Mathematics

Test Design Details

Number of items in Mathematics on-line test forms				
Grade	Total Items	Item Category		
		Core Operational	FT Slots (Items)	FT Slots (Perf. Event)
3	47 + PE	42	5	1
4	47 + PE	42	5	1
5	47 + PE	42	5	1
6	51 + PE	46	5	1
7	51 + PE	46	5	1
8	51 + PE	46	5	1

Estimated count of unique Math items field-tested by grade				
Grade	Field Test Item Count			
	NBT	NF	OA	*G + MD
3	16	16	23	20
4	18	21	12	24
5	13	27	10	25

*G and MD counts are combined due to Expectations shuffling in 2018.

Estimated count of unique Math items field-tested per form by					
Grade	Field Test Item Count				
	RP	NS	EE	G	SP
6	10	20	26	11	8
7	18	15	21	10	11

Estimated count of unique Math items field-tested per form by					
Grade	Field Test Item Count				
	NS	EE	F	G	SP
8	6	29	15	19	6

In 2018, the field test item counts by Reporting Category will remain the same (as listed above). However, the Reporting Category coding will change when the revised Missouri Learning Standards are assessed.

2017		Operational Total*	Field Test Per Form				Field Test Plan					
			Number of Field Test Items Per Form				Total Items per Form	Number of FT Forms	Total Number of Field Test Items Per Administration			
Subject	Grade	Core Total	MC/MS	ASCR	PE	Total		Online	MC/MS	ASCR	PE	Total
Mathematics	3	42	3	2	1	6	48	15	45	30	10	**85**
Mathematics	4	42	3	2	1	6	48	15	45	30	10	**85**
Mathematics	5	42	3	2	1	6	48	15	45	30	10	**85**
Mathematics	6	46	3	2	1	6	52	15	45	30	10	**85**
Mathematics	7	46	3	2	1	6	52	15	45	30	10	**85**
Mathematics	8	46	3	2	1	6	52	15	45	30	10	**85**
		Total	18	12	6	36		90	270	180	60	**510**

* Core Form is Reuse in 2017

Starting in 2018, there will be approximately 20-25 anchors from previous year.

In 2018, there will be two Operational forms and one breach form. If the field test doesn't provide sufficient blueprint coverage, then the breach will be duplicates of the other two forms and scrambled.

Math Timing Estimates (minutes)		
	Recommended Range - Session	Recommended Range - Total Test
Grades 3-5 Session 1	35 - 50	80 - 125
Grades 3-5 Session 2	35 - 50	
Grades 3-5 Session 3 (PE)	10 - 25	
Grade 6 Session 1	35 - 45	100 - 130
Grade 6 Session 2	45 - 60	
Grade 6 Session 3 (PE)	20 - 25	
Grade 7 Session 1	20 - 25	100 - 130
Grade 7 Session 2	60 - 80	
Grade 7 Session 3 (PE)	20 - 25	
Grade 8 Session 1	15 - 20	100 - 130
Grade 8 Session 2	65 -85	
Grade 8 Session 3 (PE)	20 - 25	

Total Forms
96 Total Online Forms 6 Braille 6 Paper Forms 6 Large Print

Number of Mathematics forms in the Spring 2017 administration	
Grade	Number of Forms
3	16 total: 15 field test forms 1 Transcription – Form has no items in field test positions.
4	16 total: 15 field test forms 1 Transcription – Form has no items in field test positions.
5	16 total: 15 field test forms 1 Transcription – Form has no items in field test positions.
6	16 total: 15 field test forms 1 Transcription – Form has no items in field test positions.
7	16 total: 15 field test forms 1 Transcription – Form has no items in field test positions.
8	16 total: 15 field test forms 1 Transcription – Form has no items in field test positions.

Mathematics
Blueprint and Test Design
Grades 3-8

Missouri Grade 3 Mathematics Test Blueprint and Test Design—2017 Administration

Math Test Form Design

Session	Session Description	Total Core Items	Total FT Items	Total Items	Recommended Session Time (min)
1	Mixture of Reporting Categories: Non-Calculator	21	3	24	35 – 50
2	Mixture of Reporting Categories: Non-Calculator	21	2	23	35 – 50
3	Performance Event - Field Test	0	1	1	10 – 15
Total		42	6	48	80 – 115

ITEM TYPE KEY	
MC	Multiple Choice
ASCR	Auto-Scored Constructed-Response (TE including hotspot, drag/drop and short answer)
PE	Performance Event (Stimulus- or scenario-based collection of questions that may include all item-types.

Math Core Items by Content Category

Reporting Category	Content Category	Item Type	# of Core Items	Points Per Item	# of Points	Percent of Total*
Operations and Algebraic Thinking	Represent and solve problems involving multiplication and division.	MC	3	1	3	7%
		ASCR	2	1	2	5%
	Understand properties of multiplication and the relationship between multiplication and division.	MC	4	1	4	10%
		ASCR	0	1	0	0%
	Multiply and divide within 100.	MC	2	1	2	5%
		ASCR	0	1	0	0%
	Solve problems involving the four operations, and identify and explain patterns in arithmetic.	MC	4	1	4	10%
		ASCR	0	1	0	0%
		Total	15		15	36%
Numbers and Operations in Base Ten	Use place value understanding and properties of operations to perform multi-digit arithmetic.	MC	4	1	4	10%
		ASCR	2	1	2	5%
		Total	6		6	14%
Numbers and Operations - Fractions	Develop understanding of fractions as numbers.	MC	6	1	6	14%
		ASCR	1	1	1	2%
		Total	7		7	17%
Measurement and Data	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	MC	3	1	3	7%
		ASCR	0	1	0	0%
	Represent and interpret data.	MC	1	1	1	2%
		ASCR	1	1	1	2%
	Geometric measurement: understand concepts of area and relate area to multiplication and to addition.	MC	3	1	3	7%
		ASCR	0	1	0	0%
	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	MC	1	1	1	2%
		ASCR	1	1	1	2%
		Total	10		10	24%
Geometry	Reason with shapes and their attributes.	MC	3	1	3	7%
		ASCR	1	1	1	2%
		Total	4		4	10%
Total Grade 3 Mathematics			42		42	100%

Missouri Grade 4 Mathematics Test Blueprint and Test Design—2017 Administration

Math Test Form Design

Session	Session Description	Total Core Items	Total FT Items	Total Items	Recommended Session Time (min)
1	Mixture of Reporting Categories: Non-Calculator	21	3	24	35 – 50
2	Mixture of Reporting Categories: Non-Calculator	21	2	23	35 – 50
3	Performance Event - Field Test	0	1	1	15 – 20
Total		42	6	48	85 – 120

ITEM TYPE KEY	
MC	Multiple Choice
ASCR	Auto-Scored Constructed-Response (TE including hotspot, drag/drop and short answer)
PE	Performance Event (Stimulus- or scenario-based collection of questions that may include all item-types.

Math Core Items by Content Category

Reporting Category	Content Category	Item Type	# of Core Items	Points Per Item	# of Points	Percent of Total*
Operations and Algebraic Thinking	Use the four operations with whole numbers to solve problems.	MC	5	1	5	12%
		ASCR	0	1	0	0%
	Gain familiarity with factors and multiples.	MC	1	1	1	2%
		ASCR	1	1	1	2%
	Generate and analyze patterns.	MC	3	1	3	7%
		ASCR	0	1	0	0%
		Total	10		10	24%
Numbers and Operations in Base Ten	Generalize place value understanding for multidigit whole numbers.	MC	2	1	2	5%
		ASCR	1	1	1	2%
	Use place value understanding and properties of operations to perform multi-digit arithmetic.	MC	2	1	2	5%
		ASCR	3	1	3	7%
		Total	8		8	19%
Numbers and Operations - Fractions	Extend understanding of fraction equivalents and ordering.	MC	3	1	3	7%
		ASCR	0	1	0	0%
	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	MC	4	1	4	10%
		ASCR	0	1	0	0%
	Understand decimal notation for fractions, and compare decimal fractions.	MC	4	1	4	10%
		ASCR	1	1	1	2%
		Total	12		12	29%
Measurement and Data	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	MC	3	1	3	7%
		ASCR	0	1	0	0%
	Represent and interpret data.	MC	1	1	1	2%
		ASCR	1	1	1	2%
	Geometric measurement: understand concepts of angle and measure angles	MC	2	1	2	5%
		ASCR	1	1	1	2%
		Total	8		8	19%
Geometry	Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	MC	3	1	3	7%
		ASCR	1	1	1	2%
		Total	4		4	10%
Total Grade 4 Mathematics			42		42	100%

Missouri Grade 5 Mathematics Test Blueprint and Test Design—2017 Administration

Math Test Form Design

Session	Session Description	Total Core Items	Total FT Items	Total Items	Recommended Session Time (min)
1	Mixture of Reporting Categories: Non-Calculator	21	3	24	35 – 50
2	Mixture of Reporting Categories: Non-Calculator	21	2	23	35 – 50
3	Performance Event - Field Test	0	1	1	20 – 25
Total		42	6	48	90 – 125

ITEM TYPE KEY	
MC	Multiple Choice
MS	Multi-Select
ASCR	Auto-Scored Constructed-Response (TE including hotspot, drag/drop and short answer)
PE	Performance Event (Stimulus- or scenario-based collection of questions that may include all item-types.

Math Core Items by Content Category

Reporting Category	Content Category	Item Type	# of Core Items	Points Per Item	# of Points	Percent of Total*
Operations and Algebraic Thinking	Write and interpret numerical expressions.	MC/MS	3	1	3	7%
		ASCR	1	1	1	2%
	Analyze patterns and relationships.	MC/MS	2	1	2	5%
		ASCR	0	1	0	0%
		Total	6		6	14%
Numbers and Operations in Base Ten	Understand the place value system.	MC/MS	3	1	3	7%
		ASCR	1	1	1	2%
	Perform operations with multi-digit whole numbers and with decimals to hundredths.	MC/MS	3	1	3	7%
		ASCR	1	1	1	2%
		Total	8		8	19%
Numbers and Operations - Fractions	Use equivalent fractions as a strategy to add and subtract fractions.	MC/MS	4	1	4	10%
		ASCR	2	1	2	5%
	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	MC/MS	6	1	6	14%
		ASCR	4	1	4	10%
		Total	16		16	38%
Measurement and Data	Convert like measurement units within a given measurement system.	MC/MS	2	1	2	5%
		ASCR	0	1	0	0%
	Represent and interpret data.	MC/MS	1	1	1	2%
		ASCR	1	1	1	2%
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	MC/MS	2	1	2	5%
		ASCR	1	1	1	2%
		Total	7		7	17%
Geometry	Graph points on the coordinate plane to solve real-world and mathematical problems.	MC/MS	3	1	3	7%
		ASCR	0	1	0	0%
	Classify two-dimensional figures into categories based on their properties.	MC/MS	2	1	2	5%
		ASCR	0	1	0	0%
		Total	5		5	12%
Total Grade 5 Mathematics			42		42	100%

Missouri Grade 6 Mathematics Test Blueprint and Test Design—2017 Administration

Math Test Form Design

Session	Session Description	Total Core Items	Total FT Items	Total Items	Recommended Session Time (min)
1	Mixture of Reporting Categories: Non-Calculator	19	3	22	35 – 45
2	Mixture of Reporting Categories: Calculator	27	2	29	45 – 60
3	Performance Event - Field Test	0	1	1	20 – 25
Total		46	6	52	100 – 130

ITEM TYPE KEY	
MC	Multiple Choice
MS	Multi-Select
ASCR	Auto-Scored Constructed-Response (TE including hotspot, drag/drop and short answer)
PE	Performance Event (Stimulus- or scenario-based collection of questions that may include all item-types.

Math Core Items by Content Category

Reporting Category	Content Category	Item Type	# of Core Items	Points Per Item	# of Points	Percent of Total*
Ratios and Proportional Relationships	Understand ratio concepts and use ratio reasoning to solve problems.	MC/MS	4	1	4	9%
		ASCR	2	1	2	4%
		Total	6		6	13%
The Number System	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	MC/MS	1	1	1	2%
		ASCR	1	1	1	2%
	Compute fluently with multi-digit numbers and find common factors and multiples.	MC/MS	4	1	4	9%
		ASCR	1	1	1	2%
	Apply and extend previous understandings of numbers to the system of rational numbers.	MC/MS	4	1	4	9%
		ASCR	2	1	2	4%
		Total	13		13	28%
Expressions and Equations	Apply and extend previous understandings of arithmetic to algebraic expressions.	MC/MS	6	1	6	13%
		ASCR	0	1	0	0%
	Reason about and solve one-variable equations and inequalities.	MC/MS	6	1	6	13%
		ASCR	1	1	1	2%
	Represent and analyze quantitative relationships between dependent and independent variables.	MC	1	1	1	2%
		ASCR	1	1	1	2%
		Total	15		15	33%
Geometry	Solve real-world and mathematical problems involving area, surface area, and volume.	MC/MS	4	1	4	9%
		ASCR	2	1	2	4%
		Total	6		6	13%
Statistics and Probability	Develop understanding of statistical variability.	MC/MS	3	1	3	7%
		ASCR	0	1	0	0%
	Summarize and describe distributions.	MC/MS	3	1	3	7%
		ASCR	0	1	0	0%
		Total	6		6	13%
Total Grade 6 Mathematics			46		46	100%

Missouri Grade 7 Mathematics Test Blueprint and Test Design—2017 Administration

Math Test Form Design

Session	Session Description	Total Core Items	Total FT Items	Total Items	Recommended Session Time (min)
1	Mixture of Reporting Categories: Non-Calculator	13	1	14	20 – 25
2	Mixture of Reporting Categories: Calculator	33	4	37	60 – 80
3	Performance Event - Field Test	0	1	1	20 – 25
Total		46	6	52	100 – 130

ITEM TYPE KEY

MC	Multiple Choice
MS	Multi-Select
ASCR	Auto-Scored Constructed-Response (TE including hotspot, drag/drop and short answer)
PE	Performance Event (Stimulus- or scenario-based collection of questions that may include all item-types.

Math Core Items by Content Category

Reporting Category	Content Category	Item Type	# of Core Items	Points Per Item	# of Points	Percent of Total*
Ratios and Proportional Relationships	Analyze proportional relationships and use them to solve real-world and mathematical problems.	MC/MS	8	1	8	17%
		ASCR	2	1	2	4%
		Total	10		10	22%
The Number System	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	MC/MS	6	1	6	13%
		ASCR	2	1	2	4%
		Total	8		8	17%
Expressions and Equations	Use properties of operations to generate equivalent expressions.	MC/MS	5	1	5	11%
		ASCR	0	1	0	0%
	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	MC/MS	7	1	7	15%
		ASCR	1	1	1	2%
		Total	13		13	28%
Geometry	Draw, construct and describe geometrical figures and describe the relationships between them.	MC/MS	1	1	1	2%
		ASCR	1	1	1	2%
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	MC/MS	3	1	3	7%
		ASCR	2	1	2	4%
		Total	7		7	15%
Statistics and Probability	Use random sampling to draw inferences about a population.	MC/MS	2	1	2	4%
		ASCR	0	1	0	0%
	Draw informal comparative inferences about two populations.	MC/MS	2	1	2	4%
		ASCR	0	1	0	0%
	Investigate chance processes and develop, use, and evaluate probability models.	MC/MS	3	1	3	7%
		ASCR	1	1	1	2%
		Total	8		8	17%
Total Grade 7 Mathematics			46		46	100%

Missouri Grade 8 Mathematics Test Blueprint and Test Design—2017 Administration

Math Test Form Design

Session	Session Description	Total Core Items	Total FT Items	Total Items	Recommended Session Time (min)
1	Mixture of Reporting Categories: Non-Calculator	10	1	11	15 – 20
2	Mixture of Reporting Categories: Calculator	36	4	40	65 – 85
3	Performance Event - Field Test	0	1	1	20 – 25
Total		46	6	52	100 – 130

ITEM TYPE KEY	
MC	Multiple Choice
MS	Multi-Select
ASCR	Auto-Scored Constructed-Response (TE including hotspot, drag/drop and short answer)
PE	Performance Event (Stimulus- or scenario-based collection of questions that may include all item-types.

Math Core Items by Content Category

Reporting Category	Content Category	Item Type	# of Core Items	Points Per Item	# of Points	Percent of Total*
The Number System	Know that there are numbers that are not rational, and approximate them by rational numbers.	MC/MS	2	1	2	4%
		ASCR	2	1	2	4%
		Total	4		4	9%
Expressions and Equations	Work with radicals and integer exponents.	MC/MS	5	1	5	11%
		ASCR	1	1	1	2%
	Understand the connections between proportional relationships, lines, and linear equations.	MC/MS	4	1	4	9%
		ASCR	1	1	1	2%
	Analyze and solve linear equations and pairs of simultaneous linear equations.	MC/MS	2	1	2	4%
		ASCR	2	1	2	4%
		Total	15		15	33%
Functions	Define, evaluate, and compare functions.	MC/MS	4	1	4	9%
		ASCR	1	1	1	2%
	Use functions to model relationships between quantities.	MC/MS	4	1	4	9%
		ASCR	1	1	1	2%
		Total	10		10	22%
Geometry	Understand congruence and similarity using physical models, transparencies, or geometry software.	MC/MS	6	1	6	13%
		ASCR	0	1	0	0%
	Understand and apply the Pythagorean Theorem.	MC/MS	2	1	2	4%
		ASCR	0	1	0	0%
	Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	MC/MS	2	1	2	4%
		ASCR	1	1	1	2%
		Total	11		11	24%
Statistics and Probability	Investigate patterns of association in bivariate data.	MC/MS	6	1	6	13%
		ASCR	0	1	0	0%
		Total	6		6	13%
Total Grade 8 Mathematics			46		46	100%