	0.90	2.64
Native American	22.52	6.80	130	0.81	2.95
<b>LEP</b>					
Yes	18.63	6.91	421	0.82	2.96
No	24.47	7.71	20,470	0.86	2.86
<b>IEP</b>					
Yes	18.48	7.08	1,872	0.82	2.98
No	24.93	7.56	19,019	0.86	2.85
<b>Migrant</b>					
Yes					
No	24.36	7.74	20,881	0.86	2.86
<b>FRL</b>					
Yes	21.02	7.03	8,559	0.82	2.98
No	26.67	7.36	12,332	0.86	2.77
<b>Title I</b>					
Yes	19.03	7.01	821	0.82	2.99
No	24.57	7.69	20,070	0.86	2.86
<b>Accommodations</b>					
Yes	17.88	6.81	726	0.81	2.99
No	24.59	7.67	20,165	0.86	2.86

**Table 10.8: Alpha Coefficients and Standard Errors of Measurement, Government, Spring 2010**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	24.37	7.87	36,782	0.87	2.84
<b>Gender</b>					
Female	23.80	7.76	18,210	0.86	2.87
Male	24.94	7.93	18,550	0.87	2.81
<b>Ethnicity</b>					
White	25.15	7.68	30,589	0.87	2.81
Black	19.48	7.21	4,263	0.83	3.00
Hispanic	21.60	7.69	1,106	0.85	2.94
Asian	24.88	8.43	597	0.89	2.81
Native American	24.13	7.81	207	0.87	2.84
<b>LEP</b>					
Yes	17.45	6.46	467	0.78	3.03
No	24.46	7.85	36,315	0.87	2.84
<b>IEP</b>					
Yes	18.07	7.40	2,768	0.84	2.98
No	24.88	7.68	34,014	0.86	2.83
<b>Migrant</b>					
Yes					
No	24.38	7.87	36,759	0.87	2.84
<b>FRL</b>					
Yes	21.34	7.49	13,064	0.84	2.96
No	26.04	7.57	23,718	0.87	2.77
<b>Title I</b>					
Yes	18.40	7.25	1,138	0.83	2.99
No	24.56	7.81	35,644	0.87	2.83
<b>Accommodations</b>					
Yes	17.41	7.10	1,043	0.82	2.98
No	24.57	7.80	35,739	0.87	2.84

**Table 10.9: Alpha Coefficients and Standard Errors of Measurement, American History, Fall 2009**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	23.26	7.18	685	0.85	2.81
<b>Gender</b>					
Female	21.60	6.84	334	0.83	2.83
Male	24.83	7.15	351	0.85	2.78
<b>Ethnicity</b>					
White	23.54	7.14	567	0.85	2.81
Black	22.21	6.85	84	0.84	2.78
Hispanic	N/A	N/A	N/A	N/A	N/A
Asian	N/A	N/A	N/A	N/A	N/A
Native American	N/A	N/A	N/A	N/A	N/A
<b>LEP</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.39	7.10	672	0.84	2.80
<b>IEP</b>					
Yes	17.77	7.31	48	0.84	2.92
No	23.67	7.00	637	0.84	2.80
<b>Migrant</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.26	7.18	685	0.85	2.81
<b>FRL</b>					
Yes	20.57	7.14	230	0.84	2.87
No	24.62	6.81	455	0.83	2.78
<b>Title I</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.31	7.17	680	0.85	2.81
<b>Accommodations</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	23.47	7.11	663	0.84	2.81

**Table 10.10: Alpha Coefficients and Standard Errors of Measurement, American History, Spring 2010**

<b>Group</b>	<b>Mean Raw Score</b>	<b>SD Raw Score</b>	<b>N Count</b>	<b>Reliability</b>	<b>SEM</b>
<b>All Students</b>	22.46	7.23	32,524	0.83	2.96
<b>Gender</b>					
Female	21.58	6.96	16,209	0.82	2.99
Male	23.35	7.39	16,295	0.84	2.93
<b>Ethnicity</b>					
White	23.01	7.13	26,838	0.83	2.95
Black	19.39	7.00	3,820	0.81	3.03
Hispanic	20.21	7.35	1,198	0.83	3.01
Asian	22.84	7.66	475	0.85	2.93
Native American	21.80	6.58	167	0.79	3.01
<b>LEP</b>					
Yes	16.90	6.26	503	0.76	3.04
No	22.55	7.22	32,021	0.83	2.96
<b>IEP</b>					
Yes	17.46	7.03	2,207	0.81	3.02
No	22.83	7.11	30,317	0.83	2.96
<b>Migrant</b>					
Yes	N/A	N/A	N/A	N/A	N/A
No	22.47	7.23	32,495	0.83	2.96
<b>FRL</b>					
Yes	20.27	6.98	13,122	0.81	3.02
No	23.95	7.02	19,402	0.83	2.92
<b>Title I</b>					
Yes	17.14	6.45	1,459	0.78	3.01
No	22.71	7.17	31,065	0.83	2.96
<b>Accommodations</b>					
Yes	16.19	6.68	861	0.80	3.02
No	22.63	7.17	31,663	0.83	2.96

#### 10.4 Conditional Standard Error Estimates for Scale Scores

The overall *SEM* in Tables 10.1 to 10.10 represents the *SD* of projected replications of the testing procedure averaged over all students. In contrast, conditional standard errors of measurement (*CSEMs*) are conditioned on the ability of the student. Rasch-based *CSEMs* ( $CSEM(\theta)$ ) for each scale score are defined as the reciprocal of the square root of the test information function ( $I(\theta)$ ) at the point on the ability continuum that corresponds to each scale score (Hambleton and Swaminathan 1985):

$$CSEM(\theta) = \frac{1}{\sqrt{I(\theta)}}.$$

*CSEMs* are especially useful for characterizing measurement precision in the neighborhood of score levels used for decision making, such as cut scores at various achievement levels. The *CSEMs* for the Proficient cut scores for the MO EOC Assessments are presented in Table 10.11. *CSEMs* for other scale scores are reported in Chapter 7 of this technical report. Note that *CSEMs* are smaller in the middle of the score distribution than at the extremes. This pattern is expected for item response theory (IRT)-based *CSEMs*. The value for all *CSEMs* was between 7 and 9 scale-score points. These values reflect a reasonable amount of measurement error at the Proficient cut for making adequate yearly progress (AYP) determinations for federal accountability.

**Table 10.11: *CSEMs* at the Proficient Cut Score**

Test Event	Subject	SS Cut*	<i>CSEM</i>
<b>Fall 2009</b>	English I	200	8
	Algebra II	200	7
	Geometry	200	7
	Government	200	7
	U. S. History	200	9
<b>Spring 2010</b>	English I	200	8
	Algebra II	200	7
	Geometry	200	8
	Government	200	7
	U. S. History	200	9

\* See Tables 7.25 through 7.34 in Chapter 7 for the *CSEM* at each scale score.

## 10.5 Reliability of Classifications

The reliability of student achievement-level classifications (i.e., Below Basic, Basic, Proficient, and Advanced) was evaluated using a computer program developed by Huynh (1979). This FORTRAN program is based on the beta-binomial model that also provides standard errors (*SEs*) for the consistency estimates. Classification consistency refers to the degree to which each student's achievement level can be replicated and is similar to the traditional test-retest or equivalent forms reliability. Using the maximum possible score, mean, *SD*, and KR-21 reliability estimate, the program computes parameters ( $\alpha$ ,  $\beta$ ) for the beta-binomial distribution. Kappa indices, which estimate the level of improvement in decision consistency beyond chance when test data are used, are then computed (Huynh 1979).

Tables 10.12 and 10.13 show the results of the classification and decision consistency analyses for Fall 2009 and Spring 2010 administrations for the five MO EOC Assessments. As noted above, the raw agreement index is a classification consistency index that estimates the percentage of examinees who would (hypothetically) be assigned to the same achievement level if the same test was administered a second time or an equivalent test was administered under the same conditions. The agreement consistency indices (*p*) for the EOC Assessments were generally in the low to mid 60s. These values reflect classification agreement consistency for the four performance categories: Below

Basic, Basic, Proficient, and Advanced. Had a student been regarded as “pass” if his or her achievement level was Proficient or Advanced and as “fail” if his or her achievement level was Below Basic or Basic, the agreement consistency indices would have been 15 to 20 percent higher, as indicated in Tables 10.14 and 10.15. The latter classification accuracy is directly related to determining the accuracy of proficiency classifications for the No Child Left Behind Act (NCLB).

**Table 10.12: Classification Consistency Coefficients**

Year	N (Items)	Raw Cut Scores			Mean	SD	Kappa	SE ( $\kappa$ )
		Basic	Proficient	Advanced				
<b>Fall 2009</b>								
English I	40	16	25	33	23.46	7.56	0.49	0.0139
Algebra II	40	16	24	33	24.12	7.34	0.48	0.0110
Geometry	40	17	24	32	27.00	7.56	0.51	0.0102
Government	40	15	25	34	24.30	7.75	0.52	0.0016
Am. History	40	19	25	32	23.20	7.19	0.45	0.0104
<b>Spring 2010</b>								
English I	40	16	25	33	24.98	7.33	0.48	0.0012
Algebra II	40	16	24	33	22.24	7.24	0.47	0.0017
Geometry	40	17	24	32	23.69	7.39	0.47	0.0016
Government	40	15	25	34	24.36	7.87	0.52	0.0012
Am. History	40	19	25	32	22.45	7.24	0.45	0.0015

**Table 10.13: Raw Agreement Consistency Coefficients**

Year	N (Items)	Raw Cut Scores			Mean	SD	p	SE (p)
		Basic	Proficient	Advanced				
<b>Fall 2009</b>								
English I	40	16	25	33	23.46	7.56	0.64	0.0055
Algebra II	40	16	24	33	24.12	7.34	0.64	0.0039
Geometry	40	17	24	32	27.00	7.56	0.66	0.0064
Government	40	15	25	34	24.30	7.75	0.67	0.0005
Am. History	40	19	25	32	23.20	7.19	0.60	0.0063
<b>Spring 2010</b>								
English I	40	16	25	33	24.98	7.33	0.64	0.0005
Algebra II	40	16	24	33	22.24	7.24	0.63	0.0006
Geometry	40	17	24	32	23.69	7.39	0.62	0.0008
Government	40	15	25	34	24.36	7.87	0.67	0.0004
Am. History	40	19	25	32	22.45	7.24	0.60	0.0010

**Table 10.14: Classification Consistency Coefficients (Two Classification Categories)**

Year	N (Items)	Raw Cut Scores		Mean	SD	Kappa	SE ( $\kappa$ )
		Proficient/ Advanced					
<b>Fall 2009</b>							
English I	40	25		23.46	7.56	0.66	0.0145
Algebra II	40	24		24.12	7.34	0.65	0.0117
Geometry	40	24		27.00	7.56	0.68	0.0109
Government	40	25		24.30	7.75	0.68	0.0017
Am. History	40	25		23.20	7.19	0.64	0.0105
<b>Spring 2010</b>							
English I	40	25		24.98	7.33	0.66	0.0013
Algebra II	40	24		22.24	7.24	0.64	0.0019
Geometry	40	24		23.69	7.39	0.65	0.0016
Government	40	25		24.36	7.87	0.68	0.0013
Am. History	40	25		22.45	7.24	0.63	0.0016

**Table 10.15: Raw Agreement Consistency Coefficients (Two Classification Categories)**

Year	N (Items)	Raw Cut Scores		Mean	SD	p	SE (p)
		Proficient/ Advanced					
<b>Summer 2009</b>							
English I	40	25		23.46	7.56	0.83	0.0072
Algebra II	40	24		24.12	7.34	0.83	0.0058
Geometry	40	24		27.00	7.56	0.86	0.0044
Government	40	25		24.30	7.75	0.84	0.0009
Am. History	40	25		23.20	7.19	0.82	0.0052
<b>Spring 2010</b>							
English I	40	25		24.98	7.33	0.83	0.0006
Algebra II	40	24		22.24	7.24	0.82	0.0009
Geometry	40	24		23.69	7.39	0.83	0.0008
Government	40	25		24.36	7.87	0.84	0.0006
Am. History	40	25		22.45	7.24	0.82	0.0007



## CHAPTER 11: VALIDITY

### 11.1 Introduction

According to the Standards (AERA, APA, and NCME 1999), “Ultimately, the validity of an intended interpretation of test scores relies on all the available evidence relevant to the technical quality of a testing program. This includes evidence of careful test construction; adequate score reliability; appropriate test administration and scoring; accurate score scaling, equating, and standard setting; and careful attention to fairness for all examinees” (p. 17). While this chapter summarizes evidence that supports claims about the validity of Missouri End-of-Course (MO EOC) Assessment scores, many other parts of this technical report also provide appropriate evidence for validity. Some of this evidence is cross-referenced below for added convenience. The procedural and empirical evidence available, along with the rationale presented below, provides support for the standards-based interpretations of the MO EOC Assessments.

This chapter begins with a brief review of important federal statutes that require the MO EOC Assessments and explains the purposes and intended uses of test scores, suggesting the value implications of these assessments for schools, teachers, students, and parents. Validity evidence related to test content is presented in terms of the adequacy and appropriateness of the EOC Assessments for measuring progress on the Missouri content standards. Then, validity evidence based on the internal structure of the MO EOC Assessments is provided through a correlational analysis of MO EOC Assessment content clusters. References to specific standards are provided where appropriate.

### 11.2 Federal Authority for School Accountability

The United States Department of Education bases accountability on a school’s achievement of adequate yearly progress (AYP) in reading/language arts and mathematics. AYP determinations refer to the minimum improvement required of each school and district during the course of one year. For Missouri high schools and school districts, AYP is set in terms of the percentage of all students, and all student groups of sufficient size, scoring Proficient or above on the MO EOC Phase I tests in English II and Algebra I.

### 11.3 Purpose and Intended Uses of Test Scores

The *Standards* state that “Validation logically begins with an explicit statement of the proposed interpretation of the test scores, along with a rationale for the relevance of the interpretation to the proposed use” (AERA, APA, and NCME 1999).<sup>9</sup> The MO EOC Assessments were developed for the following purposes and uses:

- Measuring and reflecting students’ mastery toward post-secondary readiness
- Identifying students’ strengths and weaknesses
- Communicating expectations for all students

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<sup>9</sup> **Standard 1.2:** The test developer should set forth clearly how test scores are intended to be interpreted and used. The population(s) for which a test is appropriate should be clearly delimited, and the construct that the test is intended to assess should be clearly described (p. 17).

- Serving as the basis for state and national accountability plans
- Evaluating programs

The valid interpretation and appropriate use of MO EOC Assessment scores are supported in a variety of ways, including the training and consultation provided by personnel of the Missouri Department of Elementary and Secondary Education (DESE) and publications such as the *Test Examiner's Manual*, *Guide to Interpreting Results*, and this technical report. The training and documentation provided to test users help them better administer, understand, and use test score results.

### 11.4 MO EOC Assessment Scores

The MO EOC Assessment scores are scaled in several ways: raw-score points, item response theory (IRT)-derived scale scores, and achievement level (based on scale-score cuts). Missouri actively promotes the use of achievement-level results, reporting them annually on each assessment at the student, school, district, and state levels. Individual student and average scale scores are also used, but they play a secondary role and are generally interpreted with reference to their distance from achievement-level cut points. Test results are reported for students as a whole as well as by student group, including gender, ethnicity, migrant status, free and reduced lunch (FRL) status, English language proficiency, Title I, Individualized Education Program (IEP) status, and accommodations used during testing. Scores are reported to schools and districts in annually published reports (for more information, see Chapter 8: Reporting).

The MO EOC Assessment score indicates that an individual student performs at the Below Basic, Basic, Proficient, or Advanced level in a given content area. Achievement-level descriptors provide details about the content expectations that students at each level meet or exceed. No stakes for teachers are attached to student-level scores by the state. Teachers are counseled to interpret individual student scores only in the context of other assessment results and their own experience.

### 11.5 Content-Related Evidence of Validity

Baker and Linn (2002) suggest that “Two questions are central in the evaluation of content aspects of validity. Is the definition of the content domain to be assessed adequate and appropriate? Does the test provide an adequate representation of the content domain the test is intended to measure?” (p. 6). The following sections help answer these two very important questions and also address Standard 1.6<sup>10</sup> of the Standards (AERA, APA, and NCME 1999), which specifically relates to the definition and development of test content.

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<sup>10</sup> **Standard 1.6:** When the validation rests in part on the appropriateness of test content, the procedures followed in specifying and generating test content should be described and justified in reference to the construct the test is intended to measure or the domain it is intended to represent. If the definition of the content sampled incorporates criteria such as importance, frequency, or criticality, these criteria should also be clearly explained and justified (p. 18).

### ***11.5.1 Appropriateness of Content Definition***

In 1993, the Missouri legislature passed the Outstanding Schools Act (Senate Bill 380), requiring the Missouri State Board of Education to adopt challenging academic performance standards that define the skills and competencies necessary for students to successfully advance through the public school system, prepare for post-secondary education and the workplace, and participate as citizens in a democratic society. The State Board of Education formally adopted the academic standards known as the Show-Me Standards in January 1996.

In addition to mandating the development of rigorous academic standards, the Outstanding Schools Act of 1993 required the development and implementation of a comprehensive, primarily performance-based assessment program to measure student proficiency in the knowledge, skills, and competencies identified in the standards. Upon adoption of the standards in 1996, Missouri began developing the Missouri Assessment Program (MAP).

In January 2007, the Missouri State Board of Education approved a plan to replace the MAP for high school students, beginning in August of the 2008–2009 school year, with EOC Assessments in English II, Algebra I, and Biology. The remaining EOC Assessments (English I, Algebra II, Geometry, Government, and American History) were added the following year. The intent was to provide MO EOC Assessments that are an integral part of the statewide assessment system and, as such, are a logical extension of MAP tests at the elementary and middle school grade levels.

### ***11.5.2 Adequacy of Content Representation***

Adequacy of the content representation of the MO EOC Assessments is critically important because the tests must provide an indication of student progress toward achieving the knowledge and skills identified in the Missouri Course-Level Expectations (CLEs), and they must fulfill the requirements of the No Child Left Behind Act (NCLB).

Adequate representation of the content domains defined in the CLEs is assured through the use of a test blueprint and a carefully documented test construction process. CLEs and the Show-Me Standards for the Phase II Assessments are taken into consideration in the writing of selected response (SR) items. Each assessment must align with and proportionally represent the subdomains of the test blueprint. Evidence to support the content validity of the MO EOC Assessments was provided in Chapter 2: Test Development through the documentation of the test specifications and blueprints, item-writing processes, and item-review processes.

Additional evidence to support the content validity of the MO EOC Assessments was provided in Tables 2.1 through 2.7 in Chapter 2: Test Development and also in Chapter 4: Item Analysis. Chapter 2 outlined the target strand and CLE point distributions on the English I, Algebra II, Geometry, Government, and American History operational forms. All forms administered in 2009–2010 met the point ranges specified in the blueprints. In addition, Riverside Publishing strove to equitably represent the strands on each assessment by balancing CLE and sub-CLE coverage according to the targets outlined in the test specifications.

## 11.6 Validity Evidence Based on the Internal Structure of the MO EOC Assessments

Standard 1.11<sup>11</sup> pertains to the relationships between the parts of the test. Because the MO EOC Assessments measure student performance in several content areas, it is important to study the pattern of relationships among the content domains and clusters. One way to study patterns of relationships to provide evidence supporting the inferences made from test scores is the multitrait, multimethod matrix. Tables 11.1 through 11.3 summarize Pearson correlation coefficients among test domains and clusters for Algebra II, Geometry, and Government. Because both English I and American History have only one content cluster, correlation coefficients were not calculated for these EOC Assessments. The correlations between clusters within each assessment are in the moderate to moderately high range, suggesting strong relationships between the clusters. Note that the high correlations between cluster scores and total assessment scores are inflated due to the overlap of items.

**Table 11.1: Pearson Correlation Coefficients Between Domains and Clusters for Algebra II**

		Algebraic Relationships	Data and Probability	Numbers and Operations
Fall 2009	Algebra II	0.95	0.79	0.82
	Algebraic Relationships	1.00	0.61	0.69
	Data and Probability	0.61	1.00	0.58
	Numbers and Operations	0.69	0.58	1.00
Spring 2010	Algebra II	0.93	0.80	0.79
	Algebraic Relationships	1.00	0.60	0.61
	Data and Probability	0.60	1.00	0.55
	Numbers and Operations	0.61	0.55	1.00

<sup>11</sup> **Standard 1.11:** If the rationale for a test use or interpretation depends on premises about the relationships among parts of the test, evidence concerning the internal structure of the test should be provided (p. 20).

**Table 11.2: Pearson Correlation Coefficients Between Domains and Clusters for Geometry**

		<b>Algebraic Relationships</b>	<b>Geometric and Spatial Relationships</b>	<b>Measurement</b>
Fall 2009	Geometry	0.81	0.96	0.82
	Algebraic Relationships	1.00	0.67	0.56
	Geometric and Spatial Relationships	0.67	1.00	0.70
	Measurement	0.56	0.70	1.00
Spring 2010	Geometry	0.77	0.95	0.83
	Algebraic Relationships	1.00	0.62	0.56
	Geometric and Spatial Relationships	0.62	1.00	0.68
	Measurement	0.56	0.68	1.00

**Table 11.3: Pearson Correlation Coefficients between Domains and Clusters for Government**

		<b>Knowledge of principles and processes of governance systems</b>	<b>Knowledge of the principles expressed in documents shaping constitutional democracy in the United States</b>
Fall 2009	Government	0.94	0.94
	Knowledge of principles and processes of governance systems	1.00	0.78
	Knowledge of the principles expressed in documents shaping constitutional democracy in the United States	0.78	1.00
Spring 2010	Government	0.95	0.94
	Knowledge of principles and processes of governance systems	1.00	0.79
	Knowledge of the principles expressed in documents shaping constitutional democracy in the United States	0.79	1.00

### 11.7 Additional Validity Evidence for the MO EOC Assessments

Validity evidence related to other standards is described below.

Standard 1.5<sup>12</sup> relates to the characteristics of the sample of examinees from which validity evidence is inferred. The sample of examinees from which the validity evidence for the MO EOC Assessments was obtained is described in detail in Chapter 9: Summary Statistics, which includes tables with descriptive statistics for raw-score, scale-score, and achievement-level distributions. Statistics include *n*-counts, means, standard deviations (*SDs*), minimum and maximum values, and a variety of data disaggregations.

<sup>12</sup> **Standard 1.5:** The composition of any sample of examinees from which validity evidence is obtained should be described in as much detail as is practical, including major relevant sociodemographic and developmental characteristics (p. 18).

Standard 1.7<sup>13</sup> relates to human judgment at various points in the test development, scoring, and reporting process. For the MO EOC Assessments, human judgment was especially prevalent during the standard-setting process. Chapter 3: Achievement-Level Setting contains detailed information about the standard-setting procedures used for the MO EOC Assessments, including the selection process for and characteristics of the standard-setting participants.

Standard 1.13<sup>14</sup> relates to the conditions under which the data used to support validity claims were collected. Chapter 5: Test Administration contains information about how data were gathered in both the online and paper-and-pencil administrations, including the testing environment, materials distribution and security, Test Examiner training, student preparation, and allowable accommodations.

## 11.8 Summary

Validity is not an all-or-nothing property of a test; rather, validity evidence must be documented for a specific purpose and in the context of how the test scores will be interpreted and used. Much of the information contained in this technical report is, in and of itself, documentation of the validity of the MO EOC Assessments for their stated purpose. This chapter provides a summary of the evidence presented elsewhere in the manual and provides some additional types of validity evidence relevant to the content and internal structure of the assessments.

The overall technical quality of the EOC Assessments was sound. The Spring 2009 standalone field tests produced pools of technically sound items, with more than a 90% retention rate after psychometric and content criteria were applied. From those pools, Riverside Publishing was able to assemble forms that were psychometrically very similar and that similarity helped support the pre-equating model that is in place. Application of IRT pre-equating resulted in perfect or nearly congruent raw-to-scale score conversions between the Spring (base) and Fall forms at the proficiency level cuts.

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<sup>13</sup> **Standard 1.7:** When a validation rests in part on the opinions or decisions of expert judges, observers, or raters, procedures for selecting such experts and for eliciting judgments or ratings should be fully described. The qualifications, and experience, of the judges should be presented. The description of procedures should include any training and instructions provided, should indicate whether participants reached their decisions independently, and should report the level of agreement reached. If participants interacted with one another or exchanged information, the procedures through which they may have influenced one another should be set forth (p. 19).

<sup>14</sup> **Standard 1.13:** When validity evidence includes statistical analyses of test results, either alone or together with data on other variables, the conditions under which the data were collected should be described in enough detail that users can judge the relevance of the statistical findings to local conditions. Attention should be drawn to any features of a validation data collection that are likely to differ from typical operational testing conditions and that could plausibly influence test performance (p. 20).

Post-administration test analyses supported the technical quality of the MO EOC Assessments. Evaluations of IRT model assumptions supported the use of the Rasch model for all tests. Test reliabilities ranged from 0.83 to 0.88 across the content areas for the Fall and Spring forms. Conditional standard errors of measurement (*CSEMs*) were between 7 and 9 scale score points at the cut scores. The item analyses also showed that the MO EOC Assessments have sound psychometrics properties. The *p*-value ranges were sufficiently broad to indicate that the items do measure achievement across a broad range of difficulty. Nearly all items had discrimination values  $> 0.15$ , and only two items had a value  $< 0.10$ . Speededness was not a factor in students' test performance. Item bias analyses conducted on the pools further indicated that items were functioning equivalently for gender and ethnic groups.

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**APPENDIX A:**

**LIST OF MISSOURI EDUCATION-RELATED PROFESSIONAL ORGANIZATIONS**

Missouri Migrant Education/English Language Learning  
Missouri National Education Association  
Missouri PTA  
Missouri Reading Initiative  
Missouri School Boards' Association  
Missouri School Public Relations Association  
Missouri Special Needs Association  
Missouri Staff Development Council  
Missouri State Council–International Reading Association  
Missouri State Teachers Association  
Missouri Student Success Network  
Missouri Unit Association of Teacher Educators  
Missouri United School Insurance Council  
Show-Me Curriculum Administrators Association  
Show-Me Scholars  
Southwest Center for Educational Excellence  
SuccessLink  
Technology Education Association of Missouri

**APPENDIX B:**  
**NOMINATION LETTERS**



## Missouri Department of Elementary and Secondary Education

— Making a positive difference through education and service —

July 31, 2009

Dear School Administrator,

In 2009-2010, Missouri students will have the opportunity to take the second phase of End-of-Course (EOC) assessments, including tests in Algebra II, Geometry, Integrated Mathematics II and III, English I, American History, and Government. Just as we determined achievement levels for the first phase EOC assessments (Algebra I, English II, and Biology) about a year ago, we will need to define student performance on these EOC assessments as Below Basic, Basic, Proficient or Advanced.

To accomplish this important task, we will conduct an Achievement Level Setting Conference with the assistance of our contractors for EOC assessment development, Riverside Publishing and Questar Assessment. This conference will provide an opportunity for panels of educators and other individuals to discuss course-level expectations for each applicable course and to review assessment items to determine the appropriate “cut scores” for each achievement level. The composition of the achievement level setting panels and the expertise of panelists are critically important to this process. The panel for each EOC assessment will consist of 15-18 members. Within each panel, a minimum of 50 percent of the panelists will be classroom teachers. At least half of the remaining panelists will be non-teacher educators (administrators, curriculum specialists, etc.) with knowledge of the appropriate content area. Each panel will also include non-school employees (parents, business professionals, etc.) with expertise in the appropriate content area. Because you have the opportunity to work with excellent educators, as well as members of your community, we are asking for your input in assembling achievement level setting panels that are knowledgeable and reflective of Missouri’s diverse population.

Forms for you to nominate classroom teachers, non-teacher educators and business professionals to serve on EOC achievement level setting panels, along with guidelines for panelist nomination, are posted on the DESE website at <http://www.dese.mo.gov/divimprove/assess/>. These nominations will be placed into a large pool from which we will select final panelists. Selected panelists will be representative of the state’s demographic characteristics and geographic make-up. **The EOC Achievement Level Setting Conference will be held on November 2-5, 2009.** Panels for English I, American History, and Integrated Mathematics II and III (combined panel) will meet on **November 2<sup>nd</sup> and 3<sup>rd</sup>**; panels for Government, Geometry, and Algebra II will meet on **November 4<sup>th</sup> and 5<sup>th</sup>**. Specific location for the conference has not yet been determined, but it will be held in mid-Missouri.



## Missouri Department of Elementary and Secondary Education

— Making a positive difference through education and service —

If you are interested in nominating an individual(s) to serve as a panelist, please complete the appropriate form(s) according to the specified guidelines and return it to the Curriculum and Assessment Section by e-mail, mail or fax. **Nomination forms must be postmarked, faxed, or e-mailed on or before September 1, 2009, to be considered for panel selection. Return address and fax number are printed on the forms.**

Prior to submitting nominations, please contact any individual you wish to nominate to ensure his/her interest and availability if selected to participate as a panelist. It is very important that panelists are available for both days of the conference for their content area. All participants will be reimbursed for travel expenses and meals not provided during the conference. Additionally, those panelists that are not otherwise being compensated (by their employer, school district, etc.) will receive a stipend of \$100 for each full day of work. For teachers that are on contract (and, therefore not requesting a stipend) school districts will be reimbursed for the cost of substitutes. We will notify all potential panelists of the status of their nomination in early October. Those nominees selected to participate in the Achievement Level Setting Conference will receive further information about the conference at that time. Thank you for your assistance in this important endeavor. Please feel free to contact the Curriculum and Assessment Section at 573-751-2625 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads 'Stan Johnson'.

Stan Johnson, Assistant Commissioner  
Division of School Improvement



## Missouri Department of Elementary and Secondary Education

— Making a positive difference through education and service —

July 31, 2009

TO: RPDC Directors  
FROM: Michael Muenks, Coordinator, Curriculum and Assessment  
RE: End-of-Course Assessment Achievement Level Setting

In 2009-10, Missouri students will have the opportunity to take End-of-Course (EOC) assessments in Geometry, Algebra II, Integrated Mathematics II and III, [English II](#), American History, and Government (Phase II EOC tests). From November 2-5, DESE's Assessment Section will conduct an achievement level setting conference with the assistance of Riverside Publishing and Questar Assessment to determine the scores that will be used to define student performance as Below Basic, Basic, Proficient or Advanced. Panels for English I, American History, and Integrated Mathematics II and III (combined panel) will meet on November 2<sup>nd</sup> and 3<sup>rd</sup>; panels for Geometry, Algebra II, and Government will meet on November 4<sup>th</sup> and 5<sup>th</sup>. Specific location for the conference has not yet been determined, but it will be held in mid-Missouri.

This conference will provide an opportunity for panels of educators and other individuals to discuss course-level expectations for each applicable course and to review assessment items to determine the appropriate "cut scores" for each achievement level. The composition of the achievement level setting panels and the expertise of panelists are critically important to this process. We anticipate including at least two post-secondary education representatives on each panel.

I am requesting your assistance in identifying teacher educators or other post-secondary educators that have expertise in the appropriate course content to serve as panelists. Nomination guidelines and forms are posted on the DESE website at <http://www.dese.mo.gov/divimprove/assess/>. If you would like to nominate an individual to serve as a panelist, please return the completed nomination form to the Curriculum and Assessment Section by e-mail, mail or fax no later than September 1, 2009 (mailing address and fax number are printed on the form).

Prior to submitting nominations, please contact any individual you wish to nominate to ensure his/her interest and availability if selected to participate as a panelist. It is very important that panelists are available for both days on which their panel will meet. All participants will be reimbursed for travel expenses and meals not provided during the conference. Additionally, those panelists that are not otherwise being compensated by their employer will receive a stipend of \$100 for each full day of work. We will notify

all panelists of the status of their nomination in early October. Those nominees selected to participate in the Achievement Level Setting Conference will receive further information about the conference at that time.

Feel free to contact the Curriculum and Assessment Section at 573-751-2625 or e-mail [map@dese.mo.gov](mailto:map@dese.mo.gov) if you have any questions.



## Missouri Department of Elementary and Secondary Education

— Making a positive difference through education and service —

July 31, 2009

Dear Colleague in Education,

[In 2009-2010](#), Missouri students will have the opportunity to take the second phase of End-of-Course (EOC) assessments, including tests in Algebra II, Geometry, Integrated Mathematics II and III, English I, American History, and Government. Just as we determined achievement levels for the first phase EOC assessments (Algebra I, English II, and Biology) about a year ago, we will need to define student performance on these EOC assessments as Below Basic, Basic, Proficient or Advanced.

To accomplish this important task, we will conduct an Achievement Level Setting Conference with the assistance of our contractors for EOC assessment development, Riverside Publishing and Questar Assessment. This conference will provide an opportunity for panels of educators and other individuals to discuss course-level expectations for each applicable course and to review assessment items to determine the appropriate “cut scores” for each achievement level. The composition of the achievement level setting panels and the expertise of panelists are critically important to this process. The panel for each EOC assessment will consist of [15-18](#) members. Within each panel, a minimum of 50 percent of the panelists will be classroom teachers. At least half of the remaining panelists will be non-teacher educators (administrators, curriculum specialists, etc.) with knowledge of the appropriate content area. Each panel will also include non-school employees (parents, business professionals, etc.) with expertise in the appropriate content area. Because you have the opportunity to work with excellent educators, as well as members of communities throughout the state, we are asking for your input in assembling achievement level setting panels that are knowledgeable and reflective of Missouri’s diverse population.

Forms for you to nominate individuals to serve on EOC achievement level setting panels, along with guidelines for panelist nomination, are posted on the DESE website at <http://www.dese.mo.gov/divimprove/assess/>. These nominations will be placed into a large pool from which we will select final panelists. Selected panelists will be representative of the state’s demographic characteristics and geographic make-up. **The EOC Achievement Level Setting Conference will be held on [November 2-5, 2009](#).** Panels for English I, American History, and Integrated Mathematics II and III (combined panel) will meet on **November 2<sup>nd</sup> and 3<sup>rd</sup>**; panels for Government, Geometry, and Algebra II will meet on **November 4<sup>th</sup> and 5<sup>th</sup>**. Specific location for the conference has not yet been determined, but it will be held in mid-Missouri.

If you are interested in nominating an individual(s) to serve as a panelist, please complete the appropriate form(s) according to the specified guidelines and return it to the Curriculum and Assessment Section by e-mail, mail, or fax. **Nomination forms must be postmarked, faxed, or e-mailed on or before September 1, 2009, to be considered for panel selection. Return address and fax number are printed on the forms.**

Prior to submitting nominations, please contact any individual you wish to nominate to ensure his/her interest and availability if selected to participate as a panelist. It is very important that panelists are available for both days of the conference for their content area. All participants will be reimbursed for travel expenses and meals not provided during the conference. Additionally, those panelists that are not otherwise being compensated (by their employer, school district, etc.) will receive a stipend of \$100 for each full day of work. For teachers that are on contract (and, therefore not requesting a stipend) school districts will be reimbursed for the cost of substitutes. We will notify all potential panelists of the status of their nomination in early October. Those nominees selected to participate in the Achievement Level Setting Conference will receive further information about the conference at that time. Thank you for your assistance in this important endeavor. Please feel free to contact the Curriculum and Assessment Section at 573-751-2625 if you have any questions.

Sincerely,

Stan Johnson, Assistant Commissioner  
Division of School Improvement

**APPENDIX C:**  
**NOMINATION FORMS**



**PHASE II END-OF-COURSE ASSESSMENT ACHIEVEMENT LEVEL SETTING  
 CLASSROOM TEACHER NOMINATION**

**Directions**

Complete this form for each individual you wish to nominate to serve as a panelist for Phase II End-of-Course Assessment [Achievement Level Setting](#). Please verify spelling of first and last name of the individual you are nominating, and ensure that all information is complete and accurate.

E-MAIL, FAX OR MAIL: the completed form no later than **October 5, 2009**

E-MAIL: [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov)

FAX: **(573) 526-7861**

MAIL: **MO Department of Elementary and Secondary Education, ATTN: Sara Hagenhoff**

**P.O Box 480**

**Jefferson City, MO 65102**

QUESTIONS: Call: (573) 751-2625 or Email: [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov)

**Content Area**

END-OF-COURSE ASSESSMENT FOR WHICH NOMINEE SHOULD SERVE AS A PANELIST (please check one):

- Algebra II    Geometry    Integrated Mathematics II/III    English I    American History    Government

Years of experience in teaching the course indicated above: \_\_\_\_\_

**Participant Information**

CURRENT NAME (LAST, FIRST, MIDDLE INITIAL) Please Print:

STREET ADDRESS:

CITY, STATE, ZIP CODE:

HOME E-MAIL ADDRESS

HOME PHONE NUMBER:

RACE/ETHNICITY (optional):

- Asian/Pac Isl.    Black    Hispanic    Native Am. Indian    White

CURRENT COURSE ASSIGNMENT:

NUMBER OF YEARS IN CURRENT POSITION:

AREAS OF EXPERTISE (Mark all that apply):

- Regular Education    Special Education    English Language Learners (ELL)

GENDER:  Male    Female

**District Information**

SCHOOL DISTRICT NAME:

COUNTY-DISTRICT CODE:

SCHOOL BUILDING NAME:

SCHOOL CODE:

SCHOOL EMAIL ADDRESS:

SCHOOL PHONE NUMBER

**Experience/Expertise**

Summarize the nominee's involvement in education initiatives that are pertinent to Phase II End-of-Course assessment achievement level setting (e.g., Show-Me Standards development/review, Course-Level/Grade-Level Expectations development/review, EOC development activities, Regional Professional Development Center professional development activities).

**Professional Organizations/Affiliations**

**Individual Providing Nomination**

NAME/TITLE

PHONE NUMBER

E-MAIL ADDRESS



**PHASE II END-OF-COURSE ASSESSMENT ACHIEVEMENT LEVEL SETTING NON-TEACHER EDUCATOR NOMINATION (INCLUDING POST-SECONDARY EDUCATOR)**

**Directions**

Complete this form for each individual you wish to nominate to serve as a panelist for Phase II End-of-Course Assessment [Achievement Level Setting](#). Please verify spelling of first and last name of the individual you are nominating, and ensure that all information is complete and accurate.

E-MAIL, FAX OR MAIL the completed form no later than **October 5, 2009**, to Sara Hagenhoff

E-MAIL: [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov)

FAX: (573) 526-7861

MAIL: MO Department of Elementary and Secondary Education, ATTN: Sara Hagenhoff  
P.O. Box 480  
Jefferson City, MO 65102

QUESTIONS: Call: (573) 751-2625 or Email: [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov)

**Content Area**

END-OF-COURSE ASSESSMENT FOR WHICH NOMINEE SHOULD SERVE AS A PANELIST (please check one):

- Algebra II    Geometry    Integrated Mathematics II/III    English I    American History    Government

**Participant Information**

CURRENT NAME (LAST, FIRST, MIDDLE INITIAL) Please Print:

HOME ADDRESS:

CITY, STATE, ZIP CODE:

HOME E-MAIL ADDRESS

HOME PHONE NUMBER:

RACE/ETHNICITY (optional):  Asian/Pac Isl.    Black    Hispanic  
 Native Am. Indian    White

GENDER:  Male    Female

**District Information (If nominee is a post-secondary educator, please provide name of institution.)**

SCHOOL DISTRICT NAME:

COUNTY-DISTRICT CODE:

SCHOOL BUILDING NAME:

SCHOOL CODE:

SCHOOL EMAIL ADDRESS:

SCHOOL PHONE NUMBER

**Experience/Expertise**

Summarize the nominee's involvement in education initiatives that are pertinent to End-of-Course assessment [achievement level setting](#) (e.g., Show-Me Standards development/review, Grade-Level/Course-Level Expectations development/review, EOC development activities)

CURRENT POSITION/TITLE:

PREVIOUS TEACHING EXPERIENCE

Grade Level(s): \_\_\_\_\_ Years: \_\_\_\_\_ Subject Area(s): \_\_\_\_\_

# OF YEARS IN CURRENT POSITION: \_\_\_\_\_

AREAS OF EXPERTISE (Mark all that apply):

- Regular Education    Special Education    English Language Learners (ELL)

**Professional Organizations/Affiliations**

**Individual Providing Nomination**

NAME/TITLE

PHONE NUMBER

E-MAIL ADDRESS



**PHASE II END-OF-COURSE ASSESSMENT ACHIEVEMENT LEVEL SETTING BUSINESS  
PROFESSIONAL NOMINATION FORM**

**Directions**

Complete this form for each individual you wish to nominate to serve as a panelist for Phase II End-of-Course Assessment [Achievement Level Setting](#). Please verify spelling of first and last name of the individual you are nominating, and ensure that all information is complete and accurate.

E-MAIL, FAX OR MAIL the completed form no later than **September 1, 2009**, to Sara Hagenhoff:

E-MAIL: [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov)

FAX: (573) 526-7861

MAIL: MO Department of Elementary and Secondary Education, ATTN: Sara Hagenhoff  
 P.O. Box 480  
 Jefferson City, MO 65102

QUESTIONS: Call: (573) 751-2625 or Email: [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov)

**Content Area**

END-OF-COURSE ASSESSMENT FOR WHICH NOMINEE SHOULD SERVE AS A PANELIST (please check one):

- Algebra II     Geometry     Integrated Mathematics II/III     English I     American History     Government

**Participant Information**

CURRENT NAME (LAST, FIRST, MIDDLE INITIAL) Please Print:

EMPLOYER:

TITLE:

HOME ADDRESS:

CITY, STATE, ZIP CODE:

HOME E-MAIL ADDRESS

HOME PHONE NUMBER:

RACE/ETHNICITY (optional):  Asian/Pac Isl.     Black     Hispanic  
 Native Am. Indian     White

GENDER:  Male     Female

**Experience/Expertise**

Explain why you believe this individual would be an asset to the Phase II End-of-Course Assessment [Achievement Level Setting Panel](#):

**Professional Organizations/Affiliations**

**Individual Providing Nomination**

NAME/TITLE

PHONE NUMBER

SCHOOL DISTRICT/EMPLOYER

E-MAIL ADDRESS

**APPENDIX D:**  
**PANELIST QUALIFICATION GUIDELINES**

**GUIDELINES FOR PANELIST NOMINATION  
PHASE II END-OF-COURSE ASSESSMENT ACHIEVEMENT LEVEL SETTING**

**Qualifications of Classroom Teachers:**

- Must have taught the course for which they are being nominated to serve as a panelist for a minimum of five years.
- Should be familiar with the Show-Me Standards and the applicable Course-Level Expectations.
- Should be recognized as “outstanding” in professional performance.

**Qualifications of Non-Teacher Educators and Post-Secondary Educators:**

- May be a non-teacher educational staff member in a building or district central office, or an instructor or administrator at a post-secondary institution.
- Must have familiarity with the course content for which they are being nominated to serve as a panelist.
- Should be familiar with the Show-Me Standards and applicable Course-Level Expectations.
- Must be recognized as “outstanding” in professional performance by the individual making the nomination.

**Qualifications of Business Professionals:**

- Must have familiarity with the content of the course for which they are being nominated to serve as a panelist (Algebra II, Geometry, Integrated Mathematics II and III, English I, American History, or Government).
- Should either:
  - use high school course content for the applicable content area in their daily professional work
  - OR be familiar with the knowledge and skills that high school students completing the applicable courses must possess to have a firm foundation for further coursework or for the workplace.
- Should not be a current or former employee of the public school system.

**General Information to Share with Nominees:**

- It is imperative that panelists participate fully in all conference activities. **Before making a nomination, please verify that any individual you nominate is all available for ALL applicable conference dates (November 2-3 for English I, American History, and Integrated Mathematics II and III; November 4-5 for Algebra II, Geometry, and Government).**
- A total of 15-18 panelists per End-of-Course assessment will be selected from the pool of nominations. A minimum of half of the members of each panel will be classroom teachers. At least half of the remaining panelists will be non-teacher educators. Each panel will also include members of the business/professional community.
- All nominees will receive notice of the status of their nomination in early October.
- Selected panelists will receive a stipend of \$100 per day for their work if they are not otherwise being compensated by their employer. (Classroom teachers may request a stipend if not on contract with their school district on meeting days.) Participants will be reimbursed for mileage at the State’s approved rate, lodging, and meals not provided during the conference.

**Making a Nomination:**

- Download and complete the correct nomination form for each individual(s) you wish to nominate:
  - Classroom Teacher Nomination
  - Non-Teacher Educator Nomination
  - Business/Professional Nomination
- Make sure the form is completed fully and accurately. Incomplete forms will not be placed in the pool for consideration. Please verify all information on each form prior to submitting nominations.
- Mail, e-mail or fax the nomination form(s) to DESE on or before September 18, 2009. Forms postmarked, e-mailed or faxed after September 18, 2009, will NOT be accepted.

**PLEASE CONTACT THE CURRICULUM AND ASSESSMENT SECTION AT 573-751-2625 OR E-MAIL [sara.hagenhoff@dese.mo.gov](mailto:sara.hagenhoff@dese.mo.gov) IF YOU HAVE FURTHER QUESTIONS ABOUT COMPLETING NOMINATION FORMS.**

**APPENDIX E:**

**PANEL DEMOGRAPHIC CHARACTERISTICS**

**Appendix Table E.1: Panel Characteristics for English I**

<b>District</b>	<b>Position</b>	<b>Gender</b>	<b>Ethnicity</b>	<b>Community Type</b>	<b>RPDC Region</b>	<b>% FRL*</b>	<b>% Minority*</b>
Francis Howell	Classroom Teacher	Female	White	Suburban	St. Louis	13%	11%
Boonville R-I	Classroom Teacher	Female	White	Rural	Heart of Missouri	46%	16%
Blue Springs	Nonteacher educator	Female	White	Suburban	Kansas City	21%	19%
Affton	Classroom Teacher	Female	White	Suburban	St. Louis	32%	15%
Lee's Summit R-7	Classroom Teacher	Female	White	Suburban	Kansas City	13%	19%
N/A (MC3)	Nonteacher educator	Female	White	N/A	N/A		
Milan C-2	Classroom Teacher	Female	White	Rural	Northeast	67%	39%
St. Louis Public	Classroom Teacher	Female	White	Urban	St. Louis	72%	86%
Lebanon R-III	Classroom Teacher	Female	White	Rural	Southwest	52%	5%
Butler	Nonteacher educator	Female	White	Rural	West Central	50%	6%
Raytown C-2	Nonteacher educator	Female	White	Suburban	Kansas City	49%	55%
N/A (William Woods University)	Higher Ed.	Female	Native American	Rural	Heart of Missouri		
Richland R-I	Classroom Teacher	Male	White	Rural	South Central	71%	7%
Willard R-2	Classroom Teacher	Female	White	Rural	Southwest	38%	5%
Park Hill	Nonteacher educator	Male	White	Suburban	Kansas City	22%	12%
Prairie Home R-V	Nonteacher educator	Female	White	Rural	Heart of Missouri	26%	3%

\* Percent free and reduced lunch (FRL) and percent minority refer to the population of the district represented by the panelist.

N/A = Not available

**Appendix Table E.2: Panel Characteristics for Algebra II**

<b>District</b>	<b>Position</b>	<b>Gender</b>	<b>Ethnicity</b>	<b>Community Type</b>	<b>RPDC Region</b>	<b>% FRL*</b>	<b>% Minority*</b>
Forsyth R-3	Classroom Teacher	F	White	Rural	Southwest	65%	4%
Pattonville	Classroom Teacher	M	White	Suburban	St. Louis	36%	38%
Francis Howell	Classroom Teacher	F	White	Suburban	St. Louis	13%	11%
Boonville R-I	Nonteacher Educator	M	White	Rural	Heart of Missouri	46%	16%
Jennings	Classroom Teacher	M	African American	Urban	St. Louis	84%	99%
Norwood R-I	Classroom Teacher	F	White	Rural	Southwest	62%	0%
Fredericktown	Classroom Teacher	F	White	Rural	Southeast	53%	3%
N/A (St. Charles Community College)	Higher Education	F	White	Suburban	St. Louis		
North Pemiscot R-I	Classroom Teacher	F	White	Rural	Southeast	71%	19%
Webster Groves	Classroom Teacher	F	White	Suburban	St. Louis	19%	27%
Washington	Classroom Teacher	F	White	Rural	Southeast	23%	4%
Sikeston	Classroom Teacher	F	White	Rural	Southeast	60%	39%
N/A (Northwest Missouri State University)	Higher Education	F	White	Rural	Northwest		
St. James R-I	Classroom Teacher	F	White	Rural	South Central	55%	6%
Park Hill	Classroom Teacher	F	White	Suburban	Kansas City	22%	22%
Rolla 31	Classroom Teacher	F	White	Rural	South Central	42%	11%

\* Percent free and reduced lunch (FRL) and percent minority refer to the population of the district represented by the panelist.

N/A = Not available

**Appendix Table E.3: Panel Characteristics for Geometry**

<b>District</b>	<b>Position</b>	<b>Gender</b>	<b>Ethnicity</b>	<b>Community Type</b>	<b>RPDC Region</b>	<b>% FRL*</b>	<b>% Minority*</b>
St. James R-I	Regular Ed.	M	White	Rural	South Central	55%	6%
Kearney R-I	Regular Ed.	M	White	Rural	Missouri Western	11%	4%
Sikeston	Regular Ed.	F	White	Rural	Southeast	60%	39%
N/A (Mineral Area College)	Regular Ed.	F	White	Rural	South Central		
North St. Francois R-I	Regular Ed.	F	White	Rural	Southeast	51%	3%
Southern Reynolds County R-2	Regular Ed.	F	White	Rural	South Central	67%	3%
Richland	Regular Ed.	F	White	Rural	Southeast	53%	4%
Prairie Home R-V	Regular Ed.	F	White	Rural	Heart of Missouri	26%	3%
Ray-Pec	Regular Ed.	F	White	Rural	West Central	21%	14%
Center 58	Regular Ed.	F	White	Urban	Kansas City	67%	76%
Francis Howell	Regular Ed.	F	White	Suburban	St. Louis	13%	11%
Marshfield R-I	Regular Ed.	M	White	Rural	Southwest	42%	4%
Lees Summit	Regular Ed.	F	White	Suburban	Kansas City	13%	19%
Ferguson-Florissant	Regular Ed.	M	White	Suburban	St. Louis	64%	79%
Fairplay	Regular Ed.	M	White	Rural	Southwest	63%	1%
Fort Osage	Regular Ed.	M	White	Suburban	Kansas City	43%	16%

\* Percent free and reduced lunch (FRL) and percent minority refer to the population of the district represented by the panelist.

N/A = Not available

**Appendix Table E.4: Panel Characteristics for Government**

<b>District</b>	<b>Position</b>	<b>Gender</b>	<b>Ethnicity</b>	<b>Community Type</b>	<b>RPDC Region</b>	<b>% FRL*</b>	<b>% Minority*</b>
N/A (Missouri Bar)	Noneducator	Female	White	Suburban	Heart of Missouri		
North Kansas City	Nonteacher Educator	Female	White	Suburban	Kansas City	39%	28%
Hazelwood	Nonteacher Educator	Female	White	Urban	St. Louis	53%	70%
Waynesville	Classroom Teacher	Male	White	Urban	South Central	39%	39%
Independence	Classroom Teacher	Male	White	Suburban	Kansas City	55%	25%
Jefferson College	Higher Education	Male	White	Suburban	St. Louis		
Sikeston R-6	Classroom Teacher	Female	White	Rural	Southeast	60%	39%
Affton	Classroom Teacher	Male	Asian/ Pacific Islander	Urban	St. Louis	32%	15%
Salem R-80	Classroom Teacher	Male	White	Rural	South Central	56%	5%
Francis Howell	Classroom Teacher	Female	White	Suburban	St. Louis	13%	11%
Neosho R-5	Classroom teacher	Male	White	Rural	Southwest	56%	17%
Rockwood	Nonteacher Educator	Female	White	Suburban	St. Louis	13%	17%

\* Percent free and reduced lunch (FRL) and percent minority refer to the population of the district represented by the panelist.

N/A = Not available

**Appendix Table E.5: Panel Characteristics for American History**

<b>District</b>	<b>Position</b>	<b>Gender</b>	<b>Ethnicity</b>	<b>Community Type</b>	<b>RPDC Region</b>	<b>% FRL*</b>	<b>% Minority*</b>
Neosho R-5	Classroom teacher	F	White	Rural	Southwest	56%	17%
Prairie Home R-V	Classroom teacher	M	White	Rural	Heart of Missouri	26%	3%
Holden	Classroom teacher	M	White	Rural	West Central	38%	3%
Rolla 31	Classroom teacher	M	White	Rural	South Central	42%	11%
Ferguson-Florissant	Nonteacher educator	M	White	Suburban	St. Louis	64%	79%
St. James	Classroom teacher	M	White	Rural	South Central	55%	6%
Sikeston R-6	Classroom teacher	M	White	Rural	Southeast	60%	39%
Hazelwood	Classroom teacher	M	White	Urban	St. Louis	53%	70%
Dixon	Classroom teacher	M	White	Rural	South Central	45%	5%
Warrensburg R-VI	Classroom teacher	M	White	Rural	West Central	33%	15%
Francis Howell	Classroom teacher	F	White	Suburban	St. Louis	13%	11%
Park Hill	Nonteacher educator	M	White	Suburban	Kansas City	22%	12%
University City	Classroom teacher	F	African American	Urban	St. Louis	59%	88%
Neosho R-5	Classroom teacher	F	White	Rural	Southwest	56%	17%
Prairie Home R-V	Classroom teacher	M	White	Rural	Heart of Missouri	26%	3%

\* Percent free and reduced lunch (FRL) and percent minority refer to the population of the district represented by the panelist.

N/A = Not available

**APPENDIX F:**  
**PARTICIPANT AGENDAS**

# MISSOURI EOC STANDARD SETTING

## November 2–3, 2009 English I & American History

### Participant Agenda

#### Day 1—Morning

##### 7:45 AM: Participants Arrive for Registration and Breakfast

- Welcome, Introductions, Logistics .....(DESE staff)  
(*Large-Group session—all panels together*)
- Overview of MO EOC Assessment System .....(DESE)
- Overview of the two days of sessions .....(Mike Beck [Questar])
- Intro. to Achievement-Level Descriptors (ALDs) ..... (Sheila Potter [Questar])

(*Panelists now break into 3 individual groups, separately facilitated; all subsequent panel work will take place in the separate sessions.*)

- Setting Performance Standards—General Process
- “Experience” the Assessments

##### 12:00 PM: Lunch

#### Day 1—Afternoon

- Definitions and Description of Performance Standards
- Orientation to the Specific Standard-Setting Methodology
- Preparation for Round 1 of Judgments
- First Round of Judges’ Work (until completed)

##### 5:30 PM: Participants Excused

#### Day 2—Morning

##### 7:45 AM: Participants Arrive for Registration and Breakfast

- Review of Day 1 Activities and Discussions
- Feedback & Discussion of Round 1 Judgments
- Preparation for Round 2 Judgments (until completed)
- Round 2 of Judges’ Work

##### 12:00 PM: Lunch

#### Day 2—Afternoon

- Review of Round 2 Judgments
- Preparation for Final Judgments
- Final Round of Judgments & Evaluation (until completed)
- Final review of ALDs & Session [Wrapup](#)

##### 4:45 PM: Participants Excused

# MISSOURI EOC STANDARD SETTING

## November 4–5, 2009: Algebra II, Geometry, & Government

### Participant Agenda

#### Day 1—Morning

##### 7:45 AM: Participants Arrive for Registration and Breakfast

- Welcome, Introductions, Logistics .....(DESE staff)  
(*Large-Group session—all panels together*)
- Overview of MO EOC Assessment System .....(DESE)
- Overview of the two days of sessions .....(Mike Beck [Questar])
- Intro. to Achievement-Level Descriptors (ALDs) .....(Sheila Potter [Questar])

(*Panelists now break into 3 individual groups, separately facilitated; all subsequent panel work will take place in the separate sessions.*)

- Setting Performance Standards—General Process
- “Experience” the Assessments

##### 12:00 PM: Lunch

#### Day 1—Afternoon

- Definitions and Description of Performance Standards
- Orientation to the Specific Standard-Setting Methodology
- Preparation for Round 1 of Judgments
- First Round of Judges’ Work (until completed)

##### 5:30 PM: Participants Excused

#### Day 2—Morning

##### 7:45 AM: Participants Arrive for Registration and Breakfast

- Review of Day 1 Activities and Discussions
- Feedback & Discussion of Round 1 Judgments
- Preparation for Round 2 Judgments (until completed)
- Round 2 of Judges’ Work

##### 12:00 PM: Lunch

#### Day 2—Afternoon

- Review of Round 2 Judgments
- Preparation for Final Judgments
- Final Round of Judgments & Evaluation (until completed)
- Final review of ALDs & Session [Wrapup](#)

##### 4:45 PM: Participants Excused

**APPENDIX G**

**OPENING SESSION POWERPOINT PRESENTATION**

## Setting the Standard

### Achievement Level-Setting Conference Missouri End-of-Course Assessments

English I, American History – November 2-3, 2009  
Algebra II, Geometry, Government – November 4-5, 2009

## Statewide Assessment in Missouri - A Brief History

- Missouri S.B. 380 – The Outstanding Schools Act
  - Passed in 1993
  - Required development of academic performance standards
  - Mandated statewide assessments to measure student progress toward standards
- The Missouri Assessment Program (MAP)
  - Designed to evaluate student performance relative to Show-Me Standards
  - First administration in 1996 (began with grade span Mathematics test)
  - Developed over the next decade to include assessments in multiple grades and content areas

## No Child Left Behind (NCLB)

- Federal legislation passed in 2001
- By 2005-2006, states required to assess students in Mathematics and Communication Arts in all grades 3-8 and once in high school
- Science added in 2007 – States required to assess once in each grade range (elementary, middle, and high school)
- Goal is to have all students reach "Proficiency" by 2014
- States create unique definitions of "Proficiency"

## Impact of NCLB on MAP

- Added grade-level assessments for grades 3-8 and 10 in Mathematics and grades 3-8 and 11 in Communication Arts in Spring 2006
- Added Science assessments for grades 5, 8, and 11 in Spring 2007
- Established achievement levels of Below Basic, Basic, Proficient, and Advanced for all MAP-assessed grade levels and content areas

## Missouri End-of-Course (EOC) Assessments

- New approach to high school assessment in Missouri
- Recommended by Missouri State Board of Education and task force on high school assessment
- Designed to be administered when students complete specific course content rather than at the end of a grade level

## Purposes of Missouri EOC Assessments

- According to the Missouri State Board of Education, Missouri EOC Assessments are intended to:
  - measure and reflect student mastery toward post secondary readiness
  - identify students' strengths and weaknesses
  - communicate expectations for all students to patrons and community
  - serve as the basis of state and national accountability plans
  - evaluate programs

## Missouri EOC Assessment Development

- Phase I – Algebra I, English II, Biology
  - Implemented in 2008-2009
  - Replaced high school MAP assessments in Mathematics, Communication Arts, and Science
- Phase II – Algebra II, Geometry, English I, American History, Government
  - Implemented in 2009-2010

## About Missouri EOC Assessments...

- Phase I EOC Assessments include both multiple choice items and performance items and are designed to be administered in two 55-minute class periods
- Phase II EOC Assessments include multiple choice items only and can be administered in one 55-minute class period.
- Flexible administration – Districts can administer during fall, spring, or summer window.
- Can contribute to course grades (local decision)
- Provide data for state and federal accountability

## Achievement Level-Setting for Phase II Missouri EOC Assessments

- What is the task?
  - To determine what score on a Missouri EOC Assessment separates "Below Basic" from "Basic" performance, "Basic" from "Proficient" performance, and "Proficient" from "Advanced" performance
  - To define what characteristics of student performance should be demonstrated at each performance level

## Achievement Level-Setting for Phase II Missouri EOC Assessments

- Why is it important?
  - Defining achievement levels helps us answer the question, "How good is good enough?"
  - Achievement levels provide a common measure and a common vocabulary for educators, parents, and other stakeholders to talk about student performance.
  - Achievement levels provide us with a way of looking at student performance and progress over time.

## Achievement Level-Setting for Phase II Missouri EOC Assessments

- Who is involved?
  - Approximately 15 panelists per Missouri EOC Assessment
  - Panels include classroom teachers (at least 50 percent), non-teacher educators, representatives of postsecondary education, and other professionals
  - Panelists nominated by building and district administrators, professional educator organizations, and postsecondary education community
  - Panels selected to be geographically and demographically representative of Missouri's population

## Achievement Level-Setting for Phase II Missouri EOC Assessments

- Roles and responsibilities
  - Riverside Publishing Company (Missouri's contractor for EOC Assessments) – Overseeing achievement level-setting process and providing onsite data
  - Questar Assessment (Riverside Publishing Company's subcontractor for achievement level setting) – Training and facilitating in large and small group sessions
  - DESE Curriculum and Assessment staff – Available to answer questions about test development and content, and conference logistics
  - Regional Instructional Facilitators – Present in each room during small group sessions to serve as content resources
  - Panelists – Evaluate test content and data to recommend cut scores and to revise achievement level descriptors

### Achievement Level-Setting for Phase II Missouri EOC Assessments

- The Achievement Level-Setting Process
  - Modified Angoff method as recommended by Missouri's TAC
  - Training in large and small groups
  - Review of test items and content
  - Rounds of judgments of cutscores for each achievement level
  - Consideration of 2008-2009 field test data
  - Review and revision of achievement level descriptors

### Achievement Level-Setting for Phase II Missouri EOC Assessments

- Results:
  - Recommended cut scores for each Phase II Missouri EOC Assessment
  - Recommended achievement level descriptors for each Phase II Missouri EOC Assessment

### Final Determination of Achievement Levels for Phase II Missouri EOC Assessments

Recommended cutscores and achievement level descriptors will be presented to the Missouri State Board of Education in January, 2010.

## Standard Setting Overview

### Missouri End-of-Course (EOC) Assessments

November, 2009

1

## Session Overview - Day 1

- I. What is "standard setting" - in general and for the EOC Assessments?
- II. Describe the performance categories; refine achievement-level descriptors.
- III. Review and discuss the actual EOC test
- IV. The "Angoff procedure" – how it works; "Practice" and "Warm-up"
- V. Round 1 of Recommendations

2

## Setting Performance Standards

- *Who's Involved?* State and contractor roles
- *Why Questar?* Who's facilitating? Our role:  
*Not content experts, but facilitators*

3

## Setting Performance Standards

- *Who's Involved?* State and contractor roles
- *Why Questar?* Who's facilitating? Our role
- *Why you?* Individually and collectively:

**You are the *experts*.**  
**You *represent* various audiences.**

4

## Setting Performance Standards

- *Who's Involved?* State and contractor roles
- *Why Questar?* Who's facilitating? Our role
- *Why you?* Individually and collectively:

**You are the *experts*.**  
**You *represent* various audiences.**  
**You are *judges*, not psychometricians.**

5

## Setting Performance Standards

- *Who's Involved?* State and contractor roles
- *Why Questar?* Who's facilitating? Our role
- *Why you?* Individually and collectively:

**You are the *experts*.**  
**You *represent* various audiences.**  
**You are *judges*, not psychometricians.**  
**You are *advisors*, not policy makers.**

6

**Groundrules**

***NO DISCUSSIONS*** about the *EOC* program or its underlying content standards

***OR***

7

**Groundrules**

***NO DISCUSSIONS*** about the *EOC* program  
***OR***

- why to set standards
- the philosophy of educational assessment
- why these particular tasks/assessments
- why a particular procedure is being used

8

**Groundrules**

***NO DISCUSSIONS*** about the *EOC* program  
***OR***

- why to set standards
- the philosophy of educational assessment
- why these particular tasks/assessments
- why a particular procedure is being used

***Confidentiality -***  
**all materials & discussions.**

9

**Groundrules**

***NO DISCUSSIONS*** about the *EOC* program  
***OR***

- why to set standards
- the philosophy of educational assessment
- why these particular tasks/assessments
- the fairness of assessing special students
- why a particular procedure is being used

***Confidentiality of all materials & discussions***

**All discussions should be *as a group*.**

**Overarching Principle  
to Guide our Work**

First expounded by,  
unarguably, the world's  
leading philosopher and  
intellectual . . . .

**Dave Barry**

11

**Overarching Principle  
to Guide our Work**

**"If you had to identify, in one  
word, the reason why the  
human race has not achieved,  
and never will achieve, its full  
potential, that word  
would be . . . *meetings*."**

12

### What IS Standard Setting?

- another frame of reference to interpret test scores  
("How good is *good*??")
- a routine, daily activity

11

### What IS Standard Setting?

- another frame of reference to interpret test scores ("How good is *good*??")
- a routine, daily activity
- true "criterion-referencing"

12

### What IS Standard Setting?

- another frame of reference to interpret test scores ("How good is *good*??")
- a routine, daily activity
- true "criterion-referencing"
- a *semi*-quantitative, *semi*-standardized, socio-political judgment process

13

### What IS Standard Setting?

- just a frame of reference for test scores
  - a routine, daily activity
  - true "criterion-referencing"
  - essentially, a judgment process
- **NOT** "science" !

14

### 4 Keys to Being a Great Judge

1. Judgments vs. Data

15

### 4 Keys to Being a Great Judge

1. Judgments vs. Data
2. "Should" vs. "Will"

16

#### 4 Keys to Being a Great Judge

1. Judgments vs. Data
2. "Should" vs. "Will"
3. Consider *ALL Missouri* students who will take this EOC assessment.

»

#### 4 Keys to Being a Great Judge

1. Judgments vs. Data
2. "Should" vs. "Will"
3. Consider *ALL Missouri* students who took this EOC assessment
4. Think of *threshold* students, not *all* who are Proficient.

»

#### *Advice on Setting Standards*

- Set demanding, but *attainable* standards.

»

#### *Advice on Setting Standards*

- Set demanding, but *attainable* standards.
- What "*should be*" probably shouldn't disregard what "*is*."

»

#### *Advice on Setting Standards*

- Set demanding, but *attainable* standards.
- What "*should be*" probably shouldn't disregard what "*is*."
- Focus on *concrete* behaviors, skills, responses.

»

#### *Advice on Setting Standards*

- Set demanding, but *attainable* standards.
- What "*should be*" probably shouldn't disregard what "*is*."
- Focus on *concrete* behaviors, skills, responses.
- Item difficulty resides in the answer choices, not the item "*stem*."

»

Who was the 7<sup>th</sup> President  
of the United States?

25

Who was the 7<sup>th</sup> President  
of the United States?

- A. Augie Busch
- B. Stan Musial
- C. Andrew Jackson
- D. Mark Twain
- E. George Washington Carver

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Who was the 7<sup>th</sup> President  
of the United States?

- A. Abraham Lincoln
- B. Harry Truman
- C. Andrew Jackson
- D. Nelle Tayloe Ross
- E. George Bush

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Who was the 7<sup>th</sup> President  
of the United States?

- A. Martin VanBuren
- B. John Quincy Adams
- C. Andrew Jackson
- D. James Monroe
- E. John F. Kennedy

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*Advice on Setting Standards*

- Set demanding, but *attainable* standards.
- What "*should be*" shouldn't disregard what "*is*."
- Focus on the *concrete*.
- Remember to review the options for all items.

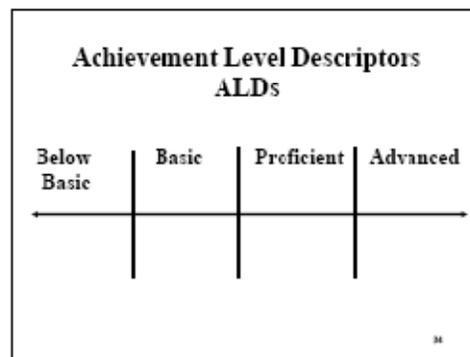
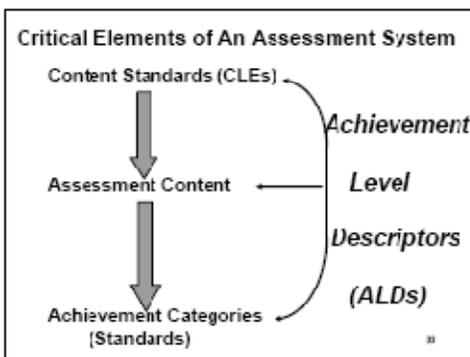
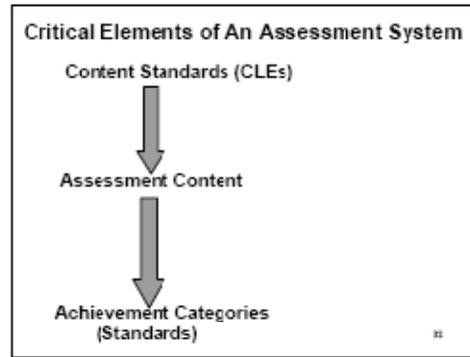
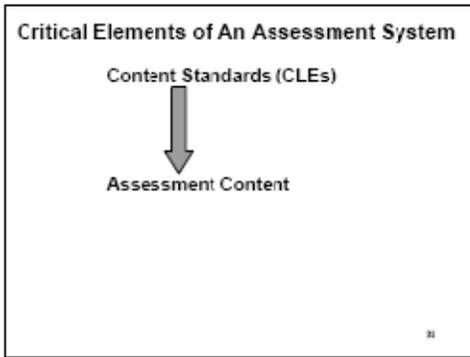
Use your best judgment !!

29

Critical Elements of An Assessment System

**Content Standards =  
Course-Level Expectations  
(CLEs)**

30



**Achievement Level Descriptors ALDs**

*Written draft* statements describing in content-specific terms the level of knowledge and skills required at each performance/achievement category  
*Below Basic, Basic Proficient, Advanced*



11

**Achievement Level Descriptors ALDs**

Anchors for your decisions consisting of:

- Labels, i.e., BB, B, P, A
- Introductory paragraphs - general descriptions of Achievement Levels
- Lists of specific behaviors - what students should know and be able to do



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**Achievement Level Descriptors  
ALDs**

Why are they important?  
**Standard-setting ANCHORS**  
 for classifying student performance and determining cut scores.  
 Reporting tools to help students, teachers, parents *interpret* what learners know and can do, and what they do not know and cannot do.



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**Achievement Level Descriptors  
ALDs**

- Are derived from the Course Level Expectations CLEs.
- Are based on *assessable* CLEs.
- Describe in general terms behaviors assessed specifically on the EOC assessments.

*Not everything that can be counted counts, and not everything that counts can be counted.*  
 Albert Einstein

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**Achievement Level Descriptors  
ALDs – Your Task**

Determine what these *general* ALDs mean **concretely** for students taking each EOC assessment.

**How??**

39

**Achievement Level Descriptors  
ALDs – Your Task**

- Beginning with the *Proficient* category, describe the assessed students *concretely*.
- What do they know? What can they do?
- What skills do they possess in order to demonstrate this behavior?
- What does the skill look like?
- What are examples?
- What behaviors/actions “fit” a certain category?

40

**ALDs – Your Task**

**Advanced**

- Demonstrate thorough understanding
- Demonstrate higher-level skills
- Use wide range of strategies to understand
- Consistently apply

**Proficient**

- Demonstrate understanding of skills and processes
- Use a range of strategies to understand and apply

**Basic**

- Demonstrate incomplete or partial understanding
- Demonstrate skills inconsistently
- Use some strategies

**Below Basic**

- Demonstrate little understanding
- Demonstrate skills inconsistently or incorrectly
- Use few strategies

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**Achievement Level Descriptors  
ALDs – Your Task**

- **Action verbs** - e.g., determine, evaluate, analyze, identify, compare, describe, explain
- **Qualifiers** - adjectives and adverbs that describe:
  - Differences in amount (most, various, few, both, limited)
  - Degree of
    - understanding (complex, clear, relevant, little, incomplete)
    - frequency (consistently, inconsistently, rarely)
    - effectiveness (highly, moderately, somewhat, thorough)

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**Achievement Level Descriptors  
ALDs – Your Task**

**QUALITY & CLARITY**

- High-quality, clear *anchors* for setting achievement standards
- High-quality, clear *targets* to assist teachers in
  - designing instruction and assessment
  - supporting acquisition of pre-requisite knowledge and skills
  - providing “on-target” intervention and practice
  - evaluating and grading

4

**APPENDIX H:**

**DRAFT ALDs WITH PANEL EDITS MARKED**

**Missouri End-of-Course Assessment Achievement-Level Descriptors—DRAFT**  
***English I***  
**Achievement Levels**

**Advanced:** Students performing at the Advanced level on the Missouri English I End-of-Course Assessment consistently demonstrate a thorough understanding of the skills and processes identified in the Course Level Reading Expectations for English I. They demonstrate higher-level skills in reading processes and in responding to both fiction and nonfiction texts. In addition to understanding and applying the skills at the Proficient level, students scoring at the Advanced level use a range of strategies to comprehend and interpret a variety of texts, demonstrate a thorough understanding of literary forms, and consistently apply different strategies for accessing and summarizing information.

**Proficient:** Students performing at the Proficient level on the Missouri English I End-of-Course Assessment demonstrate an understanding of the skills and processes identified in the Course Level Reading Expectations for English I. They demonstrate these skills in reading processes and in responding to both fiction and nonfiction texts. In addition to understanding and applying the skills at the Basic level, students scoring at the Proficient level use a range of strategies to comprehend and interpret a variety of texts, demonstrate an understanding of literary forms, and apply strategies for accessing and summarizing information.

**Basic:** Students performing at the Basic level on the Missouri English I End-of-Course Assessment demonstrate an incomplete understanding of the skills and processes identified in the Course Level Reading Expectations for English I. They demonstrate these skills inconsistently in reading processes and in responding to both fiction and nonfiction texts. In addition to understanding and applying the skills at the Below Basic level, students scoring at the Basic level use some strategies to comprehend and interpret a variety of texts, demonstrate a partial understanding of literary forms, and inconsistently apply few strategies for accessing and summarizing information.

**Below Basic:** Students performing at the Below Basic level on the Missouri English I End-of-Course Assessment demonstrate little understanding of the skills and processes identified in the Course Level Reading Expectations for English I. They demonstrate these skills inconsistently and/or incorrectly in reading processes and in responding to both fiction and nonfiction texts. Students scoring at the Below Basic level use few strategies to comprehend and interpret texts, demonstrate little understanding of literary forms, and apply few strategies for accessing information.

## **Achievement Descriptors**

### **Advanced**

**Reading**—In both fiction and nonfiction, a student can

- ✓ Determine vocabulary meaning
- ✓ Analyze the main idea and evaluate supporting details
- ✓ Make connections—compare, contrast, evaluate
- ✓ Evaluate text features
- ✓ Analyze and evaluate figurative language and literary techniques
- ✓ Draw insightful conclusions ~~to evaluate text~~
- ✓ Summarize and paraphrase complex ideas and information
- ✓ Evaluate literary elements
- ✓ Evaluate proposed solutions
- ✓ Evaluate accuracy and adequacy of evidence
- ✓ Analyze organizational patterns
- ✓ Evaluate the author’s point of view, viewpoint/perspective, and purpose
- ✓ Evaluate the author’s style and word choice

### **Proficient**

**Reading**—In both fiction and nonfiction, a student can

- ✓ Determine vocabulary meaning
- ✓ Identify the main idea and supporting details
- ✓ Make connections—compare, contrast, analyze
- ✓ Analyze text features
- ✓ Analyze figurative language and literary techniques
- ✓ Draw accurate conclusions
- ✓ Summarize and paraphrase ideas and information
- ✓ Analyze literary elements
- ✓ Analyze proposed solutions
- ✓ Analyze accuracy and adequacy of evidence
- ✓ ~~Analyze~~ Explain organizational patterns

- ✓ Analyze the author’s point of view, viewpoint/perspective, and purpose
- ✓ Analyze the author’s style and word choice

### **Basic**

**Reading**—In fiction and nonfiction, a student can

- ✓ Determine vocabulary meaning
- ✓ Identify the main idea and major details
- ✓ Make simple connections—compare, contrast
- ✓ Identify text features
- ✓ Identify figurative language and literary techniques
- ✓ Draw conclusions
- ✓ Summarize and paraphrase basic ideas and information
- ✓ Identify basic literary elements
- ✓ Identify proposed solutions
- ✓ Determine reliability of evidence
- ✓ Identify organizational patterns
- ✓ Identify author’s point of view and purpose
- ✓ Identify the author’s style and word choice

### **Below Basic**

**Reading**—In fiction and nonfiction, a student can

- ✓ Determine vocabulary meaning
- ✓ Identify the main idea and some details
- ✓ Make simple connections
- ✓ Identify simple text features
- ✓ Identify figurative language
- ✓ Identify characters, plot, and setting
- ✓ Identify point of view
- ✓ Determine literal meaning

**Missouri End-of-Course Assessment Achievement-Level Descriptors**  
***Algebra II***  
**Achievement Levels**

**Advanced:** Students performing at the Advanced level on the Missouri Algebra II End-of-Course Assessment demonstrate a thorough understanding of the course-level expectations for Algebra II. They demonstrate these skills in numbers and operations, algebraic relationships, and data and probability. In addition to understanding and applying the skills at the Proficient level, students scoring at the Advanced level use a wide range of strategies to solve problems and demonstrate a thorough understanding of important mathematical content and concepts.

**Proficient:** Students performing at the Proficient level on the Missouri Algebra II End-of-Course Assessment demonstrate an understanding of most of the course-level expectations for Algebra II. They demonstrate these skills in numbers and operations, algebraic relationships, and data and probability. In addition to understanding and applying the skills at the Basic level, students scoring at the Proficient level use a range of strategies to solve problems and demonstrate an understanding of important mathematical content and concepts.

**Basic:** Students performing at the Basic level on the Missouri Algebra II End-of-Course Assessment demonstrate some understanding of the course-level expectations for Algebra II. They demonstrate these skills in numbers and operations, algebraic relationships, and data and probability. In addition to understanding and applying the skills at the Below Basic level, students scoring at the Basic level use some strategies to solve problems and demonstrate some understanding of important mathematical content and concepts.

**Below Basic:** Students performing at the Below Basic level on the Missouri Algebra II End-of-Course Assessment demonstrate a limited understanding of the course-level expectations for Algebra II. They demonstrate these skills in numbers and operations, algebraic relationships, and data and probability. In addition to demonstrating these skills, students scoring at the Below Basic level use very few strategies to solve problems and demonstrate a limited understanding of important mathematical content and concepts.

## **Achievement Descriptors**

### **Advanced**

***Algebraic Relationships***—Using algebraic relationships, a student can

- ✓ Describe the effect of parameter changes on logarithmic and rational functions
- ✓ Compare and contrast properties of rational functions
- ✓ Use symbolic algebra to represent and solve problems that involve logarithmic relationships
- ✓ Describe and use algebraic manipulations, inverse, or composition of functions
- ~~✓ Compare and contrast properties of rational functions~~
- ✓ Use and solve equivalent forms of logarithmic, radical, and rational equations
- ✓ Use and solve systems of quadratic equations or inequalities with 2 variables
- ✓ Identify quantitative relationships and determine type(s) of functions that might model the situation to solve a problem, including logarithmic and rational functions
- ✓ Analyze logarithmic functions by investigating intercepts, domain and range, and asymptotes

***Data and Probability***—Using data and probability, a student can

- ~~✓ Given one-variable quantitative data, describe its shape and calculate summary statistics~~
- ✓ Describe the concept of probability distribution
- ✓ Compute the probability of compound events

### **Proficient**

***Algebraic Relationships***—Using algebraic relationships, a student can

- ✓ Compare and contrast various forms of representations of patterns
- ✓ Describe the effect of parameter changes on quadratic, cubic, absolute value, and square root functions
- ✓ Compare and contrast the properties of exponential and logarithmic functions
- ✓ Use symbolic algebra to represent and solve problems that involve exponential or quadratic relationships

- ✓ Describe and use algebraic manipulations, including factoring or imaginary numbers, to simplify expressions
- ✓ Use and solve equivalent forms of quadratic and exponential equations
- ✓ Use and solve systems of linear inequalities with two variables
- ✓ Identify quantitative relationships and determine type(s) of functions that might model the situation to solve a problem, including quadratic and exponential growth/decay
- ✓ Analyze exponential functions by investigating rates of change, intercepts, domain and range, and asymptotes
- ~~✓ Identify quantitative relationships that can be modeled by exponential or quadratic functions to solve a problem~~

**Data and Probability**—Using data and probability, a student can

- ✓ Given a scatterplot, determine a type of function that models the data
- ✓ Given one-variable quantitative data, calculate summary statistics
- ✓ Use and describe the concepts of conditional probability
- ~~✓ Given one-variable quantitative data, display the distribution and describe its shape~~
- ~~✓ Describe the concept of probability distribution~~
- ~~✓ Compute the probability of compound events~~

**Basic**

**Numbers and Operations**—Using numbers and operations, a student can

- ✓ Compare and order irrational numbers, including finding their approximate location on a number line
- ✓ Use real numbers and various models, drawings, etc. to solve problems

**Algebraic Relationships**—Using algebraic relationships, a student can

- ✓ Generalize patterns using explicitly or recursively defined linear or exponential functions
- ✓ Describe the effect of parameter changes on exponential functions
- ✓ Compare and contrast the properties of linear and exponential functions

- ~~✓ Describe the effect of parameter changes on exponential functions~~
- ~~✓ Describe and use algebraic manipulations, including rules of exponents, to simplify expressions~~
- ✓ Use symbolic algebra to represent and solve problems that involve linear relationships
- ✓ Describe and use algebraic manipulations, including rules of exponents, to simplify expressions
- ✓ Use and solve equivalent forms of absolute value and linear equations
- ✓ Use and solve systems of linear equations with two variables
- ✓ Identify quantitative relationships that can be modeled by linear functions to solve a problem

**Data and Probability**—Using data and probability, a student can

- ✓ Given a scatterplot, determine an equation for a line of best fit
- ✓ Given one-variable quantitative data, display the distribution and describe its shape
- ✓ Apply statistical measures of center to solve problems
- ~~✓ Given a scatterplot, determine an equation for a line of best fit~~
- ~~✓ Use and describe the concepts of conditional probability~~

### **Below Basic**

**Numbers and Operations**—Using numbers and operations, a student can

- ✓ Compare and order rational numbers, including finding approximate locations on a number line

**Algebraic Relationships**—Using algebraic relationships, a student can

- ✓ Generalize patterns using explicitly or recursively defined single operation functions
- ✓ Describe the effects of parameter changes on linear functions
- ✓ Compare the properties of linear functions
- ✓ Describe and use algebraic manipulations, including order of operations, to simplify expressions

- ✓ Use and solve equivalent forms of linear equations

***Data and Probability***—Using data and probability, a student can

- ✓ Use appropriate graphical representations of data
- ✓ Describe the concept of sample space
- ✓ Determine the probability of two independent events

## Missouri End-of-Course Assessment Achievement-Level Descriptors

### Geometry

### Achievement Levels

**Advanced:** Students performing at the Advanced level on the Missouri Geometry End-of-Course Assessment demonstrate a thorough understanding of the course-level expectations for Geometry. They demonstrate these skills in algebraic relationships, geometric and spatial relationships, and measurement. In addition to understanding and applying the skills at the Proficient level, students scoring at the Advanced level use a wide range of strategies to solve problems and demonstrate a thorough understanding of important mathematical content and concepts.

**Proficient:** Students performing at the Proficient level on the Missouri Geometry End-of-Course Assessment demonstrate an understanding of most of the course-level expectations for Geometry. They demonstrate these skills in algebraic relationships, geometric and spatial relationships, and measurement. In addition to understanding and applying the skills at the Basic level, students scoring at the Proficient level use a range of strategies to solve problems and demonstrate an understanding of important mathematical content and concepts.

**Basic:** Students performing at the Basic level on the Missouri Geometry End-of-Course Assessment demonstrate some understanding of the course-level expectations for Geometry. They demonstrate these skills in algebraic relationships, geometric and spatial relationships, and measurement. In addition to understanding and applying the skills at the Below Basic level, students scoring at the Basic level use some strategies to solve problems and demonstrate some understanding of important mathematical content and concepts.

**Below Basic:** Students performing at the Below Basic level on the Missouri Geometry End-of-Course Assessment demonstrate a limited understanding of the course-level expectations for Geometry. They demonstrate these skills in algebraic relationships, geometric and spatial relationships, and measurement. In addition to demonstrating these skills, students scoring at the Below Basic level use very few strategies to solve problems and demonstrate a limited understanding of important mathematical content and concepts.

## **Achievement Descriptors**

### **Advanced**

***Algebraic Relationships***—Using algebraic relationships, a student can

- ✓ Compare and contrast various forms of representations of patterns (exponential)

***Geometric and Spatial Relationships***—Using geometric and spatial relationships, a student can

- ✓ Use inductive and deductive reasoning to prove theorems and critique arguments made by others
- ✓ Make conjectures involving 2-dimensional objects represented with Cartesian coordinates
- ✓ Apply constructions and the coordinate plane to represent translations, reflections, rotations, and dilations of objects
- ~~✓ Identify types of symmetries of 3-dimensional figures~~
- ✓ Draw vertex-edge graphs or networks to find optimal solutions
- ✓ Draw representations of 3-dimensional geometric objects from different perspectives

***Measurement***—Using measurement relationships, a student can

- ✓ Solve problems of angle measure involving polygons

### **Proficient**

***Algebraic Relationships***—Using algebraic relationships, a student can

- ✓ Identify quantitative relationships and determine the type(s) of function that might model the situation to solve the problem (exponential)
- ✓ Analyze linear functions by investigating rates of change and intercepts
- ✓ Apply appropriate properties of exponents to solve equations
- ✓ Compare and contrast various forms of representations of patterns (quadratic)

***Geometric and Spatial Relationships***—Using geometric and spatial relationships, a student can

- ✓ Use inductive and deductive reasoning to establish the validity of geometric conjectures
- ✓ Solve problems involving 2-dimensional objects represented with Cartesian

coordinates

- ✓ Use constructions and the coordinate plane to represent translations, reflections, rotations, and dilations of objects
- ✓ Identify types of symmetries of 3-dimensional figures
- ✓ Use vertex-edge graphs or networks to find optimal solutions

**Measurement**—Using measurement relationships, a student can

- ✓ Solve problems of angle measure involving parallel lines cut by a transversal
- ✓ Determine the surface area of geometric figures, including cylinders, cones, and spheres

### **Basic**

**Algebraic Relationships**—Using algebraic relationships, a student can

- ✓ Generalize patterns using explicitly or recursively defined functions
- ✓ Apply appropriate properties of exponents to simplify expressions
- ✓ Identify quantitative relationships and determine the type(s) of function that might model the situation to solve the problem (absolute value and quadratic)
- ✓ Compare and contrast various forms of representations of patterns (linear)

**Geometric and Spatial Relationships**—Using geometric and spatial relationships, a student can

- ✓ Identify types of symmetries of 2-dimensional figures (rotational)

**Measurement**—Using measurement relationships, a student can

- ✓ Solve problems of angle measure involving triangles
- ✓ Determine the volume of geometric figures, including cylinders, cones, and spheres

### **Below Basic**

**Algebraic Relationships**—Using algebraic relationships, a student can

- ✓ Identify quantitative relationships and determine the type(s) of function that might model the situation to solve the problem (linear)

**Geometric and Spatial Relationships**—Using geometric and spatial relationships, a student can

- ✓ Identify types of symmetries of 2-dimensional figures (line)

**Measurement**—Using measurement relationships, a student can

- ✓ Determine the volume of geometric figures (prism and pyramids)

**Missouri End-of-Course Assessment Achievement-Level Descriptors**  
**Government**  
**Achievement Levels**

**Advanced:** Students performing at the Advanced level on the Missouri End-of-Course Assessment demonstrate a thorough understanding of the Course-Level Expectations for Government. They demonstrate these skills in addition to understanding and applying the skills at the Proficient level. Students scoring at the Advanced level use a wide range of strategies to understand and apply the concepts of government.

**Proficient:** Students performing at the Proficient level on the Missouri End-of-Course Assessment demonstrate an understanding of the Course-Level Expectations for Government. They demonstrate these skills in addition to understanding and applying the skills at the Basic level. Students scoring at the Proficient level use a range of strategies to understand and apply the concepts of government.

**Basic:** Students performing at the Basic level on the Missouri End-of-Course Assessment demonstrate a partial understanding of the Course-Level Expectations for Government. They demonstrate these skills in addition to understanding and applying the skills at the Below Basic level. Students scoring at the Basic level use some strategies to understand and apply the concepts of government.

**Below Basic:** Students performing at the Below Basic level on the Missouri End-of-Course Assessment demonstrate a limited understanding of the Course-Level Expectations for Government. In addition to demonstrating these skills, students scoring at the Below Basic level use few strategies and demonstrate a limited understanding of important government content and concepts.

## **Achievement Descriptors**

### **Advanced**

#### ***Knowledge of the principles expressed in documents shaping constitutional democracy in the United States***—A student can

- ✓ Apply the principles of constitutional democracy to complex historical and contemporary issues
- ✓ Thoroughly assess the changing roles of government
- ✓ Describe the historical foundations of the United States governmental system by citing the influence of different documents and writings
- ✓ Determine the civic responsibilities of individual citizens
- ✓ Identify and give clear examples of democracies and republics
- ✓ Explain the relevance of constitutional principles and make complex connections to different ~~foundational~~ historical documents and court cases

#### ***Knowledge of principles and processes of governance systems***—A student can

- ✓ Describe in detail the structure of federal and state levels of government and the purposes of ~~both federal and state~~ laws
- ✓ Thoroughly explain the importance of government principles
- ✓ Evaluate the roles and influence of political parties and interest groups
- ✓ Thoroughly explain ~~Explain various~~ processes pertaining to ~~different~~ governmental systems

## **Proficient**

### ***Knowledge of the principles expressed in documents shaping constitutional democracy in the United States***—A student can

- ✓ Apply the principles of constitutional democracy to historical and contemporary issues
- ✓ Assess the changing roles of government
- ✓ Describe the historical foundations of the United States governmental system
- ✓ Determine the civic responsibilities of individual citizens
- ✓ Identify and give examples of democracies and republics
- ✓ Explain the relevance and connection of constitutional principles in different historical documents and court cases

### ***Knowledge of principles and processes of governance systems***—A student can

- ✓ Describe the structure of federal and state levels of government and the purposes of laws
- ✓ Explain the importance of government principles
- ✓ Evaluate the roles and influence of political parties and interest groups
- ✓ Explain the processes pertaining to governmental systems

## Basic

### ***Knowledge of the principles expressed in documents shaping constitutional democracy in the United States***—A student can

- ✓ Describe the principles of constitutional democracy
- ✓ Explain the changing roles of government
- ✓ Explain Identify the historical foundations of the United States governmental system
- ✓ Describe the civic responsibilities of individual citizens
- ✓ Identify democracies and republics
- ✓ Describe the relevance of different historicall documents

### ***Knowledge of principles and processes of governance systems***—A student can

- ✓ Identify the structure of government and the purposes of laws
- ✓ Define different government principles
- ✓ Identify the roles and influence of political parties and interest groups
- ✓ Recognize the processes pertaining to governance systems

**Below Basic**

***Knowledge of the principles expressed in documents shaping constitutional democracy in the United States***—A student can

- ✓ Identify the principles of constitutional democracy
- ✓ Recognize the changing roles of government
- ✓ Recognize the historical foundations of the United States governmental system
- ✓ Identify the civic responsibilities of individual citizens
- ✓ Inconsistently identifies democracies and republics
- ✓ Identify different relevant historical documents

***Knowledge of principles and processes of governance systems***—A student can

- ✓ Inconsistently identifies the structure of government and the purposes of laws
- ✓ Inconsistently defines different government principles
- ✓ Identify the roles and influence of political parties and interest groups
- ✓ Recognize the processes pertaining to governance systems

**Missouri End-of-Course Assessment Achievement-Level Descriptors**  
***American History***  
**Achievement Levels**

**Advanced:** Students performing at the Advanced level on the Missouri End-of-Course Assessment demonstrate a thorough understanding of the Course-Level Expectations for American History. They demonstrate these skills in addition to understanding and applying the skills at the Proficient level. Students scoring at the Advanced level effectively and consistently demonstrate an understanding and apply concepts in American History.

**Proficient:** Students performing at the Proficient level on the Missouri End-of-Course Assessment demonstrate an understanding of the Course-Level Expectations for American History. They demonstrate these skills in addition to understanding and applying the skills at the Basic level. Students scoring at the Proficient level demonstrate understanding and apply concepts in American History.

**Basic:** Students performing at the Basic level on the Missouri End-of-Course Assessment demonstrate a partial understanding of the Course-Level Expectations for American History. They demonstrate these skills in addition to understanding and applying the skills at the Below Basic level. Students scoring at the Basic level use some strategies to demonstrate partial understanding and apply concepts in American History.

**Below Basic:** Students performing at the Below Basic level on the Missouri End-of-Course Assessment demonstrate a limited understanding of the Course-Level Expectations for American History. In addition to demonstrating these skills, students scoring at the Below Basic level use few strategies and demonstrate a limited understanding of important content and concepts in American History.

## **Achievement Descriptors**

### **Advanced**

#### ***Knowledge of continuity and change in the history of Missouri and the United States***—A student can

- ✓ Describe various motivations and challenges for people migrating from many regions of the world and the interactions of cultures and religious traditions that have contributed to America's history from Reconstruction to the present
- ✓ Analyze the evolution of American democracy by recognizing events and movements that expanded the role of the government, civic participation, and civil rights from Reconstruction to the present
- ✓ Apply various major economic concepts in the context of the historical period studied
- ✓ Thoroughly explain the importance of various government principles within the context of United States history from Reconstruction to the present
- ✓ Analyze the various roles and influence of political parties and interest groups from Reconstruction to the present
- ✓ Describe the historical development of various aspects of the American economy
- ✓ Thoroughly analyze the interplay of people, business, labor unions, and government with respect to regulation and to fiscal and monetary policy in the United States economy
- ✓ ~~Effectively survey~~ Explain the functions and effects of major economic institutions of the United States economy
- ✓ Identify the ~~various~~ roles of the government in the United States economy
- ✓ Distinguish ~~major~~ patterns and issues with regard to population distribution, demographics, settlements, migrations, and cultures in the United States

- ✓ Identify and ~~thoroughly~~ explain criteria that give regions their identities in different periods of United States history; connect ideas about how and why regions change
- ✓ Describe and evaluate the evolution of United States domestic and foreign policies from Reconstruction to the present by citing specific policy-shaping events

***Knowledge of continuity and change in the history of the world***—A student can

- ✓ ~~Effectively analyze~~ Analyze various aspects of twentieth century wars pertinent to United States history

**Proficient**

***Knowledge of continuity and change in the history of Missouri and the United States***—A student can

- ✓ Describe the migrations of people from many regions of the world and the interactions of cultures and religious traditions that have contributed to America's history from Reconstruction to the present
- ✓ Analyze the evolution of American democracy—its ideas, institutions, and political processes from Reconstruction to the present
- ✓ ~~Apply~~ Explain major economic concepts in the context of the historical period studied
- ✓ Explain the importance of government principles within the context of United States history from Reconstruction to the present
- ✓ Analyze the significance of the roles and influence of political parties and interest groups from Reconstruction to the present
- ✓ Describe significant aspects of the historical development of the American economy
- ✓ Analyze the roles people, business, labor unions, and government play in the United States economy
- ✓ ~~Draw conclusions about~~ Survey the functions and effects of major economic institutions of the United States economy.
- ✓ Identify ~~the~~ significant roles of government in the United States economy
- ✓ Distinguish major patterns and issues with regard to population distribution, demographics, settlements, migrations, and cultures in the United States
- ✓ List ~~and explain~~ criteria that give regions their identities in different periods of United States history; explain how and why regions change

- ✓ ~~Analyze the evolution~~ Describe the changes of United States domestic and foreign policies from Reconstruction to the present

***Knowledge of continuity and change in the history of the world***—A student can

- ✓ ~~Analyze~~ Demonstrate an understanding of the causes and impacts of the wars in the twentieth century that are pertinent to United States history

## **Basic**

***Knowledge of continuity and change in the history of Missouri and the United States***—A student can

- ✓ Identify the migrations of people from many regions of the world that have contributed to America's history from Reconstruction to the present
- ✓ Explain the evolution of American democracy—its ideas, institutions, and political processes from Reconstruction to the present
- ✓ Describe major economic concepts in the context of the historical period studied
- ✓ Describe the importance of government principles within the context of United States history from Reconstruction to the present
- ✓ Explain the roles and influence of political parties and interest groups from Reconstruction to the present
- ✓ Explain the roles people, business, labor unions, and government play in the United States economy
- ✓ Identify the functions and effects of major economic institutions of the United States economy
- ✓ Describe major patterns and issues with regard to population distribution, demographics, settlements, migrations, and cultures in the United States
- ✓ Identify criteria that give regions their identities in different periods of United States history; describe how and why regions change
- ✓ ~~Describe the evolution of~~ United States domestic and foreign policies from Reconstruction to the present

***Knowledge of continuity and change in the history of the world***—A student can

- ✓ Describe the wars of the twentieth century pertinent to United States history

**Below Basic**

***Knowledge of continuity and change in the history of Missouri and the United States***—A student can

- ✓ Describe the evolution of American democracy—its ideas, institutions, and political processes from Reconstruction to the present
- ✓ Identify major economic concepts
- ✓ Identify government principles
- ✓ Describe the roles and influence of political parties and interest groups from Reconstruction to the present
- ✓ Describe the roles people, business, labor unions, and government play in the United States economy
- ✓ Identify major patterns and issues with regard to population distribution, demographics, settlements, migrations, and cultures in the United States
- ✓ Identify United States domestic and foreign policies from Reconstruction to the present

***Knowledge of continuity and change in the history of the world***—A student can

- ✓ Identify the wars of the twentieth century pertinent to United States history

**APPENDIX I:**  
**QUALIFYING TEST**

## **Pre-Standard Setting Self-Evaluation Assessment for Judges of the Missouri EOC Assessments**

1. Why are Achievement Level Descriptors such an integral part of the standard-setting process?
  - A. They provide an anchor, giving concrete meaning to the terms Basic, Proficient, and Advanced.
  - B. They describe critical knowledge and skills that all students at a given performance level should possess.
  - C. They define all of the items that are contained on the EOC.
  - D. They summarize elements of the Course-Level Expectations for the course.
  
2. Which of these statements about standard setting is TRUE?
  - A. Panelists should use their best judgment to make their recommendations but should rely more on various empirical data to be provided during the sessions.
  - B. While the EOC assessments are given statewide, judges should make recommendations based on the unique characteristics of *their* districts since other panelists will focus on other district types.
  - C. A judge who concludes that the “proper” cut score for Proficient is 24 should make a final recommendation of 22 or 23 to account for errors that are present in any assessment.
  - D. Judges must consider both the “stem” *and* answer options in selected-response items in deciding what percent of students should answer correctly.
  
3. Joe the Judge decided that about 50% of the typical Proficient students in Missouri taking the EOC assessment should answer Item 32 correctly. He coded 50% under Proficient on his Rating Form. What error did he make?
  - A. He should have coded 45% since some percent of special-needs students will take the assessment.
  - B. He should have considered *barely* Proficient, not *typical* Proficient, students.
  - C. He should reconsider his judgment, as 50% correct couldn’t possibly be considered Proficient.
  - D. He made no error here. This was the correct procedure.
  
4. Judge Jan thought that a particular item on her EOC assessment was clear, and that it measured content that was very important. She also thought that students should answer this correctly if they were Proficient performers. Which of these percentages should she most likely enter for Proficient on her Rating Form?

- A. 90%—because almost all students whose course achievement is Proficient should answer correctly
  - B. 65%—because this is the approximate percentage that corresponds to “pass” in the school’s grading system
  - C. 50%—because many students taking this test will be learning-disabled or disadvantaged or won’t take the assessment seriously
  - D. 35%—because large proportions of students taking this test aren’t receiving instruction following the state’s content standards
5. Which of these sets of “Angoff” judgments for a selected-response (SR) item appears to be *improper* and why?

	Cut Score		
	Below Basic/ Basic	Basic/ Proficient	Proficient/ Advanced
A.	25%	35%	40%
B.	80%	90%	100%
C.	50%	50%	55%
D.	40%	75%	95%

- A. A, because these are unrealistically low expectations for an SR item.
- B. B, because it is unreasonable to expect students to score this well on an SR item.
- C. C, because the judge doesn’t expect higher-achieving students to perform any better on the item than lower-achieving students.
- D. D, because the increase in percentages across the three groups is unrealistically large.

**APPENDIX J:**  
**MID-PROCESS EVALUATION**

# MISSOURI EOC STANDARD SETTING

November 2–5, 2009

## Mid-Process Evaluation

I understand the background information related to the standard-setting procedures and I am ready to begin.

\_\_\_\_\_ YES

\_\_\_\_\_ NO

If no, use the space below to identify the issues or procedures you would like the facilitator to review before the formal standard setting begins.

**APPENDIX K:**  
**EXAMPLE RATING SHEET**

**Missouri End of Course  
Standard Setting 2009  
Rating Form**

ID # 

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①	①	①	①	①
②	②	②	②	②
③	③	③	③	③

**English I**

Round 

①	②
---	---

Item	Perf Level	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
1	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
2	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
3	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
4	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
5	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
6	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
7	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
8	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
9	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		
10	Basic	<input type="radio"/>																		
	Proficient	<input type="radio"/>																		
	Advanced	<input type="radio"/>																		

**Missouri End of Course Standard Setting 2009**  
**Rating Form**

		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
11	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
12	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
13	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
14	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
15	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
16	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
29	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
30	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
31	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
32	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		

**Missouri End of Course Standard Setting 2009**  
**Rating Form**

		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
33	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
34	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
35	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
36	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
37	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
38	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
39	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
40	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
41	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
42	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		

**Missouri End of Course Standard Setting 2009  
Rating Form**

		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
<b>43</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>44</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>45</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>46</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>47</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>48</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>49</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>50</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>51</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		
<b>52</b>	<input type="checkbox"/> Basic	<input type="radio"/>																		
	<input type="checkbox"/> Proficient	<input type="radio"/>																		
	<input type="checkbox"/> Advanced	<input type="radio"/>																		

**APPENDIX L:**  
**PARTICIPANT EVALUATION FORM**

# MISSOURI EOC STANDARD SETTING

November 2–5, 2009

## Participant Evaluation Form

This form contains six sections, five of which ask for feedback on specific aspects of this standard-setting session. The last section asks for general reactions to the standard-setting session. Please fill out each of these sections as completely as possible in order to provide information that will help in the improvement of similar sessions in the future. Your identification number is used for analysis purposes only. Your responses to these questions will be held in strict confidence and will be analyzed in conjunction with those of the other judges who participated in this meeting.

Panelist I.D. (optional) \_\_\_\_\_

### Section I: Opening Training Sessions

The following statements seek your judgments about the Opening Sessions for the Missouri End-of-Course standard-setting meeting. Please circle one value on the scale under each statement that best characterizes your judgment.

1. The Opening Session provided adequate background information about the Missouri End-of-Course Assessments.

5	4	3	2	1
Completely		Somewhat		Not at all

2. The topics covered in the Opening Session were appropriate to providing a context for my role in this meeting.

5	4	3	2	1
Completely		Somewhat		Not at all

3. The content of the Opening Sessions was:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

4. The organization of the Opening Sessions was:

5	4	3	2	1
Very good		Acceptable		Very poor

The following statements seek your judgments about the Opening Session for the Missouri End-of-Course standard-setting session. Please write your responses to each prompt on the lines provided.

5. Did you have questions or concerns that were not answered or addressed in the Opening Session? Please indicate these below. (Use the reverse side for additional space.)

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6. What was most helpful about the Opening Session?

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7. Please use the space below to provide additional comments concerning the adequacy, appropriateness, usefulness, or organization of the Opening Session.

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**Section II: Discussing Proficient Performance**

The following statements seek your judgments about the discussions of Proficient performance as they relate to Missouri’s End-of-Course Assessments. Please circle the value on the scale under each statement that best characterizes your judgment.

8. The activities used to help operationalize Proficient performance were:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

9. By the end of the activity, my conception of Proficient performance was:

5	4	3	2	1
Very well formed		Moderately well formed		Not well formed

10. Please use the space below to provide additional comments concerning the activities around operationalizing Proficient performance for Missouri’s End-of-Course Assessments.

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**Section III: Discussing Basic Performance**

The following statements seek your judgments about the discussions of Basic performance as they relate to Missouri’s End-of-Course Assessments. Please circle the value on the scale under each statement that best represents your judgment.

11. The activities used to help operationalize Basic performance were:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

12. By the end of this activity my conception of Basic performance was:

5	4	3	2	1
Very well formed		Moderately well formed		Not well formed

13. Please use the space below to provide additional comments concerning the activities around operationalizing Basic performance for Missouri’s End-of-Course Assessments.

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**Section IV: Discussing Advanced Performance**

The following statements seek your judgments about the discussions of Advanced performance as they relate to Missouri’s End-of-Course Assessments. Please circle the value on the scale under each statement that best represents your judgment.

14. The activities used to help operationalize Advanced performance were:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

15. By the end of this activity my conception of Advanced performance was:

5	4	3	2	1
Very well formed		Moderately well formed		Not well formed

16. Please use the space below to provide additional comments concerning the activities around operationalizing Advanced performance for Missouri’s End-of-Course Assessments.

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**Section V: Item Rating Activities**

The following statements seek your judgments about the item rating activities as they relate to the Missouri End-of-Course standard-setting meeting. Please circle the value on the scale under each statement that best represents your judgment.

17. Using the sample items to prepare for the actual item rating was:

5	4	3	2	1
Very helpful		Somewhat helpful		Not helpful

18. The explanation of the item data during the sample item portion of the training was:

5	4	3	2	1
Very helpful		Somewhat helpful		Not helpful

19. The Item Rating Form was:

5	4	3	2	1
Very easy to use		Somewhat easy to use		Not at all easy to use

20. The information provided prior to each round of rating was:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

21. My level of understanding of the tasks I was to accomplish for each round was:

5	4	3	2	1
Very good		Acceptable		Very poor

22. The amount of time I had to complete the tasks during each round was:

5	4	3	2	1
Far too long		About right		Far too short

23. Please use the space below to provide additional comments concerning the instructions and explanations you received, the adequacy of the time available, your levels of understanding of the process, or any other aspects of the item rating activities. (Use reverse side for additional space.)

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**Section VI: The Overall Missouri End-of-Course Standard-Setting Session**

The following statements seek your judgments about the overall processes and procedures used during the Missouri End-of-Course standard-setting session in which you participated as a panelist. Please circle the value on the scale under each statement that best represents your judgment.

24. I feel that this standard-setting session provided me an opportunity to use my best judgment in selecting and revising estimates for a recommended standard of *Proficient* performance.

5	4	3	2	1
To a great extent	To some extent		Not at all	

25. I feel that this standard-setting meeting provided me an opportunity to use my best judgment in selecting and revising estimates for a recommended standard of Basic performance.

5	4	3	2	1
To a great extent	To some extent		Not at all	

26. I feel that this standard-setting meeting provided me an opportunity to use my best judgment in selecting and revising estimates for a recommended standard of Advanced performance.

5	4	3	2	1
To a great extent	To some extent		Not at all	

27. Please provide any comments you wish to share regarding the quality of assistance provided by the standard-setting staff.

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28. Please provide any additional comments you wish to share regarding the overall meeting.

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**APPENDIX M:**  
**RESULTS FOR ENGLISH I**

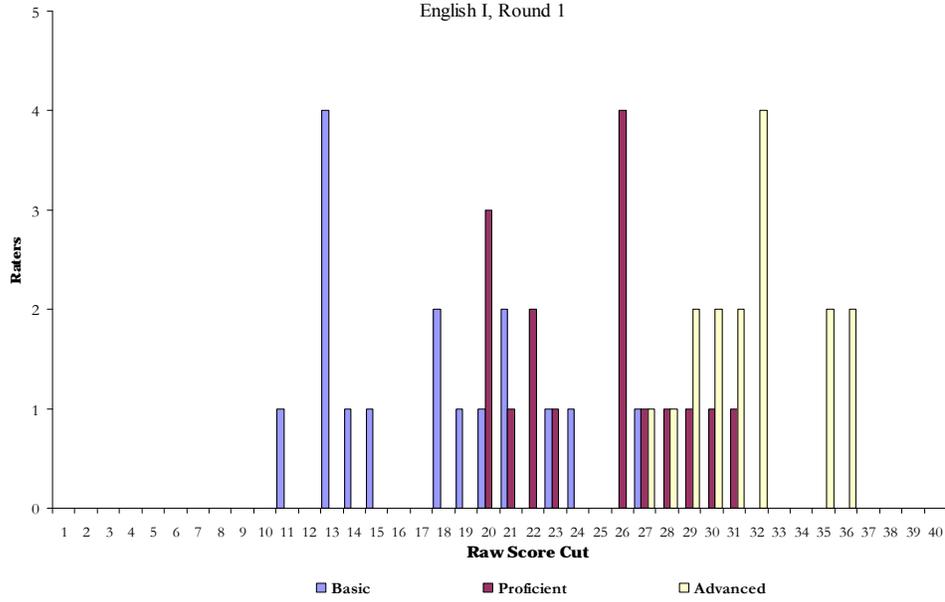
# Standard Setting for the Missouri EOC Assessment English I

## Round 1 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
12123	27	31	36
12133	24	30	35
12111	18	26	32
12213	13	21	29
12131	18	29	35
12112	11	20	29
12122	13	22	31
12211	19	26	32
12113	21	26	30
12222	15	22	31
12132	23	28	32
12232	21	27	36
12222	20	26	32
12231	13	20	27
12212	13	20	28
12121	14	23	30

Median Rating:	18	26	32
Average Rating:	17.7	24.8	31.6
Standard Deviation:	4.6	3.6	2.7
Lowest Rating:	11	20	27
Highest Rating:	27	31	36
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16

Missouri EOC Standard Setting  
English I, Round 1

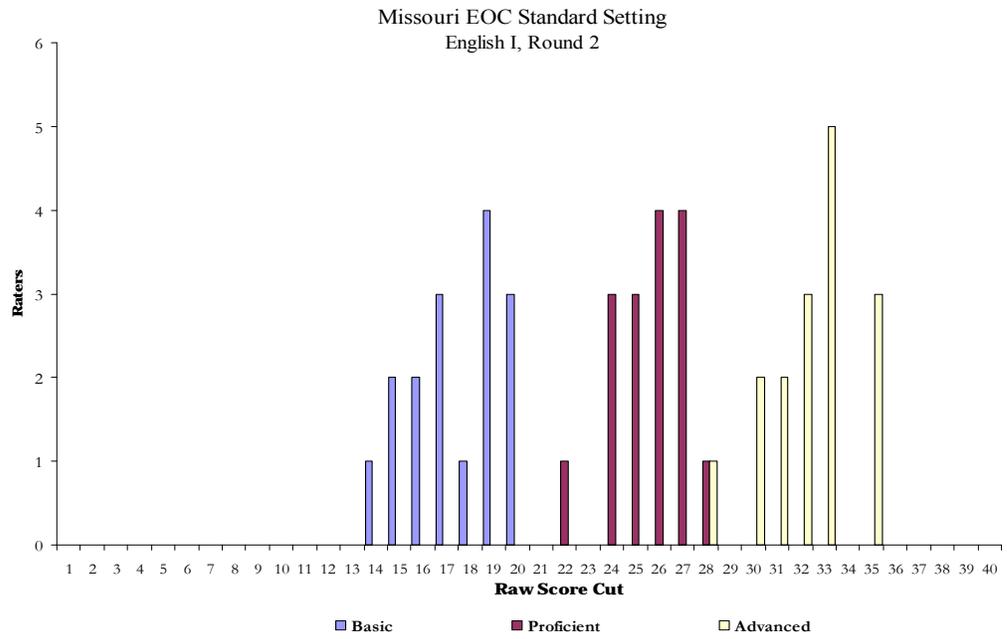


# Standard Setting for the Missouri EOC Assessment English I

## Round 2 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
12113	19	26	32
12111	17	27	33
12212	17	24	31
12231	19	27	35
12133	15	24	32
12222	20	27	33
12131	16	28	35
12232	16	25	35
12123	20	24	28
12213	18	26	33
12121	15	25	30
12122	17	25	32
12112	19	27	33
12221	14	22	31
12132	20	26	30
12211	19	26	33

Median Rating:	18	26	33
Average Rating:	17.6	25.6	32.3
Standard Deviation:	1.9	1.5	1.9
Lowest Rating:	14	22	28
Highest Rating:	20	28	35
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16



### IMPACT RESULTS

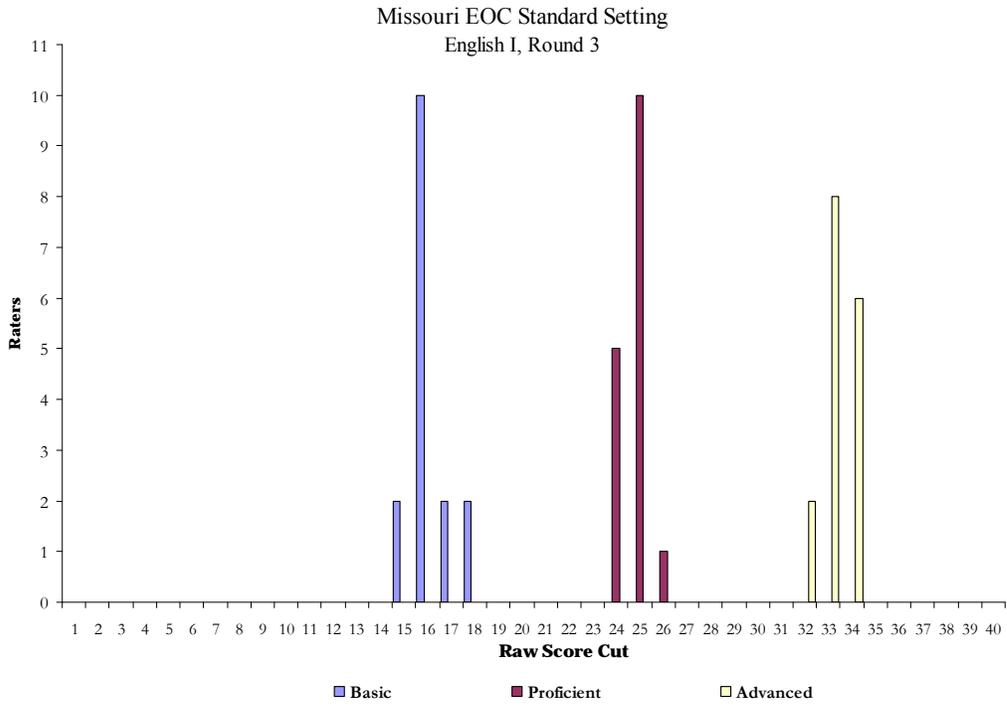
	Minimal	Basic	Proficient	Advanced
<b>Total Population</b>	<b>15.0</b>	<b>33.0</b>	<b>32.0</b>	<b>20.0</b>

# Standard Setting for the Missouri EOC Assessment English I

## Round 3 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
12111	16	24	33
12112	15	24	32
12113	16	25	34
12121	16	25	33
12122	16	25	33
12123	18	25	34
12131	16	25	33
12132	16	24	32
12133	16	24	33
12211	16	24	33
12212	17	25	33
12213	16	25	33
12221	15	25	34
12222	18	26	34
12231	16	25	34
12232	17	25	34

Median Rating:	16	25	33
Average Rating:	16.3	24.8	33.3
Standard Deviation:	0.8	0.6	0.7
Lowest Rating:	15	24	32
Highest Rating:	18	26	34
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16



## English I

### IMPACT RESULTS

	Minimal	Basic	Proficient	Advanced
<b>Total Population</b>	<b>9.0</b>	<b>34.0</b>	<b>37.0</b>	<b>20.0</b>

**APPENDIX N:**  
**RESULTS FOR ALGEBRA II**

# Standard Setting for the Missouri EOC Assessment

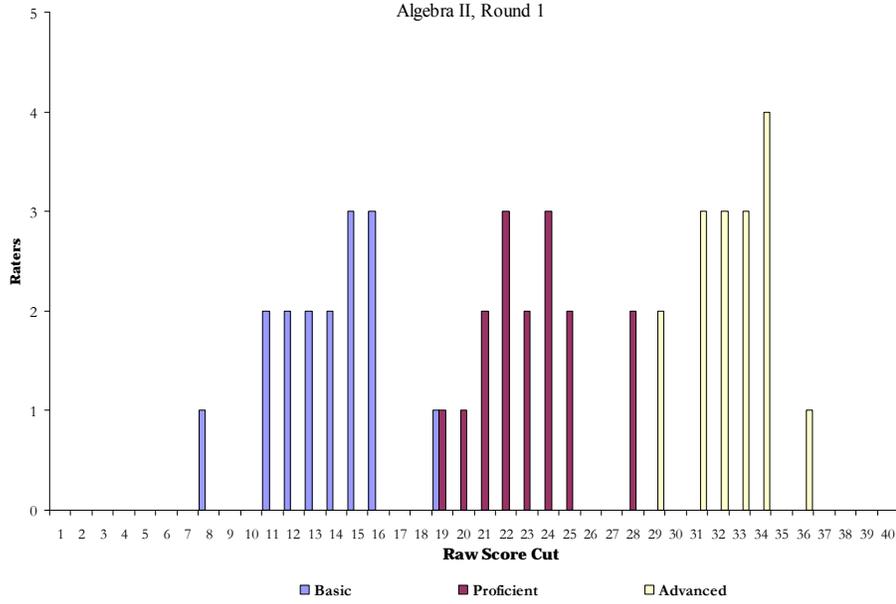
## Algebra II

### Round 1 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
21111	12	19	34
21112	19	28	34
21113	14	22	32
21121	16	25	32
21122	8	22	29
21123	11	23	33
21131	12	21	31
21132	15	24	32
21133	14	20	29
21211	13	28	36
21212	15	23	31
21213	13	24	34
21221	15	24	33
21222	11	21	33
21223	16	25	34
21231	16	22	31

Median Rating:	14	23	33
Average Rating:	13.8	23.2	32.4
Standard Deviation:	2.5	2.5	1.8
Lowest Rating:	8	19	29
Highest Rating:	19	28	36
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16

Missouri EOC Standard Setting  
Algebra II, Round 1



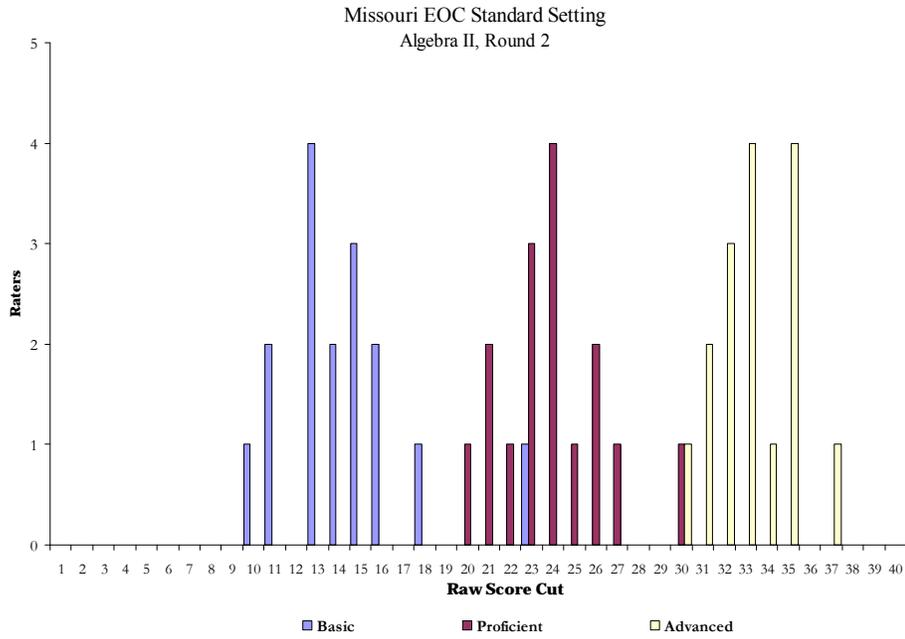
# Standard Setting for the Missouri EOC Assessment

## Algebra II

### Round 2 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
21111	13	20	33
21112	18	26	32
21113	23	30	37
21121	15	24	31
21122	10	24	33
21123	11	23	34
21131	13	22	32
21132	15	24	32
21133	14	21	30
21211	13	27	35
21212	15	23	31
21213	13	24	35
21221	16	26	35
21222	11	21	33
21223	14	25	35
21231	16	23	33

Median Rating:	14	24	33
Average Rating:	14.4	23.9	33.2
Standard Deviation:	3.0	2.4	1.8
Lowest Rating:	10	20	30
Highest Rating:	23	30	37
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16



## Algebra II

### ROUND 2 IMPACT RESULTS

	Below Basic	Basic	Proficient	Advanced
<b>Total Population</b>	<b>7.0</b>	<b>52.0</b>	<b>33.0</b>	<b>8.0</b>

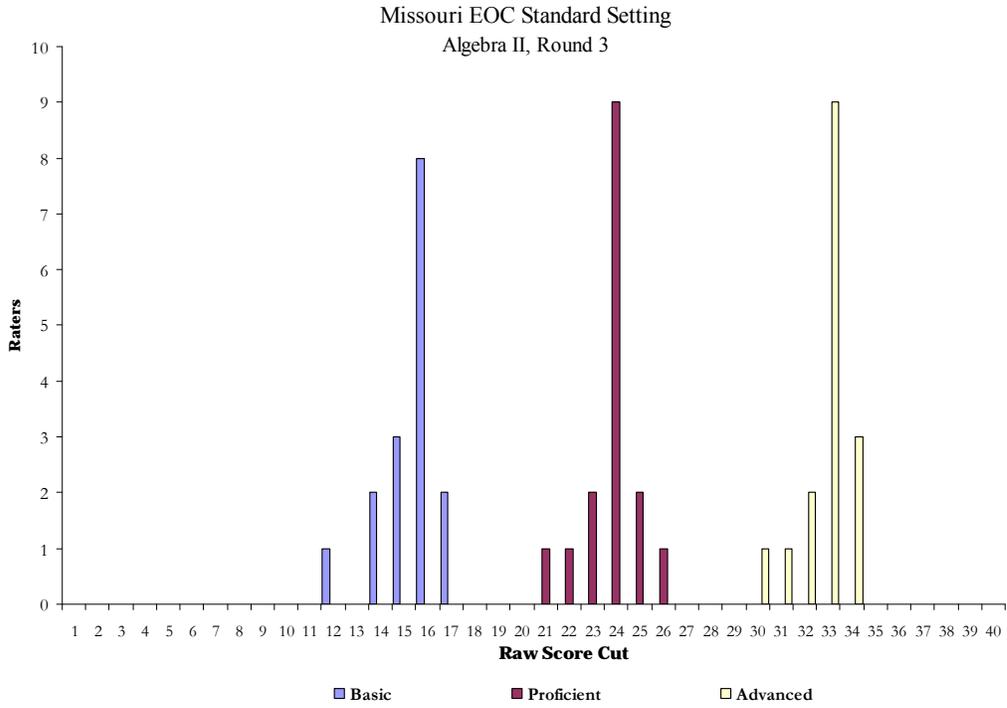
# Standard Setting for the Missouri EOC Assessment

## Algebra II

### Round 3 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
21111	16	21	31
21112	17	26	33
21113	14	24	33
21121	17	24	33
21122	12	24	33
21123	14	23	33
21131	15	24	33
21132	16	24	32
21133	16	23	33
21211	16	24	32
21212	16	24	33
21213	15	24	34
21221	16	25	34
21222	16	24	33
21223	15	25	34
21231	16	22	30

Median Rating:	16	24	33
Average Rating:	15.4	23.8	32.8
Standard Deviation:	1.2	1.1	1.0
Lowest Rating:	12	21	30
Highest Rating:	17	26	34
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16



## Algebra II

### FINAL IMPACT RESULTS

	Below Basic	Basic	Proficient	Advanced
<b>Total Population</b>	<b>14.0</b>	<b>45.0</b>	<b>33.0</b>	<b>8.0</b>

**APPENDIX O:**  
**RESULTS FOR GEOMETRY**

# Standard Setting for the Missouri EOC Assessment

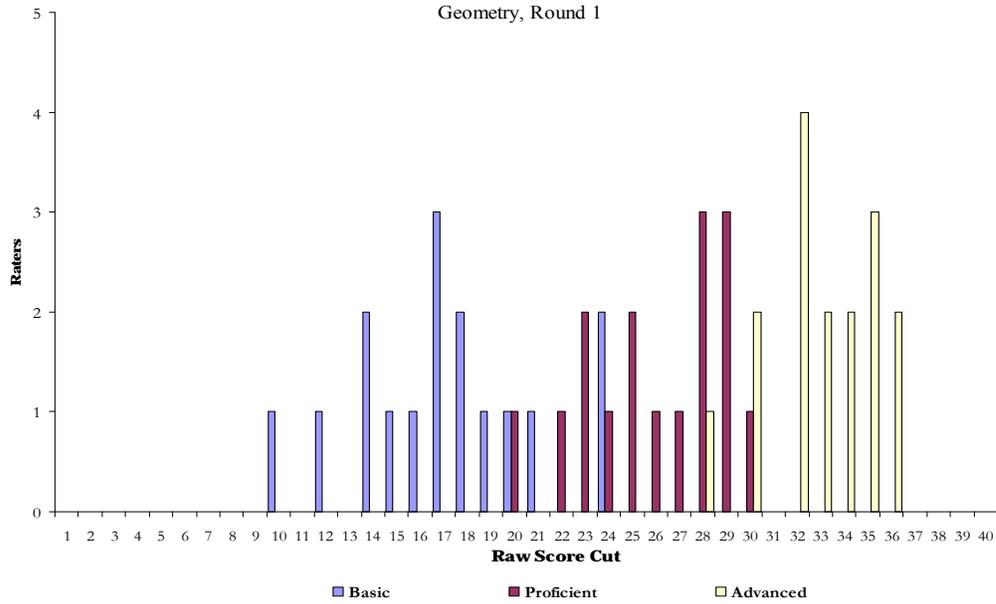
## Geometry

### Round 1 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
22111	17	26	33
22113	14	22	30
22121	12	29	36
22123	10	20	30
22131	24	28	32
22132	17	23	28
22133	16	25	32
22211	19	28	34
22212	24	30	36
22213	14	24	32
22221	18	28	35
22222	18	29	35
22223	20	27	33
22231	15	23	34
22232	21	29	35
22233	17	25	32

Median Rating:	17	27	33
Average Rating:	17.3	26.0	32.9
Standard Deviation:	3.8	2.9	2.2
Lowest Rating:	10	20	28
Highest Rating:	24	30	36
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16

Missouri EOC Standard Setting  
Geometry, Round 1



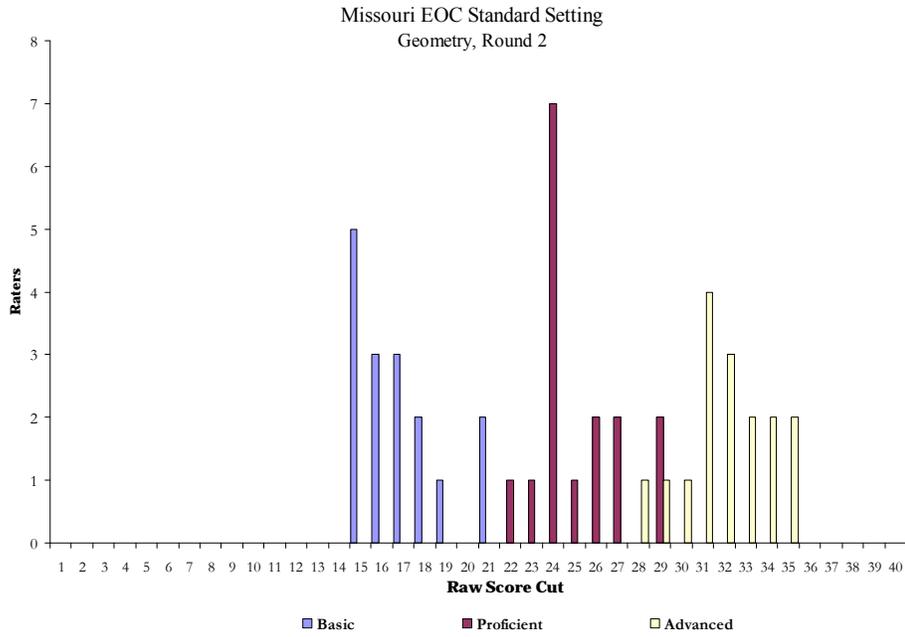
# Standard Setting for the Missouri EOC Assessment

## Geometry

### Round 2 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
22111	16	24	31
22113	15	22	28
22121	16	29	35
22123	15	24	34
22131	21	26	31
22131	19	24	30
22133	15	24	31
22211	17	23	29
22212	18	25	33
22213	16	24	31
22221	17	27	34
22222	15	26	33
22223	18	29	35
22231	15	24	32
22232	21	27	32
22233	17	24	32

Median Rating:	17	24	32
Average Rating:	16.9	25.1	31.9
Standard Deviation:	2.0	2.0	2.0
Lowest Rating:	15	22	28
Highest Rating:	21	29	35
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16



## Geometry

### ROUND 2 IMPACT RESULTS

	Below Basic	Basic	Proficient	Advanced
<b>Total Population</b>	<b>18.0</b>	<b>30.0</b>	<b>38.0</b>	<b>14.0</b>

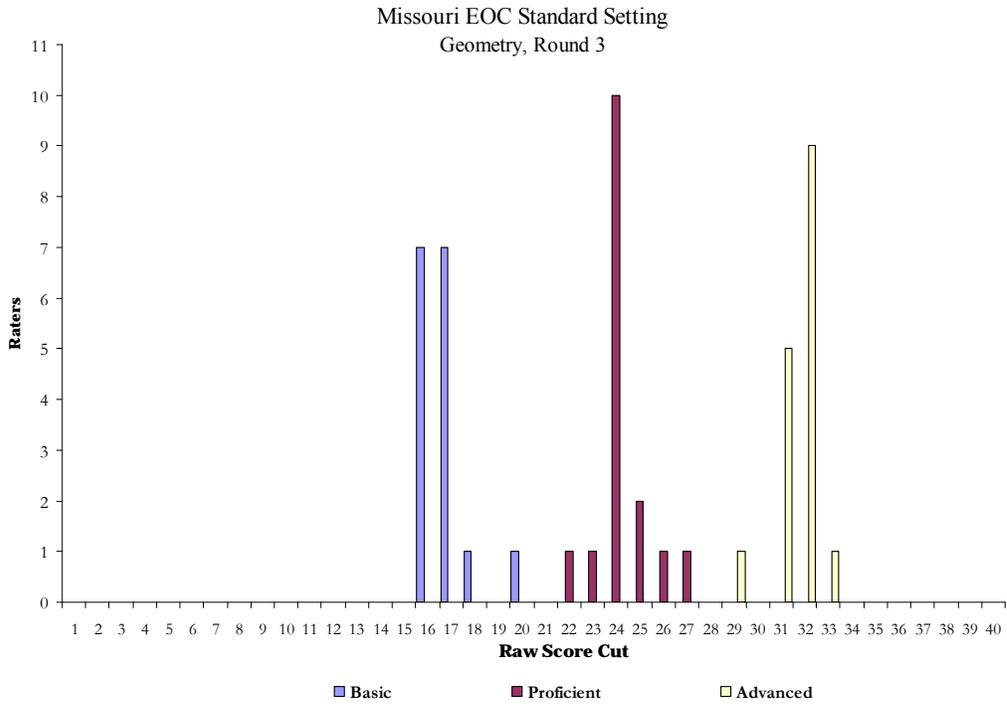
# Standard Setting for the Missouri EOC Assessment

## Geometry

### Round 3 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
22111	16	24	31
22113	16	24	32
22121	17	25	32
22123	16	24	32
22131	20	26	31
22132	17	22	29
22133	16	24	32
22211	17	24	32
22212	17	24	32
22213	17	25	31
22221	17	24	32
22222	17	24	32
22223	18	27	33
22231	16	24	31
22232	16	23	31
22233	16	24	32

Median Rating:	17	24	32
Average Rating:	16.8	24.3	31.6
Standard Deviation:	1.0	1.1	0.9
Lowest Rating:	16	22	29
Highest Rating:	20	27	33
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	16	16	16



## Geometry

### FINAL IMPACT RESULTS

	Below Basic	Basic	Proficient	Advanced
<b>Total Population</b>	<b>18.0</b>	<b>30.0</b>	<b>38.0</b>	<b>14.0</b>

**APPENDIX P:**  
**RESULTS FOR GOVERNMENT**

# Standard Setting for the Missouri EOC Assessment

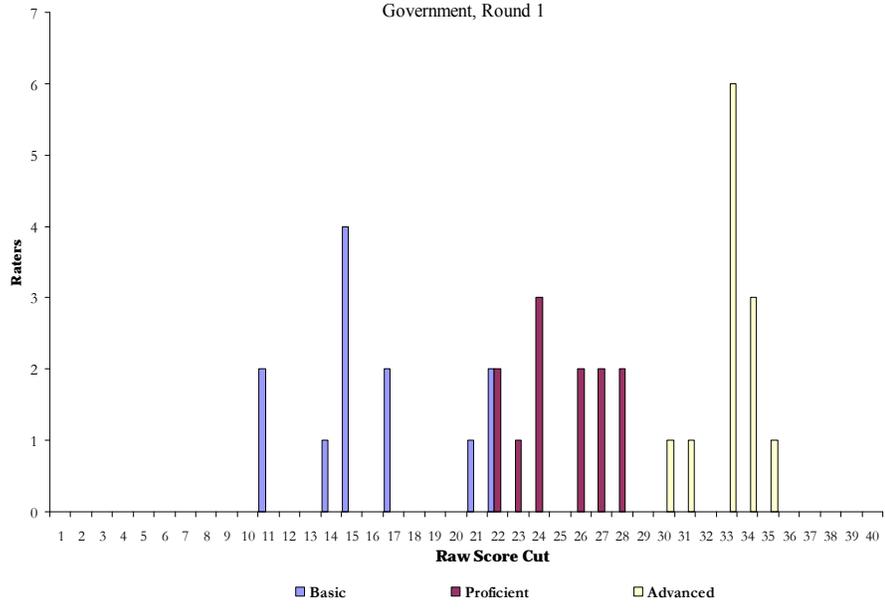
## Government

### Round 1 Ratings Summary

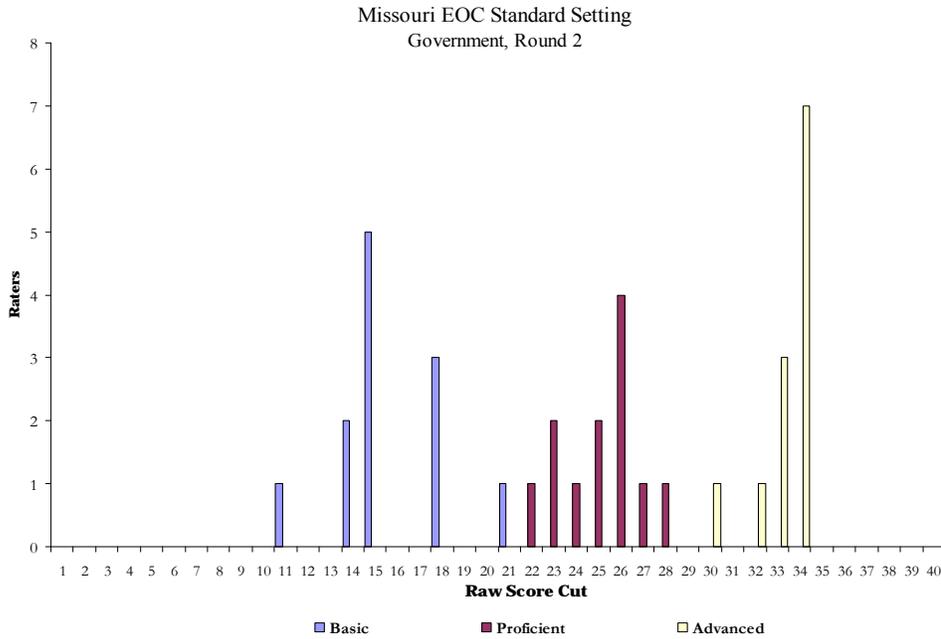
Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
22111	17	27	34
23112	22	27	33
23113	14	26	33
23121	15	23	33
23123	15	24	34
23131	22	28	33
23132	17	24	31
23133	15	26	33
23211	11	22	30
23212	11	22	33
23213	15	24	35
23221	21	28	34

Median Rating:	15	25	33
Average Rating:	16.3	25.1	33.0
Standard Deviation:	3.6	2.1	1.3
Lowest Rating:	11	22	30
Highest Rating:	22	28	35
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	12	12	12

Missouri EOC Standard Setting  
Government, Round 1







Standard Setting for the Missouri EOC Assessment

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## Government

### ROUND 2 IMPACT RESULTS

	Below Basic	Basic	Proficient	Advanced
<b>Round 2</b>	<b>12%</b>	<b>49%</b>	<b>29%</b>	<b>10%</b>

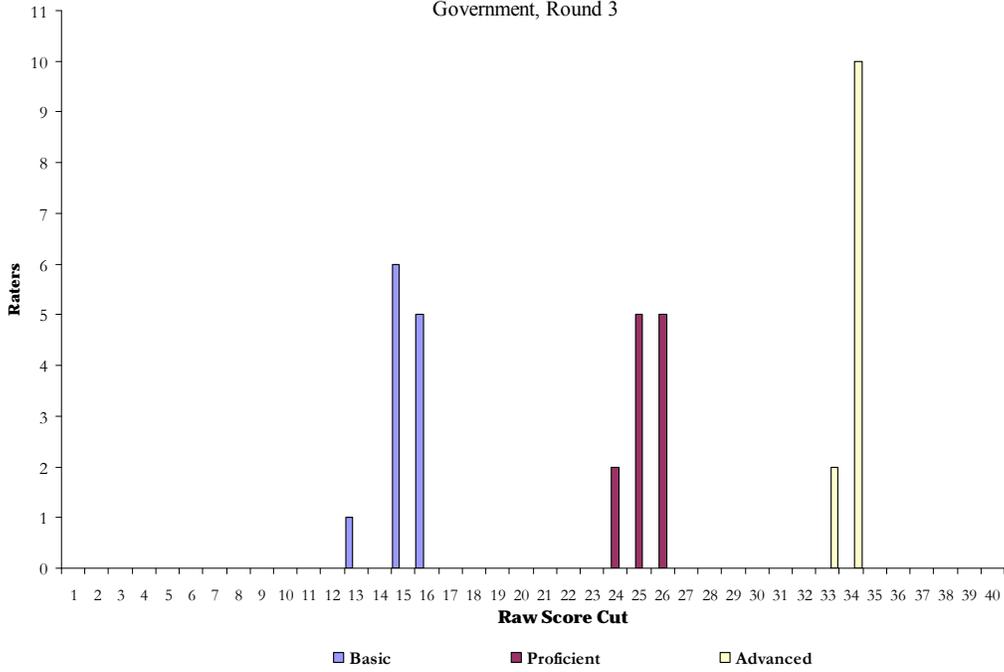
# Standard Setting for the Missouri EOC Assessment Government

## Round 3 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
23111	15	25	34
23112	16	26	34
23113	16	26	34
23121	15	25	34
23123	15	25	34
23131	15	25	33
23132	15	26	34
23133	13	24	33
23211	16	24	34
23212	16	26	34
23213	16	25	34
23221	15	26	34

Median Rating:	15	25	34
Average Rating:	15.3	25.3	33.8
Standard Deviation:	0.8	0.7	0.4
Lowest Rating:	13	24	33
Highest Rating:	16	26	34
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	12	12	12

Missouri EOC Standard Setting  
Government, Round 3



## Government

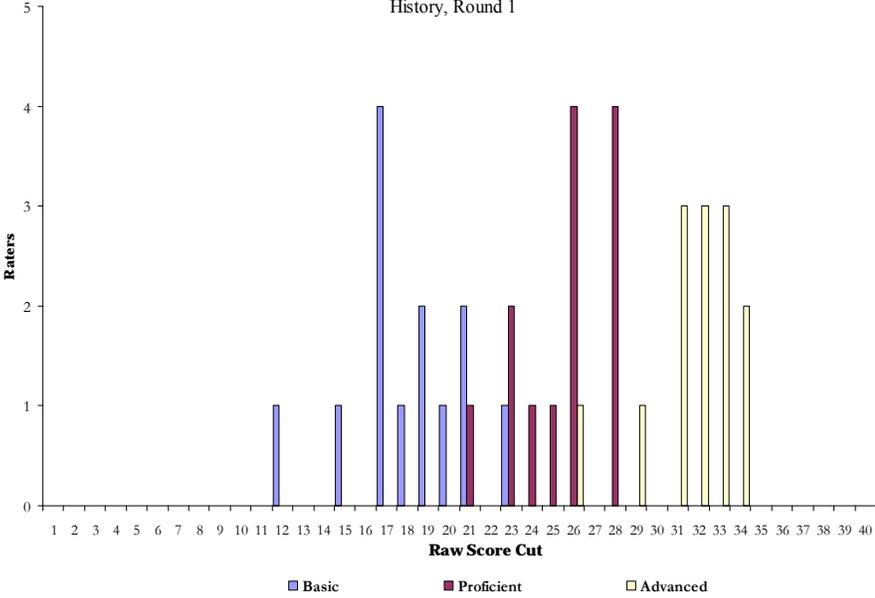
	Below Basic	Basic	Proficient	Advanced
<b>Total Population</b>	<b>12.0</b>	<b>44.0</b>	<b>34.0</b>	<b>10.0</b>

**APPENDIX Q:**

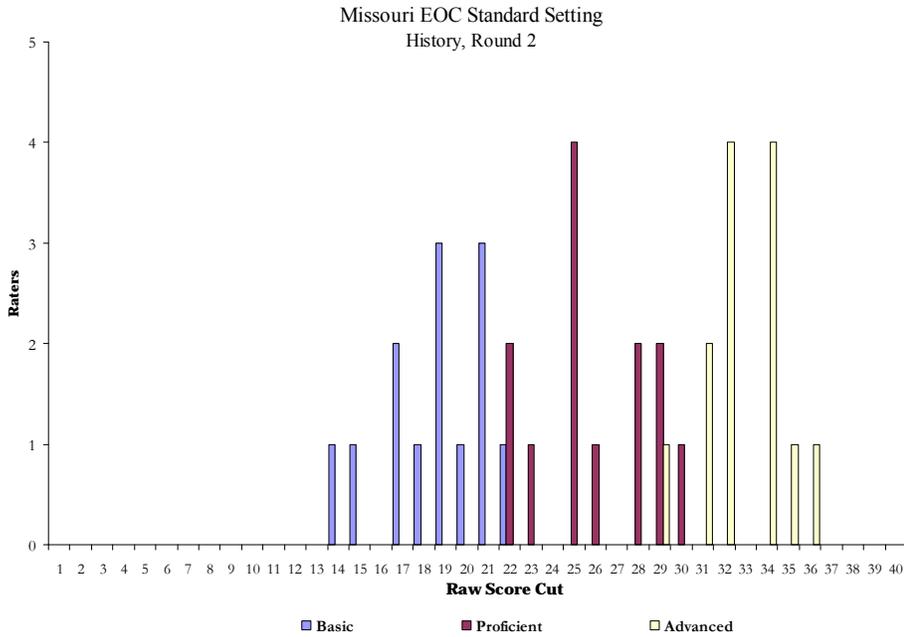
**RESULTS FOR AMERICAN HISTORY**



Missouri EOC Standard Setting  
History, Round 1







Standard Setting for the Missouri EOC Assessment

**American History**

IMPACT RESULTS

	Below Basic	Basic	Proficient	Advanced
<b>Round 2</b>	<b>23.0</b>	<b>32.0</b>	<b>30.0</b>	<b>15.0</b>

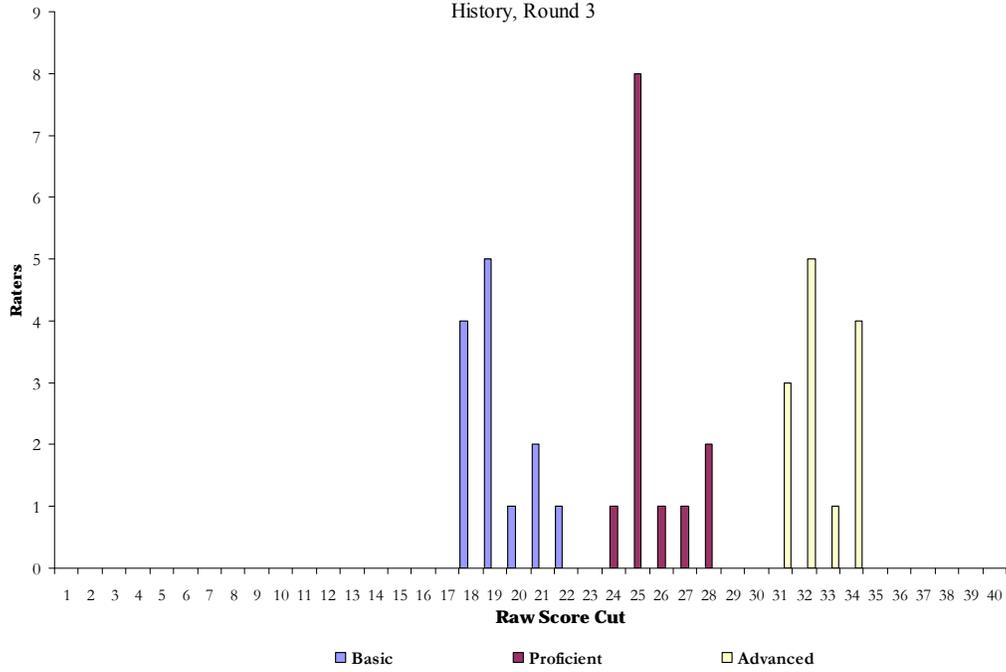
# Standard Setting for the Missouri EOC Assessment American History

## Round 3 Ratings Summary

Rater	Individual Rater Cut Scores		
	Basic	Proficient	Advanced
11111	19	25	34
11112	20	27	34
11121	18	25	32
11122	18	24	31
11123	19	25	31
11131	21	28	34
11132	19	25	32
11211	19	25	32
11212	18	25	33
11213	18	25	31
11221	22	28	34
11222	21	26	32
11223	19	25	32

Median Rating:	19	25	32
Average Rating:	19.3	25.6	32.5
Standard Deviation:	1.3	1.2	1.2
Lowest Rating:	18	24	31
Highest Rating:	22	28	34
Number of Items:	40	40	40
Points Possible:	40	40	40
Number of Raters:	13	13	13

Missouri EOC Standard Setting  
History, Round 3



**IMPACT RESULTS**

	Minimal	Basic	Proficient	Advanced
<b>Total Population</b>	<b>23.0</b>	<b>32.0</b>	<b>30.0</b>	<b>15.0</b>

**APPENDIX R:**  
**PARTICIPANT EVALUATION FORM DATA**

**Item 1**

The Opening Session provided adequate background information about the Missouri End-of-Course Assessments.

5	4	3	2	1
Completely	Somewhat			Not at all

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	13	81	11	69	10	63	10	83	11	85	55	75
4	3	19	5	31	6	38	2	17	2	15	18	25
3	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 2**

The topics covered in the Opening Session were appropriate to providing a context for my role in this meeting.

5	4	3	2	1
Completely	Somewhat			Not at all

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	14	88	13	81	10	63	11	92	12	92	60	82
4	2	13	3	19	6	38	1	8	1	8	13	18
3	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 3**

The content of the Opening Sessions was:

5	4	3	2	1
Very useful	Somewhat useful		Not useful	

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	8	50	13	81	6	38	10	84	8	62	45	67
4	8	50	3	19	7	44	2	17	5	39	25	34
3	0	0	0	0	3	19	0	0	0	0	3	4
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 4**

The organization of the Opening Sessions was:

5	4	3	2	1
Very good	Acceptable		Very poor	

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	13	81	13	81	8	50	10	84	9	70	53	73
4	2	13	2	13	5	31	2	17	4	31	15	21
3	1	6	1	6	3	19	0	0	0	0	5	7
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 8**

The activities used to help operationalize Proficient performance were:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	5	31	13	81	9	56	7	58	12	92	46	63
4	9	56	3	19	5	31	5	42	1	8	23	32
3	2	13	0	0	1	6	0	0	0	0	3	4
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 9**

By the end of the activity, my conception of Proficient performance was:

5	4	3	2	1
Very well formed		Moderately well formed		Not well formed

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	7	44	7	44	10	63	8	67	11	85	43	59
4	7	44	7	44	5	31	4	33	2	15	25	34
3	2	13	2	13	0	0	0	0	0	0	4	6
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 11**

The activities used to help operationalize Basic performance were:

5	4	3	2	1
Very useful		Somewhat useful		Not useful

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	4	25	12	75	10	63	5	42	11	85	42	58
4	9	56	4	25	5	31	7	59	2	15	27	37
3	3	19	0	0	0	0	0	0	0	0	3	4
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 12**

By the end of this activity my conception of Basic performance was:

5	4	3	2	1
Very well formed		Moderately well formed		Not well formed

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	7	44	5	31	10	63	5	42	10	77	37	51
4	7	44	10	63	5	31	6	50	3	23	31	43
3	2	13	1	6	0	0	1	8	0	0	4	6
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	16	100	16	100	12	100	13	100	73	100

**Item 14**

The activities used to help operationalize Advanced performance were:

5	4	3	2	1
Very useful	Somewhat useful			Not useful

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	5	36	12	75	9	56	7	58	12	92	45	63
4	8	57	4	25	6	38	3	25	1	8	22	31
3	1	7	0	0	0	0	2	17	0	0	3	4
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>14*</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>12</b>	<b>100</b>	<b>13</b>	<b>100</b>	<b>71</b>	<b>100</b>

\*Two English I panelists did not respond to this question.

**Item 15**

By the end of this activity my conception of Advanced performance was:

5	4	3	2	1
Very well formed	Moderately well formed			Not well formed

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	7	50	9	56	10	63	7	58	10	77	43	61
4	6	43	6	38	5	31	4	33	3	23	24	34
3	1	7	1	6	0	0	1	8	0	0	3	4
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>14*</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>12</b>	<b>100</b>	<b>13</b>	<b>100</b>	<b>71</b>	<b>100</b>

\*Two English I panelists did not respond to this question.

**Item 17**

Using the sample items to prepare for the actual item rating was:

5	4	3	2	1
Very helpful	Somewhat helpful			Not helpful

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	8	53	12	80	8	50	8	68	9	69	45	63
4	4	27	1	7	2	13	4	33	2	15	13	18
3	3	20	2	13	5	31	0	0	2	15	12	17
2	0	0	0	0	1	6	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	15*	100	15*	100	16	100	12	100	13	100	71	100

\*One English I panelist and one Algebra II panelist did not respond to this question.

**Item 18**

The explanation of the item data during the sample item portion of the training was:

5	4	3	2	1
Very helpful	Somewhat helpful			Not helpful

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	9	57	12	80	7	44	9	75	10	77	47	65
4	7	44	2	13	6	38	3	25	2	15	20	28
3	0	0	1	7	3	19	0	0	1	8	5	7
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	15*	100	16	100	12	100	13	100	72	100

\*One Algebra II panelist did not respond to this question.

**Item 19**

The Item Rating Form was:

5	4	3	2	1
Very easy to use	Somewhat easy to use			Not at all easy to use

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	14	93	11	73	12	75	8	67	9	69	54	76
4	1	7	4	27	4	25	3	25	4	31	16	23
3	0	0	0	0	0	0	1	8	0	0	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>15*</b>	<b>100</b>	<b>15*</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>12</b>	<b>100</b>	<b>13</b>	<b>100</b>	<b>71</b>	<b>100</b>

\*One English I panelist and one Algebra II panelist did not respond to this question.

**Item 20**

The information provided prior to each round of rating was:

5	4	3	2	1
Very useful	Somewhat useful			Not useful

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	10	63	13	87	12	75	8	67	9	69	52	72
4	6	38	2	13	2	13	2	17	4	31	16	22
3	0	0	0	0	2	13	2	17	0	0	4	6
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>16</b>	<b>100</b>	<b>15*</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>12</b>	<b>100</b>	<b>13</b>	<b>100</b>	<b>72</b>	<b>100</b>

\*One Algebra II panelist did not respond to this question.

**Item 21**

My level of understanding of the tasks I was to accomplish for each round was:

5	4	3	2	1
Very good	Acceptable			Very poor

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	12	75	10	67	13	81	9	75	10	77	54	75
4	3	18	5	33	3	19	1	8	3	23	15	21
3	1	6	0	0	0	0	2	17	0	0	3	4
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	15*	100	16	100	12	100	13	100	72	100

\*One Algebra II panelist did not respond to this question.

**Item 22**

The amount of time I had to complete the tasks during each round was:

5	4	3	2	1
Far too long	About right			Far too short

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	2	13	0	0	0	0	5	42	1	8	8	11
4	1	6	0	0	4	25	0	0	0	92	5	7
3	13	81	15	100	12	75	7	58	12	0	59	82
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	15*	100	16	100	12	100	13	100	72	100

\*One Algebra II panelist did not respond to this question.

**Item 24**

I feel that this standard-setting session provided me an opportunity to use my best judgment in selecting and revising estimates for a recommended standard of Proficient performance.

5	4	3	2	1
To a great extent	To some extent			Not at all

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	13	81	11	73	11	69	8	67	12	92	55	76
4	3	19	4	27	4	25	4	33	1	8	16	22
3	0	0	0	0	1	6	0	0	0	0	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	15*	100	16	100	12	100	13	100	72	100

\*One Algebra II panelist did not respond to this question.

**Item 25**

I feel that this standard-setting meeting provided me an opportunity to use my best judgment in selecting and revising estimates for a recommended standard of Basic performance.

5	4	3	2	1
To a great extent	To some extent			Not at all

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	12	75	11	73	12	75	7	58	12	92	54	75
4	4	25	3	20	3	19	4	33	1	8	15	21
3	0	0	1	7	1	6	1	8	0	0	3	4
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	15*	100	16	100	12	100	13	100	72	100

\*One Algebra II panelist did not respond to this question.

**Item 26**

I feel that this standard-setting meeting provided me an opportunity to use my best judgment in selecting and revising estimates for a recommended standard of Advanced performance.

5	4	3	2	1
To a great extent		To some extent		Not at all

Rating	English I		Algebra II		Geometry		Government		History		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
5	12	75	12	80	11	69	9	75	11	85	55	76
4	4	25	3	20	4	25	3	25	2	15	16	22
3	0	0	0	0	1	6	0	0	0	0	1	1
2	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
Total	16	100	15*	100	16	100	12	100	13	100	72	100

\*One Algebra II panelist did not respond to this question.