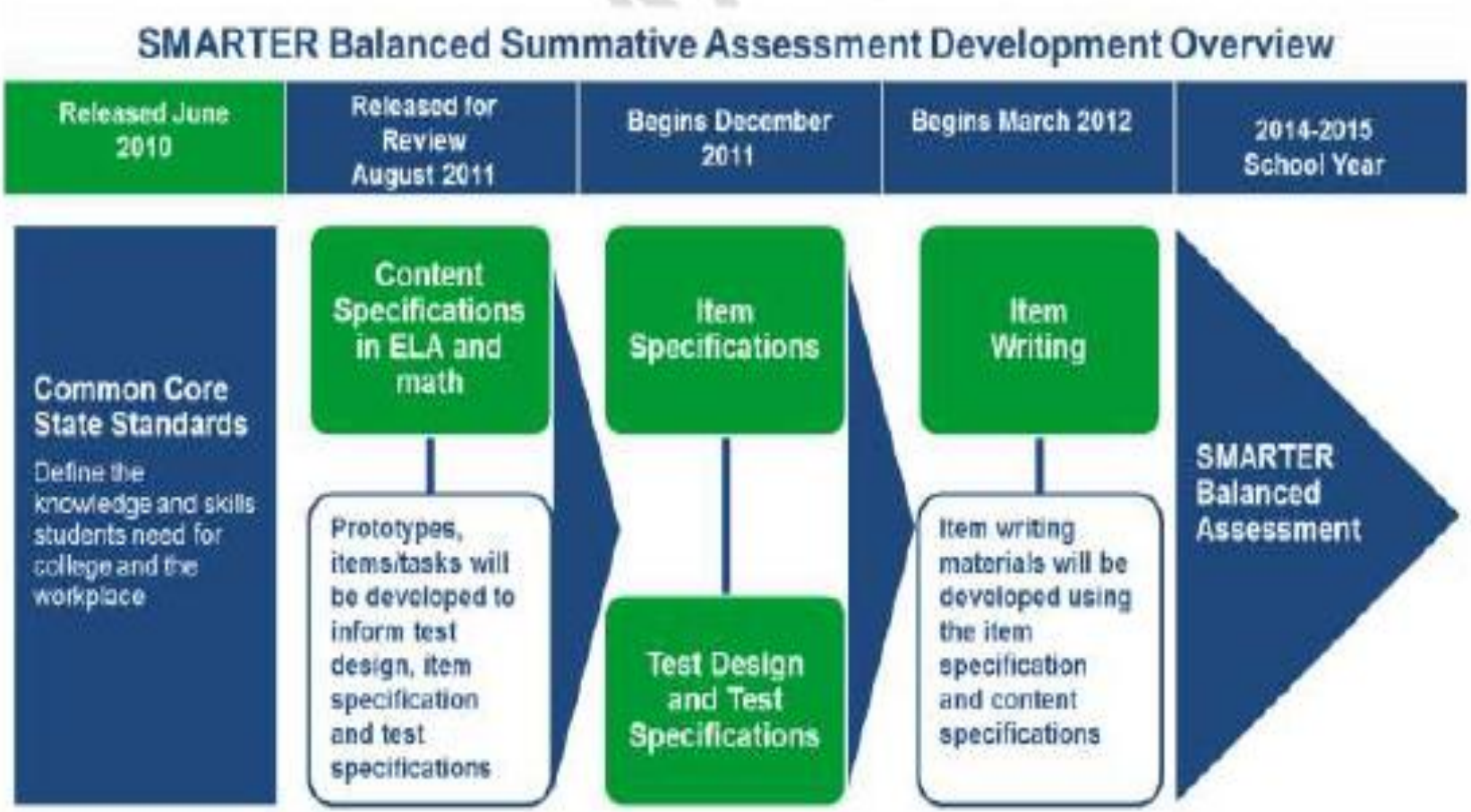
Common Core State Standards for Mathematics and the Role of Smarter Balanced Assessment Consortium (SBAC)

Harriet Pritchard – Office of Assessment
Mathematics

Assessment 2014-15 and Beyond:

SMARTER Balanced Assessment Consortium (SBAC)

Smarterbalanced.org



The Consortium Theory of Action for Assessment Systems: As stated in the SMARTER Balanced Assessment Consortium's (SMARTER Balanced) Race to the Top proposal, "the Consortium's Theory of Action calls for full integration of the learning and assessment systems, leading to more informed

* March 4, 2011 – “Eligible Content”
* December 9, 2011 – “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**

*Proposed, Tentative, Draft Information about the Administration of the Assessment

Assessment System Components

- Summative assessments
  - Computer-Adaptive
  - Performance task(s)
- Optional interim assessments
- Formative assessment

Summative

* Mandatory
* 12-week window
* Grades 3-8 and 11
* Measures progress toward college- and career-readiness
* For three years, paper/pencil tests available

Fiscal Impact

* SBAC and PARCC are collaborating in a survey for every school in the nation to provide their computer capabilities.

* The results of the survey will be used to calculate costs for districts to become computer-ready for online testing.

Summative (continued)

* Computer Adaptive (CAT)
  * Selected Response (SR)
  * Constructed Response (CR)
  * Technology Enhanced (TE)
* Performance Tasks (PT)
  * May include Extended Constructed Response (ER)

Interim

* Optional
* Include CAT and PT
* Results on the same scale as the summative
* Publicly released items and tasks (not secure!)
* Use learning progressions across grades
* Involve a large teacher role in developing and scoring
* Locally selected item sets
* Locally determined intervals

Why Computer Adaptive Testing?

* Good information for teachers when used as interim assessments
* More efficient and more secure
* More accurate way to evaluate student achievement and to measure growth over time
* Efficient and precise measurement across the full range of achievement
* Quick turnaround of results

Formative

* Tools and processes
* Resources for teachers on how to collect and use information about student success in acquisition of the CCSS
* Used by teachers throughout the year

Performance Tasks

* multiple standards, claims and targets
* depth of understanding, research skills and/or complex analysis with relevant evidence
* student-initiated planning
* feasible for the classroom, up to 2 class periods
* oral presentations, exhibitions, product development, or more extended written responses
* real-world tasks
* multiple approaches
* relevant content
* 21st century skills
* scoring that focuses on the essence of the task

Types of items

- Selected response
- Short Constructed Response
- Extended Constructed Response
- Performance Task
- Technology-Enhanced

Selected Response

1. Select a single option from among a set of options (traditional multiple-choice)
2. Select multiple options from among a set of options
3. Create a line
4. Move one or more objects to given set of locations (drag-and-drop)

Selected Response:

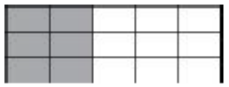
* From "Item Specifications"
  * with rubric

Figure 2.

For numbers 1a-1d, state whether or not each figure has $\frac{2}{5}$ of its whole shaded.

1a.  (Y) Yes (N) No

1b.  (Y) Yes (N) No

1c.  (Y) Yes (N) No

1d.  (Y) Yes (N) No

Figure 3.

Scoring Rubric

Responses to this item will receive 0-2 points, based upon the following:

2 points: YNYN The student has a solid understanding of 2/5 as well as the equivalent form of 2/5.

1 point: YNNN, YYNN, YYYN The student has only a basic understanding of 2/5. Either the student doesn't recognize an equivalent fraction for 2/5 or doesn't understand that all 5 parts must be equal-sized in figure 1b.

0 points: YYYY, YNNY, NNNN, NNYY, NYYN, NYNN, NYYY, NYNN, NNNN, NYNY, NNYN, NNNY The student demonstrates inconsistent understanding of 2/5 or answers "Y" to figure 1d, clearly showing a misunderstanding of what 2/5 means. Figure 1d is considered a "disqualifier" and an answer of "Y" to this part of the item would cancel out any other correct responses as "guesses" on the part of the student.

Constructed Response

* CRs that can be computer scored assigned to the CAT.
* Extended CRs assigned to PT.
* Expected to include concepts detailed in the CCSS of lower grades
* Reading level approximately one grade level below the grade level of the test, except for specifically assessed mathematical terms

CAT Constructed Response

1. Enter a text String (traditional open-response)
2. Create a line
3. Produce a geometric shape

*Technology Enhanced Items (TEI):

* Computer delivered items
* Specialized interactions for response
* interactions/responses that are not selected response
* interactions/responses that are not text entry
* may include digital media as the stimulus (sound, video, or interactive widget)

Questions so far??

*Information about the Content of the Assessment

Evidence-Centered Design (ECD)

- Evidence Centered Design used by the SMARTER Balanced Assessment Consortium
- SBAC established four Claims regarding what students should know and be able to do
- Claims are accompanied by
  - kinds of evidence that would be sufficient
  - evidence statements articulated as assessment targets.

Claims

- Claims are broad statements of the Assessment System's outcomes.
- Claims reorganize/combine standard statements.
- The Rationale presents both the scope of the claim and its connection and alignment to the CCSS.
- Content of standard is ***not*** changed.

Think:

integrating skills and concepts

versus

tapping only isolated skills in one strand

*Claims

Claims for Mathematics Summative Assessment	
Claim #1	Concepts & Procedures "Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency."
Claim #2	Problem Solving "Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies."
Claim #3	Communicating Reasoning "Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others."
Claim #4	Modeling and Data Analysis "Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems."

*SBAC Claims

* procedural skills
* conceptual understanding
* making the connection to these mathematical practices:
  * **Use appropriate tools strategically.**
  * **Attend to precision.**
  * **Look for and make use of structure.**
  * **Look for and express regularity in repeated reasoning.**

Claim 1 — Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

* Cluster headings serve as assessment targets for Claim 1.
* Note: **Only** Claim 1 Specification Tables directly connect to the content domains and clusters of CCSS-Math.
* Items for Claims 2-4 rely on the content from Claim 1, but are not necessarily directly connected.

* *Claim 1* – Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

Content emphases in the standards:

- Not all content is emphasized equally.
  - Major work of each grade (m)
  - Supportive of the areas of major emphasis (s)
  - Topics that may not connect tightly to the major work of the grade called additional (a)

* **Essential properties of items and tasks that assess Claim 1:**
  * **Selected response items,** including computer-enhanced items
  * **Short Constructed response** items
  * **Highly scaffolded tasks**
  * **Extended Response** items
    * **Application tasks**
    * **Translation tasks**
    * **Explanation tasks**

* *Claim 1* — Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

Target A [m]: Represent and solve problems involving multiplication and division. (DOK 1, 2)

* use multiplication and division within 100
* straightforward, one-step contextual word problems
* equal groups, arrays, and measurement quantities
* majority code to standard 3.OA.3
* Some tasks probe student understanding of the meanings of multiplication and division (3.OA.1,2)
* Non-contextual tasks (determine the unknown number in a multiplication or division equation relating three whole numbers (3.OA.4)) will support the development of items that provide a range of difficulty

Claim 1 Operations and Algebraic Thinking

Target B [m]: Understand properties of multiplication and the relationship between multiplication and division. (DOK 1)

* Focus more on the mathematical properties of these operations, including the mathematical relationship between multiplication and division.
* Not "Which of these illustrates the distributive property?" (not a vocabulary exercise!)
* Tasks are to probe whether students are able to *use* the properties to multiply and divide.
* Note, tasks that code directly to Target B will be limited to the 10x10 times table. (But see Target A under 3.NBT below.)

Targets C and D….

Claim 1 Operations and Algebraic Thinking

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

* Tasks associated with this target will be non-contextual computation problems that assess fluency in addition and subtraction within 1000.
* Some tasks show strategies and/or algorithms students are using, in order to ensure that they are general (based on place value and properties of operations).
* Other tasks will assess either rounding (with an emphasis on conceptual understanding, if possible) or the more important multi-digit computations specified in 3.NBT.3.
* Because the answers to such multiplications are easily found by mnemonic tricks, these items should be of a conceptual nature to assess reasoning with place value and properties of operations.

Claim 1 Number and Operations – Base Ten

* Target A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. (DOK 2, 3)
* Target B: Select and use appropriate tools strategically.
* Target C: Interpret results in the context of a situation. (DOK 2)
* Target D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (DOK 1, 2, 3)

* *Claim 2* — Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.

* Target A: Test conjectures with specific examples. (DOK 2)
* Target B: Construct chains of reasoning that will justify or refute conjectures. (DOK 3, 4).
* Target C: State logical assumptions being used. (DOK 2, 3)
* Target D: Break an argument into cases. (DOK 2, 3)
* Target E: Distinguish correct logic from that which is flawed and—if there is a flaw in the argument—explain what it is. (DOK 2, 3, 4)
* Target F: Base arguments on concrete referents. (DOK 2, 3)
* Target G: At later grades, determine conditions under which an argument does and does not apply. (DOK 3, 4)

* *Claim 3* – Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

* Problems not neatly “packaged.”
  * complex
  * insufficient or superfluous data.
* Tasks involve formulating a model
  * make assumptions and simplifications
  * Select from the data at hand or estimate data that are missing
* Distinct from the well-formulated problem-solving tasks described in Claim 2
* Identify variables and construct relationships between them
* Interpret results and check the results for reasonableness

* ***Claim 4*** **— Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.**

* involve more than one content domain
* draw upon knowledge from previous grades (especially the “major” work of previous grades)
* performance tasks (each lasting up to 120 minutes)
* Maybe a collection of 3 to 5 extended-response items/tasks

* *Claim 4* — Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

*From Showcase 2

Mathematics Item Specification
Grade 04

Balanced Assessment Consortium

Claim 1: Conceptual Understanding and Procedural Fluency Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.	
Content Domain: **Operations and Algebraic Thinking**	
Target A [m]: Use the four operations with whole numbers to solve problems. (DOK 1, 2) Tasks for this target will require students to use the four operations to solve straightforward, one-step contextual word problems in situations involving equal groups, arrays, and finding an unknown number, including problems where the remainder must be interpreted. Some of these tasks will draw on contexts in 4.MD Target I using measurement quantities such as time, liquid volume, and masses/weights of objects, and money (with decimal representations limited to those described in standards 4.NF.6 and 4.NF.7). Multi-step word problems using the four operations and mathematical problems that relate the four operations to angle addition (part of 4.MD Target K) will be assessed in Claims 2-4.	
Standards:	4.OA.1, 4.OA.2, 4.OA.3
DOK target(s):	1, 2
Evidence required:	1. The student uses models (such as equal groups, drawings, and arrays) to solve contextual multiplication and division problems with whole numbers. 2. The student solves contextual division problems involving whole numbers where the remainder must be interpreted. 3. The student represents and finds an unknown quantity in a contextual problem using whole numbers and one of the four operations.
Allowable item types*:	SR, CR, TE
Task Models:	1. SR (DOK 2) **Prompt Features:** The student is prompted to solve a contextual problem (with whole numbers) involving a multiplication or division model. **Stimuli 1:** The student is presented with a problem including an equal group model, drawing, or array requiring the student to find a product or a quotient. **Stimuli 2:** The student is presented with a problem-solving situation (in which an equal group model, drawing, or array can be used) requiring the student to develop their own equal group model, drawing, or array to solve. 1. CR (DOK 2) **Prompt Features:** The student is prompted to generate a model and find the solution to a contextual problem (with whole numbers) using multiplication or division. **Stimuli 1:** The student is presented with a problem including an equal group model, drawing, or array requiring the student to manipulate the model and find a product or a quotient. **Stimuli 2:** The student is presented with a problem-solving

*From Item Specs SC 2

SMARTER
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Mathematics Item Specification
Grade 04

Primary Claim 2: Problem Solving Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.
Secondary Claim(s): Items/tasks written primarily to assess Claim 2 will necessarily involve some Claim 1 content targets. Related Claim 1 targets should be listed below the Claim 2 targets in the item form. If Claim 3 or 4 targets are also directly related to the item/task, list those following the Claim 1 targets in order of prominence.
Primary Content Domain: Each item/task should be classified as having a primary, or dominant, content focus. The content should draw upon the knowledge and skills articulated in the progression of standards leading up to Grade 4.
Secondary Content Domain(s): While tasks developed to assess Claim 2 will have a primary content focus, components of these tasks will likely produce enough evidence for other content domains that a separate listing of these content domains needs to be included where appropriate.
Assessment Targets: Any given item/task should provide evidence for several Claim 2 assessment targets. Each of the following targets should not lead to a separate task: it is in *using* content from different areas, including work studied in earlier grades, that students demonstrate their problem solving proficiency. Multiple targets should be listed in order of prominence as related to the item/task.
Target A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. (DOK 2, 3) Under claim 2, the problems should be completely formulated, and students should be asked to find a solution path from among their readily available tools. **Target B: Select and use appropriate tools strategically. (DOK 1, 2)** Tasks used to assess this target should allow students to find and choose tools; for example, using a "Search" feature to call up a formula (as opposed to including the formula in the item stem) or using a protractor in physical space. **Target C: Interpret results in the context of a situation. (DOK 2)** Tasks used to assess this target should ask students to link their answer(s) back to the problem's context. In early grades, this might include a judgment by the student of whether to express an answer to a division problem using a remainder or not based on the problem's context. In later grades, this might include a rationalization for the domain of a function being limited to positive integers based on a problem's context (e.g., understanding that the number of buses required for a given situation cannot be 32½). **Target D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (DOK 1, 2, 3)** For Claim 2 tasks, this may be a separate target of assessment explicitly asking students to use one or more potential mappings to understand the relationship between quantities. In some cases, item stems might suggest ways of mapping relationships to scaffold a problem for Claim 2 evidence.

Relevant Verbs:	understand (often in conjunction with one or more other relevant verbs), solve, apply, describe, illustrate, interpret, and analyze
DOK target(s):	1, 2, 3
Claim 2 Rationale:	**Mathematical Practice 1: Make sense of problems and persevere in solving them.**

*From Item Specs SC 2

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Mathematics Item Specification
Grade 04

Primary Claim 3: Communicating Reasoning Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.
Secondary Claim(s): Tasks written primarily to assess Claim 3 will necessarily involve Claim 1 content targets. Related Claim 1 targets should be listed below the Claim 3 targets in the item form. If Claim 2 or Claim 4 targets are also directly related to the task, list those following the Claim 1 targets in order of prominence.
Primary Content Domain: Each task should be classified as having a primary, or dominant, content focus. The content should draw upon the knowledge and skills articulated in the progression of standards leading up to Grade 4.
Secondary Content Domain(s): While tasks developed to assess Claim 3 will have a primary content focus, components of these tasks will likely produce enough evidence for other content domains that a separate listing of these content domains needs to be included where appropriate.
Assessment Targets: Any given task should provide evidence for several of the following assessment targets; each of the following targets should not lead to a separate task. Multiple targets should be listed in order of prominence as related to the task.
Target A: Test propositions or conjectures with specific examples. (DOK 2) Tasks used to assess this target should ask for specific examples to support or refute a proposition or conjecture (e.g., An item stem might begin, "Provide 3 examples to show why/how…").
Target B: Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. (DOK 3, 4). Tasks used to assess this target should ask students to develop a chain of reasoning to justify or refute a conjecture. Tasks for Target B might include the types of examples called for in Target A as part of this reasoning, but should do so with a lesser degree of scaffolding than tasks that assess Target A alone. Some tasks for this target will ask students to formulate and justify a conjecture.
Target C: State logical assumptions being used. (DOK 2, 3) Tasks used to assess this target should ask students to use stated assumptions, definitions, and previously established results in developing their reasoning. In some cases, the task may require students to provide missing information by researching or providing a reasoned estimate.
Target D: Use the technique of breaking an argument into cases. (DOK 2, 3) Tasks used to assess this target should ask students to determine under what conditions an argument is true, to determine under what conditions an argument is not true, or both.
Target E: Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is. (DOK 2, 3, 4) Tasks used to assess this target present students with one or more flawed arguments and ask students to choose which (if any) is correct, explain the flaws in reasoning, and/or correct flawed reasoning.

*From Item Specs SC 2

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Mathematics Item Specification
Grade 08

Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: Geometry	
Target B: Understand and apply the Pythagorean Theorem. (DOK 2) Tasks associated with this target will ask students to use the Pythagorean Theorem to solve real-world and mathematical problems in two and three dimensions, including problems that ask students to find the distance between two points in a coordinate system. Some applications of the Pythagorean Theorem will be assessed at deeper levels in Claims 2 and 4. Understanding of the derivation of the Pythagorean Theorem would contribute evidence to Claim 3.	
Standards:	8.G.6, 8.G.7, 8.G.8
Allowable item types*:	SR, CR
DOK target(s):	2
Evidence required:	1. The student explains a proof of the Pythagorean Theorem and its converse. 2. The student applies the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world problems in two and three dimensions. 3. The student applies the Pythagorean Theorem to determine unknown side lengths in right triangles in mathematical problems in two and three dimensions. 4. The student applies the Pythagorean Theorem to find the distance between two points in a coordinate system.
Allowable stimulus materials:	two-dimensional representations of triangles, three-dimensional models that contain right triangles, and coordinate systems.
Allowable disciplinary vocabulary:	Pythagorean Theorem, converse, leg, hypotenuse, right triangle, base, height
Allowable manipulative materials:	calculator
Task Models:	1. SR **Prompt Features:** The student is prompted to explain a proof of the Pythagorean Theorem or its converse by filling in missing parts of the proof. **Stimuli:** The student is presented various parts of the proof of the Pythagorean Theorem or its converse. Depending on the desired complexity, the student may be presented with traditional multiple-choice, multiple blanks to be filled in using one choice bank, multiple blanks to be filled in each with its own choice bank, or multiple-part true/false questions. 1. CR **Prompt Features:** The student is prompted to explain a proof of the Pythagorean Theorem or its converse. The student may also be prompted to explain a proof of the Pythagorean Theorem or its converse by filling in

Performance Task

* From "Item Specifications"

Mathematics Sample PT Form

SMARTER Balanced Assessment Consortium

Sample Item ID:	MAT.04.PT.4.GROCE.A.074
Title:	Grocery Store (GROCE)
Grade:	04
Primary Claim:	**4: Modeling and Data Analysis** Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.
Secondary Claim(s):	1: Conceptual Understanding and Procedural Fluency Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.
Primary Content Domain	**Measurement and Data**
Secondary Content Domain(s):	Number and Operations Operations and Algebraic Thinking
Assessment Target(s):	**A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. (DOK 2, 3) **D:** Interpret results in the context of a situation. (DOK 2, 3) **G:** Identify, analyze and synthesize relevant external resources to pose or solve problems. (DOK 3, 4)
Standard(s):	4.OA.2, 4.OA.3, 4.NBT.4, 4.NBT.5, 4.NBT.6, 4.MD.3,3.NBT.2, 3.MD.1, 3.MD.3, 3.MD.6, 3.MD.7
Mathematical Practice(s):	1, 2, 3, 4, 5, 6, 7, 8
DOK:	3
Item Type:	PT
Score Points:	18
Difficulty:	H
How this task addresses the "sufficient evidence" for this claim:	The student uses concepts of measurement and data, numbers and operations in base ten, and operations and algebraic thinking to accomplish tasks required of a grocery store manager opening a new store. The work is supported by calculations and explanations of reasoning.
Target-specific Attributes (e.g., accessibility issues):	Accommodations may be necessary for students who have fine motor skills challenges and language processing challenges.
Stimulus/Source:	http://web.jjay.cuny.edu/~tflan/documents/101docs/FIS101OccupancyTypesandExits.pdf
Notes:	Multi-part task
Task Overview:	The student assumes the role of a grocery store manager opening a new store. In a group and individually, the student completes tasks that lead up to the opening of the store. The student creates a floor plan by placing shelves, refrigerators, and register areas onto a grid representing the floor of the grocery store. The student also determines store hours, staff schedules, and pricing for items.
Teacher Preparation / Resource Requirements:	Teacher preparation: Up to one week prior to administration of this task, students must be assigned a "pre-work" task that will be used to answer *Part C* of the task. The pre-work should be done as a class activity. In Session 1 of this performance task,

Mathematics Sample PT Form

SMARTER Balanced Assessment Consortium

	Part A will also incorporate group work and will require the teacher to coordinate partner/group work for this part of the task, and then make sure the *Part B* is completed independently. Session 2 will involve using the data that was collected and displayed during the pre-work in order to complete *Part C*, again followed by independent work in *Part D*. Resources: Materials/time to complete survey, blank grid paper to create the bar graph, and Store Layout grid paper (part of the assessment and included at the end of this sample).
Teacher Responsibilities During Administration:	Monitor individual student work; provide resources as necessary.
Time Requirements:	One pre-work session totaling no more than 60 minutes. One "mid-task" section incorporating group work that should total no more than 60 minutes. Two scored sections of the task totaling no more than 120 minutes.

Pre-work:

In preparation for this task, teachers must assign students the following task as a group/class activity at least 3 days prior to the administration of the performance task.

Teacher says: Students, together we must survey at least 30 adults about the times they usually shop in a grocery store. Tonight's assignment is for each of you to ask two adults to answer this question, "What part of the day do you usually shop for groceries? In the morning, afternoon, or evening"? Tomorrow we will collect all of your results and use the data to make a bar graph.

The next day, the teacher needs to facilitate the collection of all the data into a central location (like a white board) for students to be able to access the data in order to construct a bar graph within a smaller group (3-4 students).

Teacher says: Work in your assigned groups to use the information we collected to create a bar graph that displays the number of adults that we surveyed who shop during each of the three parts of the day (morning, afternoon, evening).

The teacher needs to provide grid paper and materials needed to create the bar graphs. A whole class discussion should occur after each group makes their bar graph, and the class should decide on the best display to use after sharing their work. The final "agreed-upon" bar graph will need to be copied and given out to students in order to complete Part *D* of the upcoming performance task. Have copies ready to hand out to each student at the appropriate time.

The Task:

[The first part of this task includes group work. Allowing the teacher/test administrator to read aloud this part of the task and facilitate the group work is desirable, but should be determined after piloting. A floor layout grid paper should be distributed to all students prior to starting the task.]

Performance Task

* From “Item Specifications”

Mathematics Sample PT Form

SMARTER Balanced Assessment Consortium

The Task:

Preparing to Open a New Grocery Store

You are the manager for a new grocery store. The grocery store has been built, but it is not ready to open yet. Before the grocery store can open, the list of tasks below must be completed.

1. The store layout must be planned.
2. The hours the store will be open and closed must be planned.
3. The schedule for employees must be planned.
4. The pricing of different items must be set.

Part A

Store Layout

The floor of the store is a rectangle with a width of 30 yards and a length of 50 yards. The shapes shown below represent the top views of a shelf, a refrigerator, and a register area. These shapes must be arranged on the floor layout. The area not covered by these shapes will be the area customers use to walk around the store.

Each shelf measures 3 yards by 7 yards.

 = Shelf

Each refrigerator measures 3 yards by 9 yards.

 = Refrigerator

Each register area measures 2 yards by 4 yards.

 = Register Area

Contact Information

Harriet Pritchard
hpritcha@ed.sc.gov
803-737-4276