

# **Common Core State Standards for Mathematics: Regional Training**

**April / May 2012**

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Assessment 2014-15 and Beyond:

SMARTER Balanced Assessment

Consortium (SBAC)  
DRAFT  
[Smarterbalanced.org](http://Smarterbalanced.org)

- March 4, 2011 – “Eligible Content”
- March 20, 2012 – “Content Specifications”
- January 4, 2012 – “Item Specifications: Showcase 1”
- January 26, 2012 – “Item Specifications: Showcase 2”
- February 28, 2012 – “Item Specifications: Showcase 3”

SBAC :

[Smarterbalanced.org](http://Smarterbalanced.org)



## What is Smarter Balanced?

Smarter Balanced is a state-led consortium developing assessments aligned to the Common Core State Standards in English language arts/literacy and mathematics that are designed to help prepare all students to graduate high school college- and career-ready. [READ MORE](#) ▶



### Smarter Balanced Assessment Consortium

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### Latest News

#### [Computer Adaptive Testing Event Now Available](#)

This recorded webinar addresses the advantages of adaptive testing and the critical decision points in designing, developing and administering an effective computer adaptive assessment to measure student achievement and growth.

[READ MORE](#) ▶

#### [California's Young Joins Executive Committee](#)

Dr. Beverly L. Young, assistant vice chancellor of academic affairs for the California State University System, has been

### School Years

Smarter Balanced assessments will be implemented in the 2014-15 school year. Click below to see what's happening and when.

[2009-2010](#)

[2010-2011](#)

**[2011-2012](#)**

#### What's Happening

Smarter Balanced is creating content specifications aligned to the Common Core State Standards and test development guidelines and materials.

[READ MORE](#) ▶

[2012-2013](#)

**\*Information about  
the Content of the  
Assessment**

**Table 22. Number of Mathematics CCSS Eligible for Summative Assessment**

Grade or Conceptual Category	Total	Learnable		Expected		Measurable		Eligible	
		Y	N	Y	N	Y	N	Y	N
3	25	25	0	25	0	25	0	25	0
4	28	28	0	28	0	28	0	28	0
5	26	26	0	26	0	26	0	26	0
6	29	29	0	29	0	29	0	29	0
7	24	24	0	24	0	24	0	24	0
8	28	28	0	28	0	27	1	27	1
Number and Quantity	27	27	0	9	18	27	0	9	18
Algebra	27	27	0	23	4	27	0	23	4
Functions	28	28	0	22	6	28	0	22	6
Geometry	43	43	0	37	6	41	2	35	8
Statistics and Probability	31	31	0	22	9	31	0	22	9
<b>TOTAL</b>	<b>316</b>	<b>316</b>	<b>0</b>	<b>273</b>	<b>43</b>	<b>313</b>	<b>3</b>	<b>270</b>	<b>46</b>
<b>Percent of Total</b>		<b>100%</b>	<b>0%</b>	<b>86%</b>	<b>14%</b>	<b>99%</b>	<b>1%</b>	<b>85%</b>	<b>15%</b>

**Table 23. Item Types by Which Eligible Mathematics Standards Were Judged to Be Measurable**

Grade or Conceptual Category	Total	Selected Response		Extended Constructed Response		Technology Enhanced		Performance Task	
		Y	N	Y	N	Y	N	Y	N
3	25	24	1	25	0	25	0	25	0
4	28	28	0	28	0	28	0	28	0
5	26	26	0	26	0	26	0	26	0
6	29	29	0	29	0	29	0	29	0
7	24	23	1	24	0	24	0	24	0
8	27	27	0	27	0	27	0	27	0
Number and Quantity	9	8	1	9	0	9	0	9	0
Algebra	23	22	1	23	0	23	0	23	0
Functions	22	21	1	22	0	22	0	22	0
Geometry	35	23	12	35	0	35	0	35	0
Statistics and Probability	22	21	1	22	0	22	0	22	0
<b>TOTAL</b>	<b>270</b>	<b>252</b>	<b>18</b>	<b>270</b>	<b>0</b>	<b>270</b>	<b>0</b>	<b>270</b>	<b>0</b>
<b>Percent of Total</b>		<b>93%</b>	<b>7%</b>	<b>100%</b>	<b>0%</b>	<b>100%</b>	<b>0%</b>	<b>100%</b>	<b>0%</b>

# Bloom's vs. Webb's

## Bloom's

- Type of thinking
- Cognitive skills required to perform a task

## Webb's

- Depth of content understanding
- Scope of a learning activity
- Skills required to complete the task from beginning to end

# Bloom's and Webb's DOK Matrix

## A “Snapshot” of the Cognitive Rigor Matrix (Hess, Carlock, Jones, & Walkup, 2009)

Depth of Thinking (Webb) + Type of Thinking (Revised Bloom)	DOK Level 1 Recall & Reproduction	DOK Level 2 Basic Skills & Concepts	DOK Level 3 Strategic Thinking & Reasoning	DOK Level 4 Extended Thinking
<b>Remember</b>	- Recall conversions, terms, facts			
<b>Understand</b>	-Evaluate an expression -Locate points on a grid or number on number line -Solve a one-step problem -Represent math relationships in words, pictures, or symbols	- Specify, explain relationships -Make basic inferences or logical predictions from data/observations -Use models /diagrams to explain concepts -Make and explain estimates	-Use concepts to solve non-routine problems -Use supporting evidence to justify conjectures, generalize, or connect ideas -Explain reasoning when more than one response is possible -Explain phenomena in terms of concepts	-Relate mathematical concepts to other content areas, other domains -Develop generalizations of the results obtained and the strategies used and apply them to new problem situations
<b>Apply</b>	-Follow simple procedures -Calculate, measure, apply a rule (e.g., rounding) -Apply algorithm or formula -Solve linear equations -Make conversions	-Select a procedure and perform it -Solve routine problem applying multiple concepts or decision points -Retrieve information to solve a problem -Translate between representations	-Design investigation for a specific purpose or research question - Use reasoning, planning, and supporting evidence -Translate between problem & symbolic notation when not a direct translation	-Initiate, design, and conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results
<b>Analyze</b>	-Retrieve information from a table or graph to answer a question -Identify a pattern/trend	-Categorize data, figures -Organize, order data -Select appropriate graph and organize & display data	-Compare information within or across data sets or texts -Analyze and draw conclusions from data,	-Analyze multiple sources of evidence or data sets

# Cognitive Rigor Matrix (Hess, Carlock, Jones, & Walkup)

Revised Bloom's	DOK Level 1 Recall & Reproduction
Remember	<ul style="list-style-type: none"><li>Recall, observe, recognize conversions, terms, facts, simple procedures</li></ul>
Understand	<ul style="list-style-type: none"><li>Evaluate expressions</li><li>Locate points on a number line or a grid</li><li>Solve one-step problems</li><li>Represent relationships using words or symbols</li><li>Read, write, compare scientific notation</li></ul>
Apply	<ul style="list-style-type: none"><li>Calculate, measure, apply a rule, formula or algorithm</li><li>Solve linear equations</li><li>Convert within or between metric and customary</li></ul>
Analyze	<ul style="list-style-type: none"><li>Retrieve info from a table</li><li>Graph to answer a question</li><li>Identify a pattern or trend</li></ul>
Evaluate	
Create	<ul style="list-style-type: none"><li>Brainstorm ideas related to a concept</li></ul>

# Cognitive Rigor Matrix (Hess, Carlock, Jones, & Walkup)

Revised Bloom's	DOK Level 2 Skills and Concepts
Remember	
Understand	<ul style="list-style-type: none"><li>• Specify or explain relationships (e.g., examples/non-examples/cause-effect)</li><li>• Make and record observations Explain steps</li><li>• Make and explain estimates</li></ul>
Apply	<ul style="list-style-type: none"><li>• Select and perform a procedure</li><li>• Solve routine problems (multiple concepts)</li><li>• Retrieve info from a table</li><li>• Translate tables, graphs, words, symbols</li></ul>
Analyze	<ul style="list-style-type: none"><li>• Categorize, classify materials, data, figures</li><li>• Interpret, organize, order data</li><li>• Extend a pattern</li></ul>
Evaluate	
Create	<ul style="list-style-type: none"><li>• Generate hypotheses based on observations</li></ul>

# Cognitive Rigor Matrix (Hess, Carlock, Jones, & Walkup)

Revised Bloom's	DOK Level 3 Strategic Thinking and Reasoning
Remember	
Understand	<ul style="list-style-type: none"><li>• Solve non-routine problems</li><li>• Explain, using supporting evidence</li><li>• Justify conjectures</li></ul>
Apply	<ul style="list-style-type: none"><li>• Design investigations for a specific purpose</li><li>• Conduct a designed investigation</li><li>• Solve non-routine problems</li><li>• Use and show reasoning, planning, evidence</li><li>• Translate between problem and notation when not a direct translation</li></ul>
Analyze	<ul style="list-style-type: none"><li>• Compare information across data sets</li><li>• Draw conclusions, citing data</li><li>• Generalize a pattern</li><li>• Interpret a complex graph</li></ul>
Evaluate	<ul style="list-style-type: none"><li>• Cite evidence and develop logical arguments</li><li>• Compare solution methods</li><li>• Verify reasonableness of solutions</li></ul>

# Cognitive Rigor Matrix (Hess, Carlock, Jones, & Walkup)

Revised Bloom's	DOK Level 4 Extended Thinking
Remember	
Understand	<ul style="list-style-type: none"><li>• Relate math content to other domains or other content areas</li><li>• Develop generalizations from investigations and apply to new problem situations</li></ul>
Apply	<ul style="list-style-type: none"><li>• Select an approach to a problem from among many alternatives</li><li>• Specify a problem, identify the solution path, solve the problem, and report the result.</li></ul>
Analyze	<ul style="list-style-type: none"><li>• Analyze multiple sources</li><li>• Analyze complex or abstract themes</li></ul>
Evaluate	<ul style="list-style-type: none"><li>• Gather, analyze, and evaluate information to draw conclusions</li><li>• Apply understanding in a novel way, providing justification for the application</li></ul>
Create	<ul style="list-style-type: none"><li>• Synthesize information across multiple sources</li><li>• Design a math model to inform an abstract situation</li></ul>

**Table 24. Depth of Knowledge Levels of All Mathematics Standards**

Grade or Conceptual Category	Total	Depth of Knowledge Level			
		1	2	3	4
3	25	24	24	3	0
4	28	28	16	5	0
5	26	26	18	3	0
6	29	29	20	2	0
7	24	18	22	8	0
8	28	26	25	9	0
Number and Quantity	27	27	15	0	0
Algebra	27	26	21	7	0
Functions	28	27	24	4	0
Geometry	43	24	36	19	1
Statistics and Probability	31	27	29	7	0
<b>TOTAL</b>	<b>316</b>	<b>282</b>	<b>250</b>	<b>67</b>	<b>1</b>
<b>Percentage of Total Standards at DOK Level (Standards may cover a range of DOK levels)</b>		<b>89%</b>	<b>79%</b>	<b>21%</b>	<b>&lt; 1%</b>

**Table 25. Range of Depth of Knowledge of Eligible Mathematics Content Standards**

Grade or Conceptual Category	Total	Range of Depth of Knowledge						
		1-1	1-2	1-3	2-2	2-3	2-4	3-3
3	25	1	20	3	1	0	0	0
4	28	12	11	5	0	0	0	0
5	26	8	15	3	0	0	0	0
6	29	9	18	2	0	0	0	0
7	24	2	13	3	1	5	0	0
8	27	3	15	8	0	1	0	0
Number and Quantity	9	4	5	0	0	0	0	0
Algebra	23	4	12	6	0	1	0	0

# Mathematics in the Classroom

## Grade 3

Depth of Knowledge					
Revised Bloom's Taxonomy		1	2	3	4
	1	37%			
	2	18%	2.0%		
	3	28%	8.3%	0.1%	
	4	1.8%	6.2%	0.3%	
	5				
	6	0.3%	0.6%	0.4%	

[http://www.nciea.org/publications/cognitiverigorpaper\\_KH12.pdf](http://www.nciea.org/publications/cognitiverigorpaper_KH12.pdf)

# smarterbalanced.org: Eligible Content

## APPENDIX E - SBAC Eligible Content Data Workbook: Mathematics

CCS Code	Mathematics																
	Learnable		Expected		Measurable		Item Type					Eligible	Depth of Knowledge				
	Y or N	CODE	Y or N	CODE	Y or N	CODE	Y or N	Y or N	Y or N	Y or N	Y or N	Y or N	Y or N	Y or N	Y or N	Y or N	Y or N
	Learnable during school year	Learnable Comment CODE	Expected of all Students	Expected Comment CODE	Measurable via on-demand	Measurable Comment CODE	Selected Response	Extended Constructed Response	Technology Enhanced	Performance Task	Oral Response Required	Eligible	DOK 1	DOK 2	DOK 3	DOK 4	DOK Comment CODE
4.MD.2	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	Y	N	N	
4.MD.3	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	Y	N	N	
4.MD.4	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	Y	N	N	
4.MD.5	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	N	N	N	
4.MD.6	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	N	N	N	
4.MD.7	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	Y	N	N	
4.G.1	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	N	N	N	
4.G.2	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	Y	N	N	
4.G.3	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	N	N	N	
5.OA.1	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	N	N	N	
5.OA.2	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	Y	N	N	
5.OA.3	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	Y	N	N	
5.NBT.1	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	N	N	N	
5.NBT.2	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	Y	N	N	
5.NBT.3	Y		Y		Y	301 308 302	Y	Y	Y	Y	N	Y	Y	N	N	N	
5.NBT.4	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	N	N	N	
5.NBT.5	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	N	N	N	
5.NBT.6	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	Y	N	N	
5.NBT.7	Y		Y		Y	301 308	Y	Y	Y	Y	N	Y	Y	Y	Y	N	
5.NF.1	Y		Y		Y		Y	Y	Y	Y	N	Y	Y	N	N	N	

# Focus and Coherence

- It is not feasible to assess every student on all topics.
- It is essential to provide information for all students on centrally important topics.
- Therefore, a subset of the content clusters are identified as high-priority assessment clusters.
- The overall ratio on the assessment of content in high-priority clusters to other content should be about 3:1.

## Appendix A – Grade-Level Content Emphases

The tables on the following pages summarize the cluster-level emphases (major, additional, and supporting) for grades 3-8 and Grade 11.

### *Grade 3 Cluster-Level Emphases*

m = major clusters; a = additional clusters; s = supporting clusters

#### **Operations and Algebraic Thinking**

[m]: Represent and solve problems involving multiplication and division.

[m]: Understand properties of multiplication and the relationship between multiplication and division.

[m]: Multiply and divide within 100.

[m]: Solve problems involving the four operations, and identify and explain patterns in arithmetic.

#### **Number and Operations in Base Ten**

[a]: Use place value understanding and properties of arithmetic to perform multi-digit arithmetic. (DOK 1)

#### **Number and Operations—Fractions**

[m]: Develop understanding of fractions as numbers. (DOK 1, 2)

#### **Measurement and Data**

[m]: Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (DOK 1, 2)

[s]: Represent and interpret data. (DOK 2, 3)

[m]: Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (DOK 1, 2)

[a]: Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. (DOK 1)

#### **Geometry**

[s]: Reason with shapes and their attributes. (DOK 1, 2)

Content Emphases (by cluster) in  
Appendix A of “Content Specs”

# “High” and “Low” defined:

## *“High-intensity” assessed clusters*

- *About 75%-80% of the points for Claim 1*
- Consists of the major clusters

## *“Low-intensity” assessed clusters*

- *About 20%-25% of the points for Claim 1*
- Consists of the additional and supporting clusters

# Appendix B: CAT Sampling Proportions for Claim 1

GRADE 3

Hi	75%	3.OA.B	Understand properties of multiplication and the relationship between multiplication and division	75%
		3.OA.C	Multiply and divide within 100	
		3.MD.C	Geometric measurement: understand concepts of area and relate area to multiplication and to addition	
		3.MD.A	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects	
		3.OA.D	Solve problems involving multiplication and division, and identify and explain patterns in arithmetic <sup>1</sup>	
		3.NF.A	Develop understanding of fractions as numbers	
		3.OA.A	Represent and solve problems involving multiplication and division	
Lo	25%	3.NBT.A	Use place value understanding and properties of operations to perform multi-digit arithmetic	15%
		3.G.A	Reason with shapes and their attributes	
		3.MD.B	Represent and interpret data	
		3.MD.D	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures	10%

<sup>1</sup> Two-step word problems (standard 3.OA.8) must strongly predominate in this category (≥80%). Addition and subtraction problem solving cannot be absent for a year, or else students will not be ready to extend addition and subtraction problem solving to fractions in Grade 4. Rather, the new operations of multiplication and division that are being introduced in Grade 3 must be integrated during the year with prior knowledge of addition and subtraction; two-step problems are the setting for this. They are also a key contextual counterpart/setting for the distributive property, which is central in Grade 3 (cf. 3.OA.5, 3.OA.7, 3.MD.7).

# **Proposed Reporting Categories for Summative Grades 3 - 8**

- **Overall Claim: Progress toward College and Career Readiness (Composite Score)**
- **Claim #1: Concepts and Procedures Score**
- **Claim #2: Problem Solving Score**
- **Claim #3: Communicating Reasoning Score**
- **Claim #4: Modeling and Data Analysis Score**

# **Proposed Reporting Categories for Summative High School**

- **Overall Claim: College and Career Readiness  
(Composite Score)**
- **Claim #1: Concepts and Procedures Score**
- **Claim #2: Problem Solving Score**
- **Claim #3: Communicating Reasoning Score**
- **Claim #4: Modeling and Data Analysis Score**

# Contact Information

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