



# Independent Alignment Review of the Science Missouri Assessment Program (MAP): Supplemental Appendices

Final

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## Appendix D. Content Alignment Results Item Bank Items

The following tables include statistical results on two of the four Webb alignment indicators for the non-operational items as well as item quality for each grade Science MAP test.

### *Panelist-Test Developer Analyses*

Table D-1 presents the agreement outcomes between panelists and the item bank on the content assessed by non-operational items per grade level.

**Table D-1. Percent Agreement between Panelists and Item Bank on Target Content for Operational Items**

Grade Level	Number of Items	Total Number of Panelist Ratings across Items	Percent Agreement with Item Bank Codes					
			Exact Match	Standard Match	Substrand Match	Strand Match	Standards Grade Match	No Match
5	45	384	52%	9%	<1%	8%	8%	22%
8	53	437	59%	10%	6%	3%	6%	16%

### *Categorical Concurrence*

The categorical concurrence results for grades 5 and 8 of the Science MAP are presented below. Since these are non-operational items, there is not a blueprint to match. This is just summary information as to the mean number of items assigned to each content strand by panelists.

**Table D-2. Categorical Concurrence for Science MAP, Grade 5: Mean Number of Items per Strand**

Title of Strand	Number of Items per Strand	
	Mean Items Matched	Standard Deviation
Properties and Principles of Matter and Energy (ME)	10.25	1.04
Properties and Principles of Force and Motion (FM)	6.00	0.00
Characteristics and Interactions of Living Organisms (LO)	6.00	0.00
Changes in Ecosystems and Interactions of Organisms with their Environments (EC)	8.75	0.71
Processes and Interactions of the Earth's Systems (ES)	4.63	1.06
Composition and Structure of the Universe and the Motion of Objects Within It (UN)	4.00	0.00
Scientific Inquiry (IN)	2.88	0.83
Science, Technology, and Human Activity (ST)	2.50	0.53

**Table D-3. Categorical Concurrence for Science MAP, Grade 8: Mean Number of Items per Strand**

Title of Strand	Number of Items per Strand	
	Mean Items Matched	Standard Deviation
Properties and Principles of Matter and Energy (ME)	8.88	0.64
Properties and Principles of Force and Motion (FM)	5.75	0.46
Characteristics and Interactions of Living Organisms (LO)	12.88	0.64
Changes in Ecosystems and Interactions of Organisms with their Environments (EC)	4.25	0.71
Processes and Interactions of the Earth’s Systems (ES)	11.00	1.07
Composition and Structure of the Universe and the Motion of Objects Within It (UN)	5.88	0.35
Scientific Inquiry (IN)	1.14	0.38
Science, Technology, and Human Activity (ST)	3.38	0.52

As with the operational items, panelists were asked to indicate *how well* the item assessed the benchmarks. Panelists rated the extent of item alignment to the benchmarks on a 4-point scale ranging from ‘Not aligned to any benchmark’ to ‘Fully aligned to a benchmark – exemplary item’. Table D.4 presents the mean number of items (across panelists) at each level of alignment.

**Table D-4. Categorical Concurrence for Science MAP: Mean Number of Items per Strand**

Grade Level	Degree of Alignment	Mean Number of Items per Level	SD	Percent of Items per Level
5	Not at all aligned	2.00	0.00	1.11%
	Weakly aligned	4.17	3.19	6.94%
	Highly aligned	24.38	11.48	54.17%
	Fully aligned	17.00	9.30	37.78%
8	Not at all aligned	1.00	n/a	0.24%
	Weakly aligned	2.33	1.37	3.30%
	Highly aligned	21.20	14.87	25.00%
	Fully aligned	37.88	16.58	71.46%

For the grades 5 and 8 assessment, panelists rated the non-operational items as aligned well to the benchmarks matched to that item. Comments associated with items given a ‘weakly aligned’ or ‘not at all aligned’ classification can be found in Appendix E.

### **Depth-of-Knowledge Consistency**

The Depth-of-Knowledge (DOK) consistency results for grades 5 and 8 of the Science MAP are presented below. The tables present the results from the comparison between the depth-of-knowledge expected in the content benchmarks and the depth-of-knowledge assessed by items. The tables include the mean percentage of items rated as below, at the same level, or above the DOK level of the benchmarks along with the corresponding standard deviations.

**Table D-5. DOK Consistency for Science MAP, Grade 5: Mean Percent of Items with DOK Below, At, and Above DOK Level of Benchmarks**

Title of Strand	Mean Items per Strand	Depth-of-Knowledge Consistency					
		% Items Below		% Items Same Level		% Items Above	
		M	SD	M	SD	M	SD
Properties and Principles of Matter and Energy (ME)	10.25	24.4	11.4	55.9	8.3	19.7	13.3
Properties and Principles of Force and Motion (FM)	6.00	19.9	15.6	61.6	27.0	18.5	14.0
Characteristics and Interactions of Living Organisms (LO)	6.00	35.4	20.8	41.7	15.4	22.9	8.6
Changes in Ecosystems and Interactions of Organisms with their Environments (EC)	8.75	39.5	42.0	60.5	42.0	0.0	0.0
Processes and Interactions of the Earth's Systems (ES)	4.63	<b>60.4</b>	39.5	36.5	37.3	3.1	8.8
Composition and Structure of the Universe and the Motion of Objects Within It (UN)	4.00	6.3	17.7	78.1	24.8	15.6	22.9
Scientific Inquiry (IN)	2.88	<b>59.4</b>	28.7	26.0	35.5	14.6	15.9
Science, Technology, and Human Activity (ST)	2.50	35.4	30.1	58.3	26.7	6.3	17.7

**Table D-6. DOK Consistency for Science MAP, Grade 8: Mean Percent of Items with DOK Below, At, and Above DOK Level of Benchmarks**

Title of Strand	Mean Items per Strand	Depth-of-Knowledge Consistency					
		% Items Below		% Items Same Level		% Items Above	
		M	SD	M	SD	M	SD
Properties and Principles of Matter and Energy (ME)	8.88	30.7	19.8	62.4	14.8	6.9	8.3
Properties and Principles of Force and Motion (FM)	5.75	20.8	17.3	79.2	17.3	0.0	0.0
Characteristics and Interactions of Living Organisms (LO)	12.88	35.8	15.6	47.7	11.7	16.4	6.3
Changes in Ecosystems and Interactions of Organisms with their Environments (EC)	4.25	50.0	0.0	32.3	11.3	17.7	11.3
Processes and Interactions of the Earth's Systems (ES)	11.00	48.7	18.5	34.4	13.3	16.9	7.3
Composition and Structure of the Universe and the Motion of Objects Within It (UN)	5.88	<b>51.7</b>	29.7	48.3	29.7	0.0	0.0
Scientific Inquiry (IN)	1.14	21.4	39.3	64.3	47.6	14.3	37.8
Science, Technology, and Human Activity (ST)	3.38	<b>70.4</b>	29.0	29.6	29.0	0.0	0.0

For grade 5, panelists’ ratings using Webb DOK levels imply that for more than half of the items targeting the Processes and Interactions of the Earth’s Systems and the Scientific Inquiry strands did not assess students at the appropriate cognitive complexity. In grade 8, more than half of the items in the Composition and Structure of the Universe and the Motion of Objects Within It and the Science, Technology, and Human Activity strands did not assess students at the same or higher level of cognitive complexity.

### *Test Quality: Written Content*

Panelists rated the language used in the items for the extent to which students of various backgrounds and ability levels could access the Science content. Ratings consisted of ‘yes’ or ‘no’ responses. Table D.7 below indicates the mean number of items per grade test rated as accessible or not. As the table demonstrates, the majority of items were rated favorably on accessibility.

**Table D-7. Mean Number of Items Rated As Accessible in Content to Range of Students per Grade Assessment**

Grade	Is item content accessible to the range of students who take the assessment?			
	Yes		No	
	Mean number of items	SD	Mean number of items	SD
5	39.25	4.03	3.25	3.86
8	53.13	1.96	1.40	0.55

### *Test Quality: Figures and Graphics*

For those Science items accompanied by pictures, figures, or graphs, panelists evaluated whether these graphics would be understandable to a wide range of students from different backgrounds and ability levels. Table D.8 indicates that panelists’ ratings were positive.

**Table D-8. Mean Ratings on Accessibility of Figures or Graphics to Range of Students per Grade Assessment.**

Grade	Are item figures or graphics accessible to the range of students who take the assessment?			
	Yes		No	
	Mean number of items	SD	Mean number of items	SD
5	6.00	1.60	2.33	2.31
8	7.88	1.89	1.50	0.71

### Test Quality: Overall Item Quality

In addition to rating items on accessibility, panelists had the opportunity to give items a general rating reflecting their judgments of quality. This rating encompassed aspects such as clarity (e.g., wording or item scenario, prompt, or response options) and appropriateness (e.g., off-grade, exceeds benchmark).

**Table D-9. Panelist Ratings on Overall Item Quality**

Grade	Item Quality	Mean Number of Items per Level	SD <sup>a</sup>	Percent of Items per Level
5	Poor	1.00	n/a	0.61%
	Fair	5.33	4.84	9.79%
	Good	23.63	14.35	57.80%
	Exceptional	17.33	6.65	31.80%
8	Poor	3.00	n/a	0.69%
	Fair	2.00	0.71	2.31%
	Good	18.50	15.39	25.69%
	Exceptional	38.50	14.87	71.30%

For those items rated as ‘fair’ or ‘poor’ in quality, we asked panelists to provide comments to identify the issue and suggest improvements. Comments on several items stated that the picture/graphic was difficult to read. Other items falling into these categories received comments regarding confusing or misleading wording. Notations for other items suggested that, while the item aligned to the benchmark overall, the expectations for students to respond to the item exceeded the content expectations of the benchmarks (i.e., item asked students to ‘explain’, while benchmark only asks students to ‘identify’). The grades 5 and 8 assessments had 11% and 2%, respectively, of items rated as ‘fair’ or ‘poor’. In general, over 89% of the panelists’ ratings on overall item quality were at the ‘Good’ or ‘Exceptional’ level.

### Benchmarks Matched to Items by Panelists

Tables D-10 and D-11 present the GLEs, along with mean number of items, matched by panelists. Column 1 includes the Item Codes corresponding to the benchmarks from the MAP Test Specifications for Science.

**Table D-10. Grade 5 MAP: Grade Span GLEs Matched to Items by Panelists**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ME.1.D.3.a	311401			
ME.1.D.3.b	311402			
ME.1.D.3.c	311403	4	1.00	0.0
ME.1.D.3.d	311404			
ME.1.D.3.e	311405			
ME.1.D.3.f	311406	4	1.00	0.00
ME.1.D.3.g	311407	6	1.00	0.00

(continued)

**Table D-10. Grade 5 MAP: Grade Span GLEs Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ME.2.A.3.a	312101	1	1.00	n/a
ME.2.A.3.b	312102			
ME.2.A.3.c	312103			
ME.2.A.3.d	312104			
ME.2.C.3.a	312301	2	1.00	0.00
LO.1.A.3.a	331101	8	1.00	0.00
LO.1.B.3.a	331201			
LO.1.D.3.a	331401	8	1.25	0.46
LO.2.C.3.a	332301	6	1.00	0.00
LO.3.D.3.a	333401			
EC.2.A.3.a	342101	4	1.00	0.00
EC.2.A.3.b	342102			
EC.2.A.3.c	342103	8	1.00	0.00
EC.2.A.3.d	342104			
ES.1.C.3.a	351301			
ES.1.C.3.b	351302			
ES.1.C.3.c	351303			
ES.2.E.3.a	352501			
UN.1.A.3.a	361101			
UN.1.A.3.b	361102			
UN.2.A.3.a	362101			
UN.2.B.3.a	362201			
UN.2.B.3.b	362202			
UN.2.C.3.a	362301			
UN.2.C.3.b	362302			
UN.2.C.3.c	362303			
IN.1.A.3.a	371101	2	1.00	0.00
IN.1.A.3.b	371102			
IN.1.B.3.a	371201			
IN.1.B.3.b	371202			
IN.1.B.3.c	371203			
IN.1.B.3.d	371204			
IN.1.B.3.e	371205			
IN.1.C.3.a	371301			
IN.1.C.3.b	371302			
IN.1.C.3.c	371303			
IN.1.C.3.d	371304			
IN.1.D.3.a	371401			
ST.1.A.3.a	381101	5	1.00	0.00
ST.1.B.3.a	381201			

(continued)

**Table D-10. Grade 5 MAP: Grade Span GLEs Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ST.2.A.3.a	382101			
ST.3.A.3.a	383101	1	1.00	n/a
ST.3.A.3.b	383102			
ME.1.A.4.a	411101			
ME.1.A.4.b	411102	1	1.00	n/a
ME.1.A.4.c	411103	7	1.00	0.00
ME.1.A.4.d	411104			
ME.1.B.4.a	411201	4	1.50	0.58
ME.1.B.4.b	411202	6	1.67	0.52
ME.1.B.4.c	411203			
ME.1.B.4.d	411204			
ME.2.A.4.a	412101	1	1.00	n/a
ME.2.A.4.b	412102	8	1.13	0.35
ME.2.A.4.c	412103			
ME.2.F.4.a	412601	3	1.00	0.00
ME.1.I.4.a	412901	8	1.00	0.00
FM.1.A.4.a	421101	7	1.00	0.00
FM.1.A.4.b	421102			
FM.2.A.4.a	422101	1	1.00	n/a
FM.2.A.4.b	422102			
FM.2.A.4.c	422103	5	1.40	0.55
FM.2.A.4.d	422104			
FM.2.B.4.a	422201			
FM.2.D.4.a	422401			
FM.2.D.4.b	422402			
FM.2.D.4.c	422403	5	1.00	0.00
FM.2.D.4.d	422404			
EC.1.A.4.a	441101	4	1.00	0.00
EC.1.A.4.b	441102	3	1.00	0.00
EC.1.D.4.a	441401	6	1.00	0.00
EC.2.A.4.a	442101	8	2.00	0.53
EC.2.A.4.b	442102	7	1.00	0.00
EC.2.A.4.c	442103	1	1.00	n/a
EC.3.A.4.a	443101			
EC.3.C.4.a	443301			
EC.3.C.4.b	443302			
EC.3.C.4.c	443303			
EC.3.C.4.d	443304			
ES.1.A.4.a	451101			
ES.1.A.4.b	451102			

(continued)

**Table D-10. Grade 5 MAP: Grade Span GLEs Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ES.2.A.4.a	452101			
ES.2.A.4.b	452102			
ES.2.A.4.c	452103			
ES.2.A.4.d	452104			
ES.2.A.4.e	452105			
ES.3.A.4.a	453101	2	1.00	0.00
ES.3.A.4.b	453102	1	1.00	n/a
IN.1.A.4.a	471101			
IN.1.A.4.b	471102			
IN.1.A.4.c	471103			
IN.1.B.4.a	471201			
IN.1.B.4.b	471202			
IN.1.B.4.c	471203			
IN.1.B.4.d	471204			
IN.1.B.4.e	471205			
IN.1.C.4.a	471301			
IN.1.C.4.b	471302			
IN.1.C.4.c	471303			
IN.1.C.4.d	471304			
IN.1.D.4.a	471401			
ST.1.A.4.a	481101			
ST.1.B.4.a	481201			
ST.1.C.4.a	481301			
ST.2.A.4.a	482101			
ST.3.A.4.a	483101			
ST.3.A.4.b	483102			
ME.1.C.5.a	511301			
ME.1.D.5.a	511401	4	1.25	0.50
ME.1.D.5.b	511402	6	1.83	0.98
ME.1.I.5.a	511901			
ME.2.A.5.a	512101	1	1.00	n/a
ME.2.A.5.b	512102			
ME.2.C.5.a	512301	3	1.67	0.58
FM.2.A.5.a	522101	1	1.00	n/a
FM.2.D.5.a	522401	6	1.67	0.52
FM.2.F.5.a	522601	3	1.00	0.00
FM.2.F.5.b	522602	8	1.00	0.00
FM.2.F.5.c	522603	1	1.00	n/a
FM.2.F.5.d	522604	6	1.00	0.00

(continued)

**Table D-10. Grade 5 MAP: Grade Span GLEs Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
LO.1.D.5.a	531401	1	1.00	n/a
LO.1.E.5.a	531501	2	1.00	0.00
LO.1.E.5.b	531502			
LO.1.E.5.c	531503	8	1.13	0.35
LO.1.E.5.d	531504	8	1.50	0.53
LO.1.E.5.e	531505			
LO.2.C.5.a	532301			
ES.1.B.5.a	551201			
ES.1.C.5.a	551301			
ES.2.E.5.a	551501	7	1.00	0.00
ES.2.E.5.b	551502	1	1.00	n/a
ES.2.F.5.a	552601	4	1.00	0.00
ES.2.F.5.b	552602	7	1.00	0.00
ES.3.A.5.a	553101			
ES.3.A.5.b	553102			
ES.3.A.5.c	553103			
UN.1.A.5.a	561101	6	1.00	0.00
UN.1.A.5.b	561102			
UN.1.A.5.c	561103			
UN.1.B.5.a	561201			
UN.2.B.5.a	562201	8	1.00	0.00
UN.2.C.5.a	562301	7	1.00	0.00
UN.2.C.5.b	562302	8	1.13	0.35
UN.2.C.5.c	562303	2	1.00	0.00
IN.1.A.5.a	571101			
IN.1.A.5.b	571102			
IN.1.A.5.c	571103	5	1.00	0.00
IN.1.A.5.d	571104			
IN.1.B.5.a	571201			
IN.1.B.5.b	571202			
IN.1.B.5.c	571203	2	1.00	0.00
IN.1.B.5.d	571204	4	1.00	0.00
IN.1.B.5.e	571205	2	1.00	0.00
IN.1.B.5.f	571206			
IN.1.C.5.a	571301			
IN.1.C.5.b	571302			
IN.1.C.5.c	571303			
IN.1.C.5.d	571304	8	1.00	0.00
IN.1.D.5.a	571401			

(continued)

**Table D-10. Grade 5 MAP: Grade Span GLEs Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ST.1.A.5.a	581101			
ST.1.B.5.a	581201	2	1.00	0.00
ST.1.C.5.a	581301	7	1.29	0.49
ST.2.A.5.a	582101			
ST.3.A.5.a	583101	3	1.00	0.00
ST.3.A.5.b	583102			

**Table D-11. Grade 8 MAP: Grade Span Benchmarks Matched to Items by Panelists**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ME.1.A.6.a	611101			
ME.1.A.6.b	611102			
ME.1.A.6.c	611103			
ME.1.A.6.d	611104	4	1.00	0.00
ME.1.B.6.a	611201			
ME.1.B.6.b	611202			
ME.1.B.6.c	611203			
ME.1.C.6.a	611301			
ME.1.D.6.a	611401			
ME.1.G.6.a	611701	2	1.00	0.00
ME.1.G.6.b	611702	6	2.00	0.00
ME.1.G.6.c	611703	5	1.00	0.00
ME.1.I.6.a	611901	5	1.60	0.55
ME.2.A.6.a	612101			
ME.2.A.6.b	612102	1	1.00	n/a
ME.2.A.6.c	612103			
ME.2.A.6.d	612104			
ME.2.A.6.e	612106			
ME.2.A.6.f	612107			
ME.2.A.6.g	612108			
ME.2.A.6.h	612109			
ME.2.A.6.i	612110			
ME.2.A.6.j	612111			
ME.2.A.6.k	612301	3	1.00	0.00
ME.2.C.6.a	612302			
ME.2.C.6.b	631101			
LO.1.A.6.a	631301	7	1.86	0.38
LO.1.C.6.a	631501			
LO.1.E.6.a	631502	8	1.00	0.00
LO.1.E.6.b	631502			
LO.2.A.6.a	632101	8	1.75	0.89
LO.2.A.6.b	632102	2	1.00	0.00
LO.2.B.6.a	632201			
EC.1.A.6.a	641101	8	1.00	0.00
EC.1.B.6.a	641201	1	1.00	n/a
EC.1.B.6.b	641202	7	1.00	0.00
EC.1.B.6.c	641203			
EC.1.D.6.a	641401			
EC.1.D.6.b	641402	8	1.13	0.35
EC.1.D.6.c	641403			
EC.2.A.6.a	642101			
EC.2.A.6.b	642102			
EC.3.A.6.a	643101			
EC.3.C.6.a	643301	2	1.00	0.00
EC.3.C.6.b	643302	6	1.00	0.00

(continued)

**Table D-11. Grade 8 MAP: Grade Span Benchmarks Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ES.1.A.6.a	651101			
ES.1.B.6.a	651201			
ES.2.A.6.a	652101			
ES.2.A.6.b	652102			
ES.2.A.6.c	652103	5	1.00	0.00
ES.2.A.6.d	652104	4	1.25	0.50
ES.2.B.6.a	652201	3	2.00	0.00
ES.2.D.6.a	652401			
ES.2.D.6.b	652402			
ES.3.A.6.a	653101	5	1.00	0.00
ES.3.A.6.b	653102			
ES.3.A.6.c	653103			
IN.1.A.6.a	671101			
IN.1.A.6.b	671102			
IN.1.A.6.c	671103			
IN.1.A.6.d	671104			
IN.1.A.6.e	671105			
IN.1.B.6.a	671201			
IN.1.B.6.b	671202			
IN.1.B.6.c	671203			
IN.1.B.6.d	671204			
IN.1.B.6.e	671205			
IN.1.B.6.f	671206			
IN.1.C.6.a	671301			
IN.1.C.6.b	671302			
IN.1.C.6.c	671303			
IN.1.C.6.d	671304			
IN.1.C.6.e	671305			
IN.1.D.6.a	671401			
ST.1.A.6.a	681101			
ST.1.B.6.a	681201			
ST.2.B.6.a	682201			
ST.2.B.6.a	682202			
ST.3.B.6.a	683201			
ST.3.B.6.b	683202			
ME.1.D.7.a	711401			
ME.1.I.7.a	711901	1	1.00	n/a
ME.2.A.7.a	712101			
ME.2.A.7.b	712102	1	1.00	n/a
ME.2.A.7.c	712103			
ME.2.A.7.d	712104			
ME.2.A.7.e	712105			
ME.2.A.7.f	712106			
ME.2.A.7.g	712107			

(continued)

**Table D-11. Grade 8 MAP: Grade Span Benchmarks Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
ME.2.A.7.h	712108			
ME.2.A.7.i	712109			
ME.2.A.7.j	712110			
ME.2.A.7.k	712111			
ME.2.A.7.l	712112			
ME.2.A.7.m	712113			
ME.2.A.7.n	712114			
ME.2.C.7.a	712310			
ME.2.F.7.a	712601	1	2.00	n/a
ME.2.F.7.b	712602			
ME.2.F.7.c	712603	1	3.00	n/a
FM.1.A.7.a	721101			
FM.1.A.7.b	721102	8	1.00	0.00
FM.1.A.7.c	721103	8	1.13	0.35
FM.1.A.7.d	721104	5	1.00	0.00
FM.2.A.7.a	722101			
FM.2.A.7.b	722102			
FM.2.B.7.a	722201			
FM.2.B.7.b	722202	6	1.00	0.00
FM.2.B.7.c	722203	8	1.25	0.46
FM.2.D.7.a	722401	7	1.00	0.00
FM.2.D.7.b	722402			
FM.2.D.7.c	722403	1	1.00	n/a
FM.2.D.7.d	722404			
FM.2.F.7.a	722601			
FM.2.F.7.b	722602			
FM.2.F.7.c	722603			
FM.2.F.7.d	722604			
FM.2.F.7.e	722605			
ES.1.C.7.a	751301			
ES.1.C.7.b	751302			
ES.2.E.7.a	752501	5	1.00	0.00
ES.2.E.7.b	752502	2	1.00	0.00
ES.2.E.7.c	752503	1	1.00	n/a
ES.2.F.7.a	752601			
ES.2.F.7.b	752602			
ES.2.F.7.c	752603			
ES.2.F.7.d	752604	8	1.00	0.00
ES.2.F.7.e	752605	6	1.00	0.00
ES.2.F.7.f	752606			
ES.2.F.7.g	752607			
ES.2.F.7.h	752608			
ES.3.A.7.a	753101	6	1.17	0.41
ES.3.A.7.b	753102			

(continued)

**Table D-11. Grade 8 MAP: Grade Span Benchmarks Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
UN.1.A.7.a	761101			
UN.1.A.7.b	761102	8	1.00	0.00
UN.1.A.7.c	761103	1	1.00	n/a
UN.1.B.7.a	761201			
UN.1.B.7.b	761202			
UN.1.C.7.a	761301			
UN.1.C.7.b	761302			
UN.2.A.7.a	762101			
UN.2.A.7.b	762102			
UN.2.A.7.c	762103			
UN.2.A.7.d	762104			
UN.2.A.7.e	762105			
UN.2.B.7.a	762201	2	1.00	0.00
UN.2.B.7.b	762202			
UN.2.B.7.c	762203			
UN.2.B.7.d	762204	7	1.00	0.00
UN.2.B.7.e	762205			
UN.2.B.7.f	762206	4	1.00	0.00
UN.2.C.7.a	762301			
UN.2.C.7.b	762302	8	1.00	0.00
UN.2.C.7.c	762303	4	1.00	0.00
UN.2.C.7.d	762304	3	1.00	0.00
UN.2.C.7.e	762305	2	1.00	0.00
UN.2.C.7.f	762306			
UN.2.D.7.a	762401			
UN.2.D.7.b	762402	6	1.00	0.00
UN.2.D.7.c	762403	2	1.00	0.00
IN.1.A.7.a	771101			
IN.1.A.7.b	771102			
IN.1.A.7.c	771103			
IN.1.A.7.d	771104			
IN.1.A.7.e	771105			
IN.1.A.7.f	771106			
IN.1.B.7.a	771201			
IN.1.B.7.b	771202	1	1.00	n/a
IN.1.B.7.c	771203	1	1.00	n/a
IN.1.B.7.d	771204			
IN.1.B.7.e	771205	1	1.00	n/a
IN.1.B.7.f	771206			
IN.1.B.7.g	771207			
IN.1.C.7.a	771301			
IN.1.C.7.b	771302			
IN.1.C.7.c	771303			

(continued)

**Table D-11. Grade 8 MAP: Grade Span Benchmarks Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
IN.1.C.7.d	771304			
IN.1.C.7.e	771305			
IN.1.D.7.a	771401			
ST.1.A.7.a	781101			
ST.1.B.7.a	781201			
ST.2.B.7.a	782201			
ST.2.B.7.b	782202			
ST.3.B.7.a	783201			
ST.3.B.7.b	783202			
ME.1.A.8.a	811101	4	1.25	0.50
ME.1.A.8.b	811102			
ME.1.C.8.a	811301			
ME.1.D.8.a	811401			
ME.1.D.8.b	811402			
ME.1.D.8.c	811403	3	1.33	0.58
ME.1.F.8.a	811601	7	1.00	0.00
ME.1.I.8.a	811901	3	1.00	0.00
ME.1.I.8.b	811902	4	1.00	0.00
ME.1.I.8.c	811903			
ME.2.A.8.a	812101	6	1.00	0.00
ME.2.F.8.a	812601	1	1.00	n/a
LO.1.A.8.a	831101			
LO.1.D.8.a	831401	4	1.25	0.50
LO.2.A.8.a	832101	6	1.00	0.00
LO.2.A.8.b	832102	5	1.20	0.45
LO.2.B.8.a	832201	5	1.20	0.45
LO.2.B.8.b	832202			
LO.2.B.8.c	832203	1	1.00	n/a
LO.2.C.8.a	832301	1	2.00	n/a
LO.2.C.8.b	832302	4	1.00	0.00
LO.2.C.8.c	832303	2	1.00	0.00
LO.2.C.8.d	832304	7	1.00	0.00
LO.2.C.8.e	832305			
LO.2.C.8.f	832306	6	1.00	0.00
LO.2.C.8.g	832307			
LO.2.F.8.a	832601	7	1.00	0.00
LO.2.G.8.b	832702			
LO.2.G.8.c	832703			
LO.2.G.8.d	832704			
LO.3.A.8.a	833101			
LO.3.A.8.b	833102			
LO.3.A.8.c	833103			
LO.3.A.8.d	833104			
LO.3.C.8.a	833301	6	1.00	0.00

(continued)

**Table D-11. Grade 8 MAP: Grade Span Benchmarks Matched to Items by Panelists (continued)**

Missouri GLEs	HumRRO GLE Item Codes	Number of Panelists	Mean Number of Items per GLE	SD
LO.3.C.8.b	833302			
LO.3.C.8.c	833303	5	1.00	0.00
LO.3.D.8.a	833401			
LO.3.D.8.b	833402	3	1.00	0.00
EC.1.D.8.a	841401			
EC.2.B.8.a	842201			
EC.2.B.8.b	842202	1	1.00	n/a
ES.1.A.8.a	851101			
ES.1.A.8.b	851102	7	1.14	0.38
ES.1.A.8.c	851103	7	1.00	0.00
ES.1.A.8.d	851104			
ES.2.B.8.a	852201			
ES.2.B.8.b	852202			
ES.2.B.8.c	852203	4	1.00	0.00
ES.2.C.8.a	852301	7	1.00	0.00
ES.2.C.8.b	852302	1	1.00	n/a
ES.3.C.8.c	852303	8	1.25	0.46
ES.2.D.8.a	852401			
ES.2.D.8.b	852402			
IN.1.A.8.a	871101			
IN.1.A.8.b	871102			
IN.1.A.8.c	871103			
IN.1.A.8.d	871104			
IN.1.A.8.e	871105			
IN.1.A.8.f	871106			
IN.1.B.8.a	871201			
IN.1.B.8.b	871202	1	2.00	n/a
IN.1.B.8.c	871203	2	1.00	0.00
IN.1.B.8.d	871204			
IN.1.B.8.e	871205	1	2.00	n/a
IN.1.B.8.f	871206			
IN.1.B.8.g	871207			
IN.1.C.8.a	871301			
IN.1.C.8.b	871302			
IN.1.C.8.c	871303			
IN.1.C.8.d	871304			
IN.1.C.8.e	871305			
IN.1.D.8.a	871401	4	1.00	0.00
ST.1.A.8.a	881101	7	1.86	0.38
ST.1.B.8.a	881201	6	1.00	0.00
ST.2.B.8.a	882201	2	1.50	0.71
ST.2.B.8.b	882202			
ST.3.B.8.a	883201	1	3.00	n/a
ST.3.B.8.b	883202	4	1.00	0.00

## Appendix E. Panelist Comments on Items

Tables E-1 through E-4 present panelists’ comments on item bank items on the Science MAP. Column 2 indicates the average overall alignment rating while column 3 indicates the average overall item quality rating. The items listed were identified as having an average rating across panelists per item that was less than ‘highly aligned’ for the overall alignment rating and/or less than ‘good’ for overall item quality. Comments from panelists associated with these items are listed in the fourth column to assist MDE with item reviews.

**Table E-1. Grade 5 Science MAP: Operational Item Comments**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
2000560	3.13	2.75	<ul style="list-style-type: none"> <li>Students will want to do vertebrates and invertebrates but not even one of each is shown.</li> <li>It is unclear what similarities students are expected to use since it asks for 2 even groups: vertebrate/invertebrate, legs/no legs?</li> <li>Forces students to not use accepted classification systems but to create their own.</li> <li>This problem seems very wordy which makes it confusing to decipher what is actually being asked.</li> <li>The question asks for 2 even groups so it doesn’t break into vertebrate/invertebrate. Will other groups be accepted?</li> <li>There is more than one way to classify the animals. Will they all be counted correct?</li> </ul>
2000341	3.00	2.88	<ul style="list-style-type: none"> <li>Has a wide variety of possible answers which includes 4 or more GLEs.</li> </ul>
2000313	3.00	2.75	<ul style="list-style-type: none"> <li>Students would have a hard time understanding the format – maybe with two different boxes.</li> <li>The question is vague on what wildlife and why they need protecting.</li> </ul>
2000803	3.25	2.75	<ul style="list-style-type: none"> <li>The directions still say for students to write the name next to each step rather than fill in the table. With the graphic not sure which word would be acceptable for fourth stage.</li> <li>The picture on this one is deceiving. The bottom arrow could represent groundwater flow, run-off, or collection.</li> <li>It is impossible to understand what is expected at point 4 in the graphic: Groundwater? Run-off? Infiltration?</li> <li>The graphic does not make it clear whether the arrow is pointing to groundwater or surface run-off.</li> </ul>
2000743	2.63	2.88	<ul style="list-style-type: none"> <li>Covers 2 separate GLEs in one item.</li> <li>Unclear connection between things to help avoid sunburn and technological advances.</li> <li>This GLE talks about inventions but I could not find a GLE that talked about sun leading to burns.</li> <li>This is not a GLE that really covers inventions to help avoid sunburn.</li> <li>The question asks about the natural object that causes skin to burn and inventions – this is not addressed by the GLEs.</li> </ul>

(continued)

**Table E-1. Grade 5 Science MAP: Operational Item Comments (continued)**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
2000806	2.63	3.00	<ul style="list-style-type: none"> <li>GLE does not state that the students have to be able to put the steps of the scientific method in order but rather be able to conduct a fair test.</li> <li>This GLE is one portion of what the question is asking.</li> <li>This is not a direct GLE.</li> <li>Knowing the steps is important to conducting a fair test but the steps are not actually listed in a GLE.</li> <li>Knowing the steps is necessary to conduct a fair test but not clear if putting the steps in order is covered under this GLE.</li> <li>Does not seem to align with a GLE clearly.</li> <li>This is a great question but it does not directly align with any GLE.</li> </ul>
2000545	3.50	2.88	<ul style="list-style-type: none"> <li>Question states based on the graph and it should state based on table.</li> <li>The question asks for students to use graph but they do not have a graph they have been given a data table.</li> <li>Prompt should say based on the data table not based on the graph.</li> <li>No graph only table.</li> <li>Question should say based on table not on graph in order to use same language.</li> </ul>
L1128	2.88	2.88	<ul style="list-style-type: none"> <li>This question does not directly align with the GLE.</li> <li>Another great question but does not directly align with the GLE.</li> </ul>
K0914	2.88	3.13	<ul style="list-style-type: none"> <li>GLE says to sequence – stretches the GLE.</li> </ul>
L0906	3.00	2.88	<ul style="list-style-type: none"> <li>Needs to use the correct vocabulary for the different classes of vertebrates.</li> </ul>
L1107	2.25	2.50	<ul style="list-style-type: none"> <li>GLE does not require knowledge of the angle that the sunlight hits the Earth – 7<sup>th</sup> grade GLE.</li> <li>This is a 7<sup>th</sup> grade GLE. 5<sup>th</sup> graders don't have to know directness of sunlight and seasons.</li> <li>GLE is only about the rotation of Earth. Students would need to know about tilt and direct/indirect light to answer the question.</li> <li>This is not a GLE for 5<sup>th</sup> grade.</li> <li>Great question but not covered by GLE.</li> <li>Direct/indirect light and the tilt of Earth need to be known in order to answer this question. This is not covered in this GLE.</li> <li>Not a GLE covered at this level.</li> </ul>
K1110	2.88	2.88	<ul style="list-style-type: none"> <li>Does not directly link to GLE.</li> <li>Does not meet with GLE. Multiple correct answers.</li> </ul>

(continued)

**Table E-1. Grade 5 Science MAP: Operational Item Comments (continued)**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
K1127	2.63	2.75	<ul style="list-style-type: none"> <li>• Weakly links to external cues but would have to know the characteristics of cold-blooded animals from 5<sup>th</sup> grade GLE.</li> <li>• Cold-blooded and warm-blooded is a characteristic used to help classify. The GLE does not go into detail about any of the characteristics.</li> <li>• Warm versus cold blooded is talked about in characteristics of animal classes but not specifically.</li> <li>• Assumes that the kids have knowledge not outlined in GLEs.</li> <li>• Question requires more detail about how warm and cold blooded works than is covered by the GLE.</li> </ul>
L1113	2.75	2.88	<ul style="list-style-type: none"> <li>• GLE assumes knowledge of the desert biome.</li> <li>• Requires knowledge of deserts as well as identifying how external clues change behavior.</li> <li>• Question does not closely align with GLEs.</li> </ul>

**Table E-2. Grade 5 Science MAP: Non-Operational Item Comments**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
2000620	3.13	2.88	<ul style="list-style-type: none"> <li>Covers both the dissolving portion and how solids and liquid can be combined.</li> <li>Confusing way it says salt and solid – text needs work</li> </ul>
2000621	3.13	2.88	<ul style="list-style-type: none"> <li>The question requires both knowledge of how the 3 states of matter act plus knowledge of how temperature affects water.</li> <li>Having the answer choices reference both heating and cooling is confusing.</li> <li>The answer choices have 3 things to look at each which may overwhelm a student.</li> </ul>
2000597	2.88	2.88	<ul style="list-style-type: none"> <li>The question is more about the density of the water than the friction the water creates when the marble falls through it.</li> <li>The density of water versus air is leading to more friction and this is not covered by that GLE.</li> <li>Students may be confused because water on the floor will lead to less friction.</li> </ul>
2000594	3.25	2.88	<ul style="list-style-type: none"> <li>Confusing with the word sound when thinking about motion.</li> <li>The answer choices are confusing. Students may think the sound of a bell is straight line like the sound wave or it could also be the book falling from the desk.</li> </ul>
2000607	2.75	2.38	<ul style="list-style-type: none"> <li>Question links 3 different GLEs and all options are true. Who says which is best? Seems to contradict question 2000560 where make up own system.</li> <li>This question mentions fossils but is really about classifying.</li> <li>Students could choose any of the answer choices and be technically correct. Who is to say one is better than the other? Isn't that a matter of opinion? Also dragonfly has a space in some answers and not in others.</li> <li>Will there be a focus on the word fossils over grouping them? There is a space between dragon and fly on the answer choices.</li> <li>2 of the answers have a space between dragon and fly.</li> </ul>
2000628	2.88	2.75	<ul style="list-style-type: none"> <li>Question asks what evidence is needed – GLE is about analyzing all of the evidence.</li> <li>Question deals with figuring out how to answer question instead of just analyzing results.</li> <li>Students need to discover what evidence is needed rather than analyzing evidence.</li> <li>Unclear what is testing.</li> </ul>

(continued)

**Table E-2. Grade 5 Science MAP: Non-Operational Item Comments (continued)**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
2000629	2.50	2.63	<ul style="list-style-type: none"> <li>Does not reflect either GLE well.</li> <li>This relates to shadows in that students have to identify that the sun produces a shadow but it also ties in heat and color.</li> <li>GLE doesn't really discuss reflection/absorption of heat energy by color.</li> <li>The GLE about how light or dark colors absorbs the sun is not at this level.</li> <li>Does not seem to align with a GLE clearly. There isn't really a GLE about reflecting and absorbing heat by color.</li> <li>Asks Information about light and dark colors absorbing sunlight that is not covered in these grades.</li> </ul>
2000618	2.63	2.75	<ul style="list-style-type: none"> <li>Talks about energy transformation which is not a part of the GLE.</li> <li>This question seems like a stretch for this GLE.</li> <li>GLE is about energy transfer in a closed circuit. Many students will only think of this in those terms not in one type of energy becoming another type of energy.</li> <li>This GLE covers the effect of the heat. The GLE that covers energy transformation from electric to heat is above 5<sup>th</sup> grade.</li> <li>Vocabulary is not ideas that should have been taught yet.</li> <li>Is the question about electrical energy becoming heat energy or about the effects of heat energy?</li> <li>This question goes above what the GLE seems to cover by asking about electrical to heat transformation.</li> </ul>
2000311	3.13	2.88	<ul style="list-style-type: none"> <li>Both options B and C could be right. Think one should say before and one say after.</li> <li>Two of the answer choices could be correct for this problem. Animals need to locate their cave before winter and also adding extra body fat would be beneficial.</li> </ul>
2000624	2.75	2.88	<ul style="list-style-type: none"> <li>Does not link well to the examples listed under this GLE.</li> <li>This GLE gives way for a LOT of different possibilities. I'm not sure if this item matches with the GLE chosen but if so it is a stretch.</li> <li>Seems to be more of a social studies question than science question because of the movement of goods.</li> <li>More than one answer could be chosen.</li> </ul>
2000623	2.75	3.00	<ul style="list-style-type: none"> <li>Does not link well to the examples listed under this GLE.</li> <li>This is a stretch for the GLE chosen. Windows are not listed with the GLE.</li> </ul>

**Table E-3. Grade 8 Science MAP: Operational Item Comments**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
K1425	3.13	2.88	<ul style="list-style-type: none"> <li>• The GLE discusses common objects while the item uses the examples of powders which could be the broken substance of any solid.</li> <li>• Multiple GLE coverage.</li> <li>• Question and answer wording is difficult to understand.</li> <li>• Too broad – are you assessing evidence of a transfer of energy or physical versus chemical change</li> <li>• Because the answer differs from the alternatives in structure (it is longer and compound whereas other options are short and simple) students may be more likely to guess the right answer.</li> <li>• The answer choices could easily be used for physical changes instead of chemical. Show answers that included fizzing bubbles precipitate burning which are a few other signs of chemical change.</li> </ul>
K1426	3.25	2.88	<ul style="list-style-type: none"> <li>• Adaptation? Environmental change?</li> <li>• Is there more than one possible answer to this question?</li> <li>• Right answer is not obvious.</li> <li>• Vocabulary issue: students will not know what “well-suited” means. Replace with “well-adapted”???</li> <li>• Incorporate the term adaptation.</li> <li>• Answer choices need to be more specific.</li> </ul>
K1439	3.13	2.75	<ul style="list-style-type: none"> <li>• Predation?</li> <li>• Predation? Availability of water?</li> <li>• Is there more than one possible answer to this question? Number of % that survive.</li> <li>• Right answer is not obvious.</li> <li>• Not knowing which type of animal is being questioned might lead to confusion for a student. If it’s a fish the amount of water very well might affect how many offspring live. I think you could say something like “a raccoon” so that students don’t start making crazy scenarios in their head that will distract from whether or not they actually know the right answer. Also, % versus # is an issue...guppies would have a huge # of offspring but not necessarily a high %.</li> <li>• Question is vague – provide an example of a common animal and its litter. Options are poorly worded (B and D)</li> <li>• Answer choices need to be clearer. Specify type of common animal.</li> </ul>
K1441	3.38	2.75	<ul style="list-style-type: none"> <li>• Interpretation?</li> <li>• Unusual graphic makes interpretation difficult. It would be such a better graphic as a simple table similar to the classification of celestial bodies table.</li> <li>• Adding more space between the columns on the graphic might help and also more descriptive labels.</li> <li>• Chart is confusing.</li> <li>• Graphic is difficult to interpret.</li> </ul>

(continued)

**Table E-3. Grade 8 Science MAP: Operational Item Comments (continued)**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
2000448	3.38	2.75	<ul style="list-style-type: none"> <li>• The two questions asked in this item are aligned to different GLEs.</li> <li>• If you ask them to list the 3 fossils and then only give them a blank for 2 of them, they will only list 2 of the fossils. Either ask for the oldest and youngest or give them a blank for all 3 fossils.</li> </ul>
2000433	3.75	2.00	<ul style="list-style-type: none"> <li>• Simple machines do not change the amount of work done.</li> <li>• Incorrect wording – better served saying “amount of force not work required to perform a task”.</li> <li>• Simple machines do not change the amount of work. Needs to be reworded.</li> <li>• Machines don’t change the amount of work. They change the amount of force or the distance but the amount of work remains the same. Starting the prompt with an inaccurate statement is bad!</li> <li>• Prompt information is incorrect about “Change the amount of work”.</li> </ul>
L1429	2.50	2.75	<ul style="list-style-type: none"> <li>• Can’t find a specific GLE covered.</li> <li>• Not aligned tightly.</li> <li>• Not aligned.</li> <li>• Expected that kids do chemical reactions?</li> <li>• Replace letters with actual elements.</li> </ul>

**Table E-4. Grade 8 Science MAP: Non-Operational Item Comments**

ITS ID	Average Overall Alignment Rating	Average Overall Item Quality Rating	Comments
2000110	2.75	3.38	<ul style="list-style-type: none"> <li>• Ice storms not mentioned in the GLE.</li> <li>• Examples don't specify ice storms in GLE.</li> <li>• Does not mention ice storm in GLE.</li> <li>• Ice storm not an example in GLE.</li> </ul>
2000241	3.38	2.75	<ul style="list-style-type: none"> <li>• How can other plants be competing when they will not grow either?</li> <li>• There is not a good answer provided.</li> <li>• Answer does not make sense to science teachers. Answer choices need more explanation.</li> <li>• Answer choices are confusing.</li> </ul>