



**Sample Item Teacher Guide**  
**Mathematics**  
**Grades 3–5**



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# About this Guide

This MSAA Sample Item Teacher Guide can help teachers use the newly released sample items as a formative assessment tool, allowing teachers to understand what students may be able to know and do based on the sample items, and how teachers can respond to this information through instruction. The MSAA newly released sample items are intended to be used for several different purposes as outlined in the TAM, including to allow students to practice and become familiar with the testing platform and to ensure students are familiar with the item types and accessibility tools. These guides provide directions for using the sample items in an additional way: as an instructional tool.

## Guide Terminology

The MSAA Sample Item Teacher Guide for each grade band and content area include the following:

- **Sample Item Blueprint Table.** A high-level overview of the items in each set that shows: the standard and learning targets the items align to, item type, and item position
- **Item Information.** Information about item alignment, including learning targets, instructional strategies, and scaffolds and supports
- **Student Item Thumbnail Image.** Item thumbnails are intended to help teachers easily identify the specific items in the guide as they administer the sample items through the online platform utilizing the Directions for Test Administration (DTA).

Item types in the sample item sets include the following:

- **Selected Response**
  - Multiple choice—Students select one answer from two or three possible choices
- **Constructed Response**
  - Constructed response—Students respond to a question by developing an answer rather than selecting an answer from answer options
- **Writing Prompt: ELA**
  - Open-response writing prompt—Students produce a permanent product in response to a prompt; for 2020-2021 released sample items, these will be found in grade 6 only.

## MSAA Sample Item Platform

To access MSAA's Sample Items, go to [www.msaaassessment.org/tap/sample-items](http://www.msaaassessment.org/tap/sample-items).

## Introduction to Formative Assessment

It is important to remember that formative assessment is not a test. It is a process, a practice that is part of instruction. In effective formative instruction, teachers use a variety of methods to determine what students understand and can do and adjust instruction accordingly.

## Formative Assessment Data

Students and teachers are the primary users of formative assessment data. These data have the greatest effect on learning and instruction because feedback for both student and teacher occurs over a very short or nearly instantaneous time period. This allows for adjustments in instruction, reteaching, and additional practice with learning targets to occur.

## How Best to Use the Mathematics Item Sets

The content in this section explains each component of the item sets and how they can best be incorporated into the classroom.

### Mathematics Blueprint Table

The math blueprint table/overview should be used to help select the sample item(s) that will provide the best evidence of student learning. The learning targets differentiate between the type of evidence each item will provide. The item type informs the type of interaction that the student will have to perform to respond to the item.

To obtain evidence of understanding for each grade-level standard, teachers can do the following:

- Access the sample items for the students' grade level.
- Use items individually as the learning targets are covered in class.
- Use the items in small groups to address a series of learning targets that focus on one standard.
- Use the entire sample item set to measure students' understanding of learning targets before, during, or after instruction.
- Review sample item sets from lower grades to build understanding of prerequisite skills for a given standard.
- Review sample item sets from higher grades to know how standard and item information build from the target grade.
- Use the sample items as models to create additional items to assess the standards.

### Next Steps for Formative Mathematics Item Data

After obtaining data that serve as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback.

After feedback is provided to students, educators should consider documenting the instructional modifications and supplementations provided to the students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how best to scaffold that learning. Teachers can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the student.

# **Mathematics Grade 3**

## Grade 3 Sample Item Blueprint

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Geometry	<b>3.GM.1i1</b> Partition rectangles into equal parts with equal area.	<ul style="list-style-type: none"> <li>Understand the concept of equal parts (e.g., fold rectangular pieces of paper into 2 or 4 equal pieces).</li> <li>Partition with concrete objects.</li> <li>Find the rectangle that is the same or match two congruent rectangles.</li> <li>Partition rectangles into two, three, or four equal shares.</li> <li>Understand the following concepts and vocabulary: equal, partition, area, rectangle, halves, thirds, half of, a third of.</li> </ul>	MC	1
Number and Operations Base Ten	<b>3.NO.2c1</b> Solve multi-step addition and subtraction problems up to 100.	<ul style="list-style-type: none"> <li>Use base ten blocks to create sets of objects within 100.</li> <li>Use base ten blocks or other manipulatives to solve one-step addition and subtraction problems.</li> <li>Understand the following concepts, symbols, and vocabulary for: +, −, =.</li> <li>Create a visual representation to solve one-step addition and subtraction problems.</li> </ul>	MC	2
Operations and Algebraic Thinking	<b>3.PRF.2d1</b> Identify multiplication patterns in a real-world setting.	<ul style="list-style-type: none"> <li>Identify that a pattern is formed by repeatedly adding the same number to a set.</li> <li>Add within 100 with calculator and/or manipulatives.</li> <li>Match a pattern using symbols or objects to represent a provided growing multiplication pattern in a real-world setting.</li> <li>Recognize patterns and use words to describe the patterns they see.</li> <li>Understand the following concepts and vocabulary: growing pattern, multiplication, level, increasing/increases, decreasing/decreases, objects or shapes.</li> </ul>	MC	3

\*MC = multiple-choice  
CR = constructed response

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Number and Operations Fractions	<b>3.NO.1I3</b> Identify the fraction that matches the representation (rectangles and circles; halves, fourths, and thirds, eighths).	<ul style="list-style-type: none"> <li>Identify the parts of a region and the whole region when a region is partitioned when item is divided.</li> <li>Count the number of the parts selected (e.g., 3 of the 4 parts; have fraction present but not required to read <math>\frac{3}{4}</math>).</li> <li>Understand how parts of a whole can be expressed as fractions using numbers.</li> <li>Understand a fraction <math>\frac{1}{b}</math> as the quantity formed by 1 part when a whole is partitioned into b equal parts.</li> <li>Recognize that fraction bars of equal lengths can be divided into different numbers of equal parts/units.</li> <li>Understand a fraction <math>\frac{a}{b}</math> as the quantity formed by a parts of size <math>\frac{1}{b}</math>.</li> <li>Ability to recognize that the more equal parts, the smaller the part.</li> <li>Understand the following concepts, symbols, and vocabulary: numerator, denominator, <math>\frac{\_}{\_}</math>.</li> </ul>	MC	4
Measurement and Data	<b>3.DPS.1g1</b> Collect data, organize into picture or bar graph.	<ul style="list-style-type: none"> <li>Identify data set based on a single attribute (e.g., pencils vs. markers).</li> <li>Identify data set with more or less (e.g., this bar represents a set with more).</li> <li>Organize the data into a picture or bar graph using objects that represent one piece of data (may have number symbols).</li> <li>Properly label graph (e.g., axes on bar graph).</li> <li>Identify data set with some number (e.g., bar graph representing 5 pencils).</li> <li>Identify a picture and bar graph.</li> </ul>	MC	5

\*MC = multiple-choice  
CR = constructed response

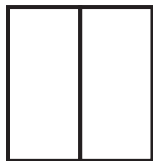


## Sample Item 1

Alignment	Core Content Connector (CCC): 3.GM.1i1 Partition rectangles into equal parts with equal area.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I understand the concept of equal parts.</p> <p>I can partition with concrete objects.</p> <p>I can find the rectangle that is the same or match two congruent rectangles.</p> <p>I can partition rectangles into two, three, or four equal shares.</p> <p>I understand the following concepts and vocabulary: equal, partition, area, rectangle, halves, thirds, half of, a third of.</p>	<ul style="list-style-type: none"> <li>• Match to same</li> <li>• Tiling</li> <li>• Task analysis (measure length, divide by number of parts, mark each equal part)</li> <li>• Multiple exemplars for equal and not equal</li> <li>• Model-Lead-Test</li> <li>• Use physical models and a trial and error approach (e.g., give student the “whole” rectangle, then give student various fractional pieces; students use trial and error with fractional pieces to determine the equal pieces that fit on the “whole”).</li> </ul>	<ul style="list-style-type: none"> <li>• Computer software</li> <li>• Ruler</li> <li>• Calculator</li> <li>• Paper with pre-determined lines (e.g., black lines, perforated lines)</li> <li>• Real-world objects (graham crackers, 2 square-game that can be drawn with chalk on the hard top)</li> <li>• Fraction bars</li> <li>• Geoboards</li> </ul>

### Item 1

This rectangle was divided into two equal parts. Each part is the same shape and size.



Which rectangle has also been divided into two equal parts?



## Sample Item 2

Alignment	Core Content Connector (CCC): 3.NO.2c1 Solve multi-step addition and subtraction problems up to 100.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can use base ten blocks to create sets of objects within 100.</p> <p>I can use base ten blocks or other manipulatives to solve one-step addition and subtraction problems.</p> <p>I understand the following concepts, symbols, and vocabulary for: +, −, =.</p> <p>I can create a visual representation to solve one-step addition and subtraction problems.</p>	<ul style="list-style-type: none"> <li>• Task analysis for each type of problem.</li> <li>• Use counting strategies.</li> <li>• Model problem solving by identifying key words.</li> <li>• Teach explicitly how to regroup to solve addition and subtraction problems.</li> <li>• Teach explicitly the steps of addition and subtraction.</li> <li>• Explicit instruction on vocabulary associated with a decision to add or subtract.</li> </ul>	<ul style="list-style-type: none"> <li>• Addition or subtraction template to fill in the steps of the word problem (___ + ___ = ___)</li> <li>• Calculator</li> <li>• Interactive whiteboards or other technology to manipulate representations</li> <li>• Provide meaningful manipulatives or picture representations with symbols included</li> <li>• Highlighted text that provides important information/vocabulary</li> </ul>

**Item 2**

There were 19 chairs in a classroom. The teacher put 7 chairs in the hallway.

Which equation shows how many chairs were still in the classroom?

A.  $19 - 7 = 12$

B.  $19 - 2 = 17$

C.  $19 + 7 = 26$

## Sample Item 3

Alignment	Core Content Connector (CCC): 3.PRF.2d1 Identify multiplication patterns in a real-world setting.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify that a pattern is formed by repeatedly adding the same number to a set.</p> <p>I can add within 100 with calculator and/or manipulatives.</p> <p>I can match a pattern using symbols or objects to represent a provided growing multiplication pattern in a real-world setting.</p> <p>I can recognize patterns and use words to describe the patterns they see.</p> <p>I understand the following concepts and vocabulary: growing pattern, multiplication, level, increasing/increases, decreasing/decreases, objects or shapes.</p>	<ul style="list-style-type: none"> <li>• Teach explicitly how to count objects in a set and that the last number said tells the number of counted objects.               <ul style="list-style-type: none"> <li>– Present a set of objects for the student to count.</li> <li>– Rearrange the objects and ask the student how many object there are (the student understands cardinality of numbers if s/he states the same number without recounting the objects).</li> </ul> </li> <li>• Teach explicitly how to create a group/row/set of objects for a given number or for a number provided in a simple word problem.</li> <li>• Multiple Exemplar Training               <ul style="list-style-type: none"> <li>– An array/row: “This is a group/row of three apples. This is another group/row of three apples. This is another group/row of three apples. This is one apple. Show me a group/ row of three apples.”</li> </ul> </li> <li>• Example / Nonexample               <ul style="list-style-type: none"> <li>– Present a row of objects (<math>\leq 10</math>). Present a second row of objects that has a different number of objects. Ask the student to select the row with a specified number of objects.</li> <li>– Present three rows of objects (<math>\leq 10</math>), two that are equal and one that is not equal. As the student to match the two rows that both include the same number of specified objects (e.g., a row of three hats, a row of three hats, a row of 5 shoes).</li> </ul> </li> <li>• Use System of Least Prompts to form an array (group/row) given a number:               <ul style="list-style-type: none"> <li>– “Make a row/group of three pencils.” The student responds correctly. “Good work. You made a row/group of three pencils.” OR The student doesn’t respond. Wait 3–5 seconds and provide a gesture prompt by pointing to the pencils, OR The student doesn’t respond. Wait 3–5 seconds and provide a verbal prompt. “Pick up three pencils. Make a group of three pencils.” OR The student makes an error; provide a physical prompt. Take the student’s hand and give him or her three pencils and help them make a row of pencils.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Counters</li> <li>• 2D and 3D shapes or objects, pictures</li> <li>• Number lines</li> <li>• Egg cartons or muffin tins to illustrate/create arrays</li> <li>• Ones blocks to form different rectangles (rows and columns)</li> <li>• Manipulatives, visuals, and Wiki Sticks to illustrate/ define arrays</li> <li>• Raised grid (to keep structure of array) or graph paper</li> <li>• PPT and shape tools to create arrays to match a provided problem</li> <li>• Interactive whiteboard or other technology to create arrays</li> <li>• Examples of repeating patterns in a real-world setting (e.g., in the environment and art)</li> <li>• T-charts for growing patterns</li> <li>• Graphic organizers that illustrate a pattern of sets in which the student places 2D or 3D shapes or colors using addition or multiplication (e.g., +3 growing pattern)               <div style="margin-left: 20px;"> <pre> ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) </pre> </div> </li> <li>• Interactive whiteboard or other technology to model growing patterns</li> </ul>

## Sample Item 3

- Model-Lead-Test (“Watch me make a row of four books. Let’s make a row of four books. Now you try to make a row of four books.”)
- Model-Lead-Test (“Here is a story problem. It says there are seven dogs. Watch me make a set of seven dogs to match the story problem. Let’s make a set of seven dogs together. Now you try to make a set of seven dogs.”); repeat with the other number of object in the story problem.
- Backward chaining: Model setting up a one-step addition word problem using two arrays and ask the student to complete the last step by combining the arrays and/or counting the number of objects in the combined arrays.
- Forward chaining: Present a one step addition or subtraction word problem and ask the student to complete the first step (e.g., Show me a row of four backpacks). Then complete the steps to solve the equation.
- Multiple Exemplar Training or Example/Non-Example Training
  - Growing Pattern: “Here is a growing pattern. Here is a growing pattern. Here is growing pattern. This not a growing pattern. Show me a growing pattern.”
- Ask students to determine if a rule exists for a provided pattern. (A pattern follows a predictable sequence OR there is no predictable sequence in this example, [e.g., no rule can be stated].)
- Model-Lead-Test
  - Teach/model growing addition patterns using 2D shapes or 3D objects as a pattern that increases by the same number in each row of the pattern (e.g., a pattern that grows by +2 would have 1 in the first row, 3 in the second row, 5 in the third row, and 7 in the fourth row).
  - Teach/model a growing multiplication problem using pictures (1 flower, 2 bees; 2 flowers, 4 bees; 3 flowers, 6 bees).
- Task Analysis (Backward Chaining)
  - Provide the first three rows of a growing addition pattern and ask the student to create the fourth row.
  - Using a T-chart, provide the first three parts of the growing pattern and ask the student to create the fourth part of the pattern.

### Item 3

Lightbulbs are sold in packages. This data table shows the total number of lightbulbs in different numbers of packages.

**Lightbulbs**

<b>Number of packages</b>	<b>Total number of lightbulbs</b>
1	4
2	8
3	12
4	?

What is the total number of lightbulbs in 4 packages?

- A. 13
- B. 14
- C. 16

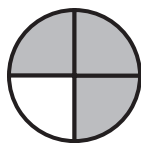
## Sample Item 4

Alignment	Core Content Connector (CCC): 3.NO.1I3 Identify the fraction that matches the representation (rectangles and circles; halves, fourths, and thirds, eighths).	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify the parts of a region and the whole region when a region is partitioned when item is divided.</p> <p>I can count the number of the parts selected.</p> <p>I understand how parts of a whole can be expressed as fractions using numbers.</p> <p>I understand a fraction <math>1/b</math> as the quantity formed by 1 part when a whole is partitioned into <math>b</math> equal parts.</p> <p>I can recognize that fraction bars of equal lengths can be divided into different numbers of equal parts/units.</p> <p>I understand a fraction <math>a/b</math> as the quantity formed by <math>a</math> parts of size <math>1/b</math>.</p> <p>I can recognize that the more equal parts, the smaller the part.</p> <p>I understand the following concepts, symbols, and vocabulary: numerator, denominator, <math>\frac{\_}{\_}</math>.</p>	<ul style="list-style-type: none"> <li>• Before introducing fraction, use fraction bars:               <ul style="list-style-type: none"> <li>– Describe a fraction bar in multiple ways (e.g., present a fraction bar with four parts and two parts shaded red and describe the representation as the color and the number of parts shaded (a red bar with two parts shaded); four parts and two parts shaded (without using color); or two out of four parts are shaded).</li> <li>– Explicitly teach types of fraction bars (whole bars with all parts shaded; whole bars divided into parts with no parts shaded; whole bars with half of the parts shaded).</li> <li>– Explicitly teach that parts out of total parts shaded (e.g., two out of four parts shaded) is the language we use to name the fraction (<math>2/4</math>).</li> </ul> </li> <li>• Teach fractions explicitly as a way to indicate part of a whole.</li> <li>• Teach explicitly that as the numerator increases, there will be more parts.</li> <li>• Multiple Exemplars (e.g., fraction bars and fractions)               <ul style="list-style-type: none"> <li>– Exemplar/Non-exemplar: Here is picture/representation of <math>1/2</math> (present a fraction bar). This is the fraction <math>1/2</math>. This is the fraction <math>1/2</math>. This is not the fraction <math>1/2</math>. Show me a fraction bar that represents <math>1/2</math>.</li> </ul> </li> <li>• Task Analysis               <ul style="list-style-type: none"> <li>– Present a shaded fraction bar with the associated fraction.</li> <li>– State that the number is called a fraction.</li> <li>– State how to determine the fraction (e.g., I have a blue bar with four parts/units. Two of the parts are shaded. The fraction is two over four or two-fourths.</li> <li>– State that for the fraction (e.g., <math>2/4</math>), the denominator means to divide something into “four” equal parts and the numerator “2” indicates two of these parts.</li> <li>– Present the fraction and have the student create/select the associated representation of the fraction.</li> </ul> </li> <li>• Have the student give fraction statements that are true for a provided group of objects. For example, 2 out of 3 or <math>2/3</math> of the pencils are yellow. Show the corresponding fraction.</li> <li>• Provide “hands on” opportunities to create fractions (e.g., salt dough, pies).</li> </ul>	<ul style="list-style-type: none"> <li>• Geoboards</li> <li>• Dot-paper</li> <li>• Cuisenaire rods</li> <li>• Color tiles</li> <li>• Pattern blocks or sets of objects</li> <li>• Pie diagrams</li> <li>• Fraction bars that are ruled into certain fixed partitions</li> <li>• Assistive technology</li> <li>• iPad applications</li> <li>• Objects (e.g., apples) shared equally and matched with a fraction card</li> </ul>



**Item 4**

This fraction circle is divided into equal parts. Some parts are shaded.



What part of the fraction circle is shaded?

- A.  $\frac{1}{4}$
- B.  $\frac{1}{3}$
- C.  $\frac{3}{4}$

## Sample Item 5

Alignment	Core Content Connector (CCC): 3.DPS.1g1 Collect data, organize into picture or bar graph.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify a data set based on a single attribute.</p> <p>I can identify a data set, within a graph, that represents more or less.</p> <p>I can organize the data into a picture or bar graph using objects that represent one piece of data (may have number symbols).</p> <p>I can properly label graph.</p> <p>I can identify a data set with a specific number.</p> <p>I can identify a picture and bar graph.</p>	<ul style="list-style-type: none"> <li>• Task analysis (e.g., decide on your question, create categories, decide on source of data, collect data based on categories, count data sets, organize data, create graph)</li> <li>• Match to same</li> <li>• Graphic organizer to establish sets</li> </ul>	<ul style="list-style-type: none"> <li>• Template (e.g., graphic organizer) or structure for collecting and organizing data</li> <li>• Numbers that physically attach to a graph</li> <li>• Interactive whiteboard</li> <li>• Computer software</li> <li>• Grid paper to construct graph</li> <li>• Pre-made graphs</li> <li>• Assistive technology/voice output device</li> <li>• Self-monitoring task analysis for student independence</li> </ul>

### Item 5


This data table shows how six students voted for their favorite after-school activity.

**Favorite  
After-School  
Activity**

Activity	Number of votes
Biking	3
Drawing	1
Reading	2

This incomplete picture graph can be used to show the same information as the data table.

**Favorite After-School Activity**

Activity	Number of votes
Biking	
Drawing	
Reading	

The data table shows that 3 students voted for biking as their favorite after-school activity.

The picture graph also shows that 3 students voted for biking as their favorite after-school activity.

The data table shows that 1 student voted for drawing as his favorite after-school activity.

The row labeled "Drawing" in the picture graph needs 1 crayon tile.

Use the book tiles to show how many students voted for reading as their favorite after-school activity. You may not need all of the tiles.

- A. The student provided the correct answer.
- B. The student did not provide the correct answer.

# **Mathematics Grade 4**

## Grade 4 Sample Item Blueprint

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Number and Operations Base Ten	<b>4.NO.1j5</b> Use place value to round to any place (i.e., ones, tens, hundreds, thousands).	<ul style="list-style-type: none"> <li>Identify ones, tens, hundreds in bundled sets.</li> <li>Make comparisons between similar/different with concrete representations (e.g., is this set of manipulatives [8 ones] closer to this set [a ten] or this set [a zero])?</li> <li>Recognize that numbers 1–4 are closer to 0 and numbers 6 through 9 are closer to 10.</li> <li>Identify 5 as a number in the middle but know that we round up.</li> <li>Identify pictorial representation of numbers in ones, tens, hundreds blocks.</li> <li>Match vocabulary of ones, tens, hundreds, thousands to digits in a number.</li> </ul>	MC	1
Number and Operations Fractions	<b>4.NO.1n2</b> Compare up to 2 given fractions that have different denominators.	<ul style="list-style-type: none"> <li>Understand the concept of equivalency (what is and what is not equivalent; this may begin with numbers/sets of objects: e.g., <math>3 &gt; 2</math>, <math>1 &lt; 2</math>, <math>10 + 5 = 15</math>).</li> <li>Understand the concept of fraction (part of a whole) (i.e., Describe that the denominator of a fraction represents the number of equal parts within a whole (length unit or region)).</li> <li>Given a visual fraction model (region or number line), write the fraction with the correct numerator and denominator.</li> <li>Determine equivalent fractions (e.g., <math>1/2 = 2/4</math>).</li> </ul>	MC	2
Operations and Algebraic Thinking	<b>4.NO.2d7</b> Determine how many objects go into each group when given the total number of objects and the number of groups where the number in each group or number of groups is not greater than 10.	<ul style="list-style-type: none"> <li>Create an array of objects given a specific number of rows and the total number, place one object in each group/row at a time.</li> <li>Draw an array using the given information.</li> <li>Understand the following concepts, symbols, and vocabulary for: <math>\div</math>, <math>=</math>.</li> </ul>	MC	3

\*MC = multiple-choice  
CR = constructed response

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Measurement and Data	<b>4.ME.1g2</b> Solve word problems using perimeter and area where changes occur to the dimensions of a figure.	<ul style="list-style-type: none"> <li>Decompose a rectilinear figure into rectangles.</li> <li>Identify the perimeter of a rectilinear figure.</li> <li>Identify the area of a rectilinear figure.</li> <li>Understand the following concepts and vocabulary (pictures/symbols): area, perimeter, length, width, side, +, −, ×, ÷.</li> </ul>	MC	4
Geometry	<b>4.GM.1h2</b> Classify two-dimensional shapes based on attributes (# of angles).	<ul style="list-style-type: none"> <li>Identify attributes within a 2-dimensional figure (e.g., rectangles have sides – student identifies sides of rectangle – and angles – student identifies angles in rectangle).</li> <li>Understand concepts and vocabulary: face, edge, corner, side, angle.</li> </ul>	CR	5

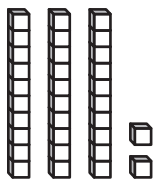
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## Sample Item 1

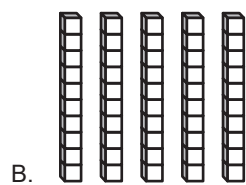
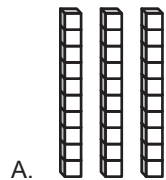
Alignment	Core Content Connector (CCC): 4.NO.1j5 Use place value to round to any place (i.e., ones, tens, hundreds, thousands)	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify ones, tens, hundreds in bundled sets.</p> <p>I can make comparisons between similar/different sets with concrete representations.</p> <p>I recognize that numbers 1-4 are closer to 0 and numbers 6 through 9 are closer to 10.</p> <p>I can identify 5 as a number in the middle but know that we round up.</p> <p>I can identify pictorial representation of numbers in ones, tens, hundreds blocks.</p> <p>I can match vocabulary of ones, tens, hundreds, thousands to digits in a number.</p>	<ul style="list-style-type: none"> <li>• Explicit instruction on rules for rounding using a number line.</li> <li>• Task analysis for rounding (e.g., circle place value, arrow next number, arrow number tells circle number what to do, make decision, enter answer).</li> <li>• Model-Lead-Test (e.g., teacher models and provides guidance to support student learning. As the student learns they develop more independence with the skill or task).</li> </ul>	<ul style="list-style-type: none"> <li>• Number line or number chart</li> <li>• Interactive whiteboards or other technology to manipulate representations</li> <li>• Graphic organizer or place value template</li> <li>• Quantities applied to coin values for a real-world application (e.g., 28¢ rounds up to 30¢)</li> </ul>

## Item 1

This model shows the number 32.



Which model is closer to the number 32?



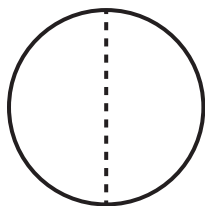


## Sample Item 2

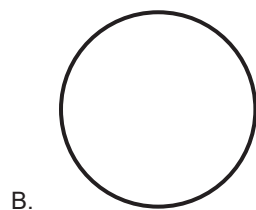
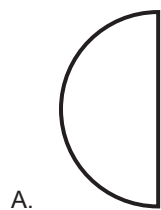
Alignment	Core Content Connector (CCC): 4.NO.1n2 Compare up to 2 given fractions that have different denominators.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I understand the concept of equivalency.</p> <p>I understand the concept of fraction (part of a whole).</p> <p>Given a visual fraction model, I can write the fraction with the correct numerator and denominator.</p> <p>I can determine equivalent fractions.</p>	<ul style="list-style-type: none"> <li>• Compare fractions represented with models (e.g., circle divided in halves and in fourths with <math>\frac{1}{2}</math> and <math>\frac{3}{4}</math> shaded in).</li> <li>• Use rectangles that are the same size for students to partition and represent fractions.</li> <li>• Use sentence strips/paper to generate number lines.</li> </ul>	<ul style="list-style-type: none"> <li>• Assistive technology</li> <li>• Virtual bars or tiles</li> <li>• Pictures that have been divided</li> <li>• Geoboards</li> <li>• Dot-paper</li> <li>• Cuisenaire rods</li> <li>• Color tiles</li> <li>• Pattern blocks or sets of objects</li> <li>• Pie diagrams</li> <li>• Fraction bars that are ruled into certain fixed partitions and lined up for comparisons</li> </ul>

## Item 2

This is a whole circle divided into two equal parts.



Which picture shows part of the circle?



### Sample Item 3

<b>Alignment</b>	<b>Core Content Connector (CCC): 4.NO.2d7</b> Determine how many objects go into each group when given the total number of objects and the number of groups where the number in each group or number of groups is not greater than 10.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can create an array of objects given a specific number of rows and the total number, place one object in each group/row at a time.</p> <p>I can draw an array using the given information.</p> <p>I understand the following concepts, symbols, and vocabulary for: <math>\div</math>, <math>=</math>.</p>	<ul style="list-style-type: none"> <li>• Teach division as the inverse of multiplication.</li> <li>• Teach explicitly the steps for division.</li> <li>• Task analysis (e.g., identify the number of groups, put one object in each group for total number of objects, count one group of objects, write down number, count second group to verify total, write answer).</li> </ul>	<ul style="list-style-type: none"> <li>• Templates or graphic organizers that create arrays</li> <li>• Calculator</li> <li>• Interactive whiteboards or other technology to manipulate representations</li> <li>• Manipulatives that provide context</li> <li>• Structure provided for each group/row</li> </ul>

### Item 3

Sabrina had 27 beads.



Sabrina put the beads into 3 equal groups.

How many beads did Sabrina put into each group?

- A. 4 beads
- B. 9 beads
- C. 14 beads

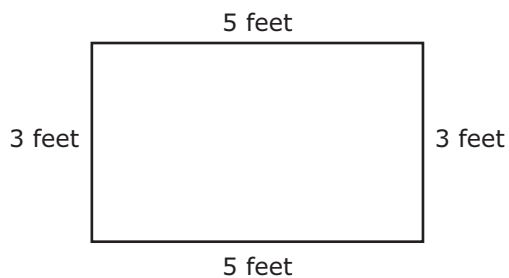
## Sample Item 4

Alignment	Core Content Connector (CCC): 4.ME.1g2 Solve word problems using perimeter and area where changes occur to the dimensions of a figure.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can decompose a rectilinear figure into rectangles.</p> <p>I can identify the perimeter of a rectilinear figure.</p> <p>I can identify the area of a rectilinear figure.</p> <p>I understand the following concepts and vocabulary (pictures/symbols): area, perimeter, length, width, side, +, −, ×, ÷.</p>	<ul style="list-style-type: none"> <li>• Task analysis (solving problems using formulas); isolate each step of the solution process.</li> <li>• Model-Lead-Test (e.g., “Watch me... do together... you try”).</li> <li>• Least-to-Most prompts – increasing support as needed until the student has completed the task appropriately.</li> <li>• Relate a story problem to everyday life/ relevant context.</li> </ul>	<ul style="list-style-type: none"> <li>• Premade formula worksheets</li> <li>• Calculator</li> <li>• Foldable ruler</li> <li>• Conversion charts (inches to feet, feet to yards)</li> <li>• 1-inch tiles</li> <li>• Raised grid with squares numbered</li> <li>• Graph paper or grid paper (virtual or with raised lines, on overhead transparencies, etc.)</li> <li>• Graphic representation of square and rectangle</li> <li>• Interactive whiteboard, PowerPoint, or other visual demonstrating how squares change to rectangles when 2 sides are elongated</li> </ul>

#### Item 4

Perimeter is the distance around a shape.

Alisha had a poster shaped like this rectangle with a length of 5 feet and a width of 3 feet.



What was the perimeter of Alisha's poster in feet?

- A. 8 feet
- B. 15 feet
- C. 16 feet

## Sample Item 5

Alignment	Core Content Connector (CCC): 4.GM.1h2 Classify two--dimensional shapes based on attributes (# of angles).	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify attributes within a 2-dimensional figure (e.g., rectangles have sides – student identifies sides of rectangle – and angles – student identifies angles in rectangle).</p> <p>I understand concepts and vocabulary: face, edge, corner, side, angle.</p>	<ul style="list-style-type: none"> <li>• Match to same</li> <li>• Tiling</li> <li>• Task analysis (identify sides and angles)</li> <li>• Multiple exemplars for equal and not equal</li> </ul>	<ul style="list-style-type: none"> <li>• Computer software</li> <li>• Ruler</li> <li>• Calculator</li> <li>• Paper with pre-determined lines (e.g., black lines, perforated lines)</li> <li>• Real-world objects (e.g., graham crackers, 2 square-game that can be drawn with chalk on the hard top)</li> <li>• Geoboards</li> </ul>

### Item 5

This is a parallelogram. It has 4 angles.



Here are more shapes.



This incomplete chart is for shapes with 4 angles.

Shapes with 4 angles

Look at the number of angles each shape has. Select the shape or shapes with 4 angles and place them onto the chart.

- A. The student provided the correct answer.
- B. The student did not provide the correct answer.



# **Mathematics Grade 5**

## Grade 5 Sample Item Blueprint

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Number and Operations	<b>5.NO.2a5</b> Solve word problems that require multiplication or division.	<ul style="list-style-type: none"> <li>Combine (<math>\times</math>) or decompose (<math>\div</math>) with concrete objects; use counting to get the answers.</li> <li>Match the action of combining with vocabulary (i.e., in all; altogether) or the action of decomposing with vocabulary (i.e., have left; take away) in a word problem.</li> <li>Understand concept of division: sharing or grouping numbers into equal parts.</li> <li>Understand concept of multiplication: the result of making some number of copies of the original.</li> <li>Draw or use a representation of the word problem.</li> <li>Symbols <math>\div</math>, <math>=</math>, <math>\times</math></li> <li>Identify purpose to either find a total (multiplication) or one component (number of sets or number within each set for division), depending upon the problem.</li> <li>Translate wording into numeric equation.</li> </ul>	MC	1
Operations and Algebraic Thinking	<b>5.PRF.2b1</b> Generate or select a comparison between two graphs from a similar situation.	<ul style="list-style-type: none"> <li>Compare two pieces of information provided in a single display.</li> </ul>	MC	2
Measurement and Data	<b>5.ME.1b2</b> Convert standard measurements of length.	<ul style="list-style-type: none"> <li>Recognize that in the same system, I can measure the same object with 2 different units (e.g., I can measure the height of a desk in both inches and feet).</li> <li>Understand the following concepts and vocabulary: conversion, inch, foot, yard.</li> <li>Understand standard units and abbreviations (e.g., feet = ft).</li> </ul>	MC	3

\*MC = multiple-choice  
CR = constructed response

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Number and Operations Fractions	<b>5.NO.2c2</b> Solve word problems involving the addition, subtraction, multiplication, or division of fractions.	<ul style="list-style-type: none"> <li>Understand that the numerator tells the number of parts and the denominator tells the type of parts (e.g., fourths, halves).</li> <li>Identify what actions to take given the context and language used in the problem (e.g., “in all” means we add, “left” means we subtract).</li> <li>Build models to match fractions in a given equation (e.g., <math>\frac{1}{3} + \frac{2}{3} =</math>, student will build model of each fraction).</li> <li>Identify key information in a word problem to represent the total and fraction.</li> <li>Solve fraction problems using: <ul style="list-style-type: none"> <li>Picture</li> <li>Models</li> <li>Representation cards</li> <li>Number sentences</li> <li>Mathematical word problems</li> <li>Graphic representation</li> </ul> </li> <li>Understand the following concepts, symbols and vocabulary: +, −, ×, ÷.</li> </ul>	MC	4
Geometry	<b>5.GM.1c3</b> Use ordered pairs to graph given points.	<ul style="list-style-type: none"> <li>Identify the x- and y-axis.</li> <li>Identify the origin (i.e., point of intersection).</li> <li>Complete concrete graphing of points (e.g., put the straw up on 3 on the x-axis; put the next straw across on 2 on the y-axis. Put a chip there [for 3, 2]).</li> <li>Identify that in an ordered pair, the first coordinate is the location on the x-axis and the second is the location on the y-axis.</li> <li>Representation</li> <li>Understand the following concepts and vocabulary: coordinates, ordered pair, origin, axis, grid, point.</li> </ul>	CR	5

\*MC = multiple-choice  
CR = constructed response

## Sample Item 1

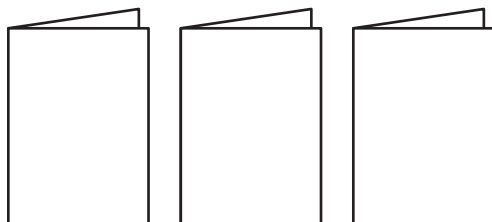
Alignment	Core Content Connector (CCC): 5.NO.2a5 Solve word problems that require multiplication or division.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can combine (<math>\times</math>) or decompose (<math>\div</math>) with concrete objects; use counting to get the answers.</p> <p>I can match the action of combining or the action of decomposing with mathematical vocabulary in a word problem.</p> <p>I understand concept of division: sharing or grouping numbers into equal parts.</p> <p>I understand concept of multiplication: the result of making some number of copies of the original.</p> <p>I can draw or use a representation of the word problem.</p> <p>I understand the symbols <math>\div</math>, <math>=</math>, <math>\times</math>.</p> <p>I can identify purpose to either find a total (multiplication) or one component (number of sets or number within each set for division), depending upon the problem.</p> <p>I can translate wording into numeric equation.</p>	<ul style="list-style-type: none"> <li>• Task analysis for each type of problem</li> <li>• Use counting strategies.</li> <li>• Use number patterns (e.g., skip counting).</li> <li>• Model problem solving by identifying key words.</li> <li>• Teach explicitly how to regroup to solve addition and subtraction problems.</li> <li>• Teach explicitly the steps of multiplication, division (i.e., divide, multiply, subtract, drop down the next digit).</li> <li>• Explicit instruction on vocabulary associated with a decision to multiply or divide</li> </ul>	<ul style="list-style-type: none"> <li>• Multiplication or division template to fill in the steps of the word problem (<math>\underline{\quad} \times \underline{\quad} = \underline{\quad}</math>; a horizontal structure with boxes for regrouping)</li> <li>• Calculator</li> <li>• Interactive whiteboards or other technology to manipulate representations</li> <li>• Meaningful manipulatives or picture representations with symbols included</li> <li>• Highlighted text that provides important information/vocabulary</li> <li>• Multiplication and division tables</li> </ul>

## Item 1

Ella had 6 hearts.

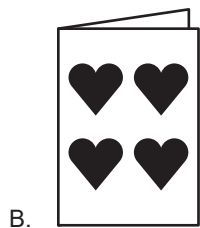
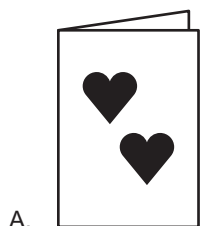


Ella had 3 cards.



Ella put the same number of hearts onto each card.

Which picture shows the number of hearts Ella put onto each card?

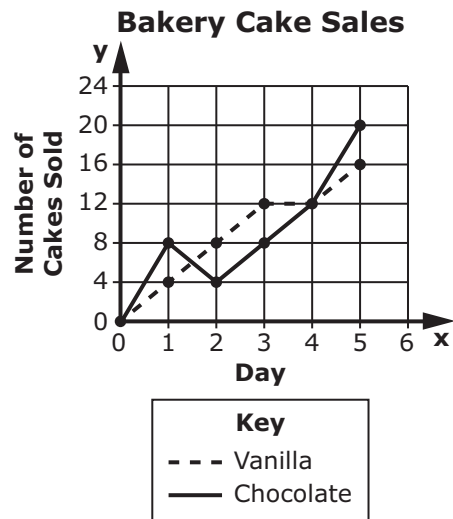


## Sample Item 2

Alignment	Core Content Connector (CCC): 5.PRF.2b1 Generate or select a comparison between two graphs from a similar situation.	
Learning Target(s)	Instructional Strategies	Scaffolds and Supports
I can compare two pieces of information provided in a single display.	<ul style="list-style-type: none"> <li>• Task analysis (e.g., decide on your question, create categories, decide on source of data, collect data based on categories, count data sets, organize data, create graph)</li> <li>• Match to same</li> <li>• Graphic organizer to establish sets</li> </ul>	<ul style="list-style-type: none"> <li>• Template (e.g., graphic organizer) or structure for collecting and organizing data</li> <li>• Numbers that physically attach to a graph</li> <li>• Interactive whiteboard</li> <li>• Computer software</li> <li>• Grid paper to construct graph</li> <li>• Pre-made graphs</li> <li>• Assistive technology/voice output device</li> <li>• Self-monitoring task analysis for student independence</li> </ul>

## Item 2

This graph shows the number of vanilla and chocolate cakes sold at a bakery over 5 days.



On which day were the number of cakes sold equal?

- A. Day 2
- B. Day 4
- C. Day 7

### Sample Item 3

Alignment	Core Content Connector (CCC): 5.ME.1b2 Convert standard measurements of length.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize that in the same system, I can measure the same object with 2 different units.</p> <p>I understand the following concepts and vocabulary: conversion, inch, foot, yard.</p> <p>I understand standard units and abbreviations.</p>	<ul style="list-style-type: none"> <li>• Multiple exemplar training (e.g., “This is an inch, this is an inch... this is not an inch, show me an inch.”)</li> <li>• Task analysis steps to convert from inches to feet using a table</li> <li>• Teach student to use proportions (e.g., 12:1, 12 inches = 1 foot) to convert the same measurement from one unit to another.</li> <li>• Measure length using one inch increments (how many) and one foot increments (how many).</li> <li>• Have students place the U.S. unit cards/ representations in order from smallest to largest.</li> </ul>	<ul style="list-style-type: none"> <li>• Conversion table, adapted or unadapted measuring tools</li> <li>• Calculator</li> <li>• Counting blocks or manipulatives</li> <li>• Counting mechanism (e.g., number line)</li> <li>• Measuring tools that match to unit (e.g., “Identify the tool to measure inches”)</li> <li>• Software</li> <li>• Rulers with limited measurement (e.g., only 1-inch and 1/2-inch tabs)</li> </ul>

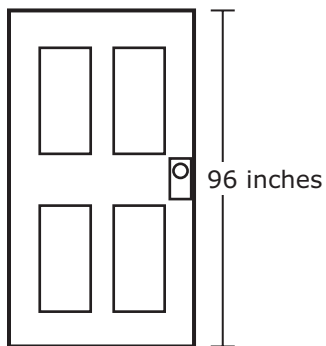


### Item 3

There are 12 inches in 1 foot.

$$12 \text{ inches} = 1 \text{ foot}$$

This door has a height of 96 inches.



What is the height of this door in feet?

- A. 7 feet
- B. 8 feet
- C. 9 feet

## Sample Item 4

Alignment	Core Content Connector (CCC): 5.NO.2c2 Solve word problems involving the addition, subtraction, multiplication, or division of fractions.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I understand that the numerator tells the number of parts and the denominator tells the type of parts.</p> <p>I can identify what actions to take given the context and language used in a word problem).</p> <p>I can build models to match fractions in a given equation or expression.</p> <p>I can identify key information in a word problem to represent the total and fraction.</p> <p>I can solve fraction problems using: pictures, models, representation cards, number sentences, word problems, graphic representation.</p> <p>I understand the following concepts, symbols and vocabulary: +, −, ×, ÷.</p>	<ul style="list-style-type: none"> <li>• Teach explicitly how to express a verbal description of a fraction (“one-fourth” as <math>\frac{1}{4}</math>).</li> <li>• Task analysis:               <ul style="list-style-type: none"> <li>– Highlight/circle important words.</li> <li>– Choose the correct operation (+, −, ×, ÷).</li> <li>– Compute the answer.</li> <li>– State the answer.</li> </ul> </li> <li>• Teach explicitly how to represent the total number of objects in a word problem as an array by creating sets based on the denominator of the provided fraction in a word problem (e.g., <math>\frac{1}{2}</math> of the 20 students would be a group of 20 objects shown as two arrays of 10 each).</li> <li>• Teach explicitly how to use a number line/ conversion tables to solve a word problem.</li> <li>• Use Model-Lead-Test.</li> <li>• Give students problems to model such as these: Charlene ate <math>\frac{1}{4}</math> of the sandwich at breakfast and <math>\frac{2}{4}</math> of the sandwich at lunch. How much of the sandwich did she eat?</li> </ul>	<ul style="list-style-type: none"> <li>• Arrays that represent the denominator as sets</li> <li>• Number line</li> <li>• Objects to represent arrays and perform operation</li> <li>• Rectangular blocks engraved with dots (can be used to teach students who have visual impairment)</li> <li>• Fraction strips</li> <li>• Assistive technology</li> <li>• Adapted text for word problems</li> </ul>

**Item 4**

Marta had 7 squares. Each square had a height of  $\frac{3}{8}$  of an inch.

This picture shows how Marta glued all of her squares together.



What was the height of all 7 squares, in inches, after Marta glued them together?

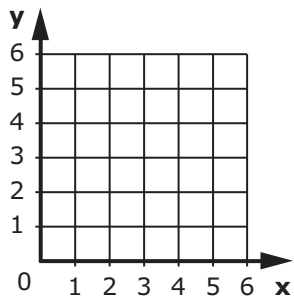
- A.  $\frac{21}{8}$  inches
- B.  $\frac{39}{8}$  inches
- C.  $\frac{59}{8}$  inches

## Sample Item 5

Alignment	Core Content Connector (CCC): 5.GM.1c3 Use ordered pairs to graph given points.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify the x- and y-axis.</p> <p>I can identify the origin.</p> <p>I can complete concrete graphing of points.</p> <p>I can identify that in an ordered pair, the first coordinate is the location on the x-axis and the second is the location on the y-axis.</p> <p>I understand the following concepts and vocabulary: coordinates, ordered pair, origin, axis, grid, point.</p>	<ul style="list-style-type: none"> <li>• Task analysis: Identify number to be plotted on x-axis, plot, identify number to be plotted on the y-axis, plot.</li> <li>• Use games such as “Battleship” to practice graphing.</li> <li>• Use a grid on the floor and have students move to coordinates.</li> <li>• Make a treasure hunt with ordered pairs.</li> <li>• Use ordered pairs that create a picture when graphed.</li> </ul>	<ul style="list-style-type: none"> <li>• Grid paper</li> <li>• Models</li> <li>• Graphic organizer</li> <li>• Computer websites</li> <li>• Raised graph paper</li> <li>• Raised coordinate plane with raised x- and y-axis and raised horizontal and vertical lines</li> <li>• Visual representation of task analysis</li> <li>• Maps of local and/or well-known cities</li> <li>• Maps of school or classroom</li> </ul>

### Item 5

This is a coordinate grid and a small object.



This is an ordered pair.

$(3, 4)$

Use the small object to plot the point  $(3, 4)$  on the coordinate grid.

- A. The student provided the correct answer.
- B. The student did not provide the correct answer.





**Sample Item Teacher Guide**  
**Mathematics**  
**Grades 6–7**





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# About this Guide

This MSAA Sample Item Teacher Guide can help teachers use the newly released sample items as a formative assessment tool, allowing teachers to understand what students may be able to know and do based on the sample items, and how teachers can respond to this information through instruction. The MSAA newly released sample items are intended to be used for several different purposes, as outlined in the TAM, including to allow students to practice and become familiar with the testing platform and to ensure students are familiar with the item types and accessibility tools. These guides provide directions for using the sample items in an additional way: as an instructional tool.

## Guide Terminology

The MSAA Sample Item Teacher Guide for each grade band and content area include the following:

- **Sample Item Blueprint Table.** A high-level overview of the items in each set that shows the standard and learning targets the items align to, item type, and item position.
- **Item Information.** Information about item alignment, including learning targets, instructional strategies, and scaffolds and supports.
- **Student Item Thumbnail Image.** Item thumbnails are intended to help teachers easily identify the specific items in the guide as they administer the sample items through the online platform utilizing the Directions for Test Administration (DTA).

Item types in the sample item sets include the following:

- **Selected Response**
  - Multiple choice—Students select one answer from two or three possible choices
- **Constructed Response**
  - Constructed response—Students respond to a question by developing an answer rather than selecting an answer from answer options
- **Writing Prompt: ELA**
  - Open-response writing prompt—Students produce a permanent product in response to a prompt; for 2020–2021 released sample items, these will be found in grade 6 only.

## MSAA Sample Item Platform

To access MSAA's Sample Items, go to [www.msaaassessment.org/tap/sample-items](http://www.msaaassessment.org/tap/sample-items).

## Introduction to Formative Assessment

It is important to remember that formative assessment is not a test. It is a process, a practice that is part of instruction. In effective formative instruction, teachers use a variety of methods to determine what students understand and can do and adjust instruction accordingly.

## Formative Assessment Data

Students and teachers are the primary users of formative assessment data. These data have the greatest effect on learning and instruction because feedback for both student and teacher occurs over a very short or nearly instantaneous time period. This allows for adjustments in instruction, reteaching, and additional practice with learning targets to occur.

## How Best to Use the Mathematics Item Sets

The content in this section explains each component of the item sets and how they can best be incorporated into the classroom.

### Mathematics Blueprint Table

The math blueprint table/overview should be used to help select the sample item(s) that will provide the best evidence of student learning. The learning targets differentiate between the type of evidence each item will provide. The item type informs the type of interaction that the student will have to perform to respond to the item.

To obtain evidence of understanding for each grade-level standard, teachers can do the following:

- Access the sample items for the students' grade level.
- Use items individually as the learning targets are covered in class.
- Use the items in small groups to address a series of learning targets that focus on one standard.
- Use the entire sample item set to measure students' understanding of learning targets before, during, or after instruction.
- Review sample item sets from lower grades to build understanding of prerequisite skills for a given standard.
- Review sample item sets from higher grades to know how standard and item information build from the target grade.
- Use the sample items as models to create additional items to assess the standards.

### Next Steps for Formative Mathematics Item Data

After obtaining data that serve as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback.

After feedback is provided to students, educators should consider documenting the instructional modifications and supplementations provided to the students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how best to scaffold that learning. Teachers can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the student.

# **Mathematics Grade 6**

## Grade 6 Sample Item Blueprint

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Expressions and Equations	<b>6.NO.2a6</b> Solve problems or word problems using up to three-digit numbers and any of the four operations	<ul style="list-style-type: none"> <li>Recognize the intended outcome of a word problem without an operation.</li> <li>Combine (+) or decompose (–) with concrete objects; use counting to get the answers.</li> <li>Combine (×) or decompose (÷) with concrete objects; use counting to get the answers.</li> <li>Match the action of combining with vocabulary (e.g., in all; altogether) or the action of decomposing with vocabulary (e.g., have left; take away, difference) in a word problem.</li> <li>Match the action of combining with vocabulary (e.g., in all; altogether) or the action of decomposing with vocabulary (e.g., have left; take away) in a word problem. Understand that division is sharing or grouping numbers into equal parts, and multiplication is the result of making some number of copies of the original.</li> <li>Draw or use a representation of the word problem.</li> <li>Understand symbols +, –, ÷, =, and ×.</li> <li>Identifying purpose to find either a total (sum for addition or product for multiplication), remaining amount (difference for subtraction), or one component (number of sets or number within each set-dividend or divisor for division), depending on the words in the problem.</li> <li>Translate wording into numeric equation.</li> </ul>	MC	1
Geometry	<b>6.GM.1d1</b> Find the area of quadrilaterals	<ul style="list-style-type: none"> <li>Use square tiles to cover a rectangle.</li> <li>Count the number of tiles to determine the area.</li> <li>Use formula to find area.</li> <li>Understand the following concepts and vocabulary: base, height, area, quadrilateral.</li> </ul>	MC	2

\*MC = multiple-choice  
CR = constructed response

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Statistics and Probability	<b>6.DPS.1d3</b> Select statement that matches mean, mode, median, and spread of data for 1 measure of central tendency for a given data set.	<ul style="list-style-type: none"> <li>Identify the lowest to highest value in a data set given a number line and matching symbols.</li> <li>Arrange data from lowest to highest.</li> <li>Identify the median.</li> <li>Identify the representation (plastic snap cubes, wiki sticks) of the mode.</li> <li>Use concrete materials to produce the mean (leveled plastic snap cubes).</li> <li>Identify the mode and the spread of the data using a line drawing of the distribution.</li> <li>Calculate the mean using pre-slugged template of data points.</li> <li>Understand the following concepts and vocabulary: mean, mode, and spread of data.</li> </ul>	MC	3
Ratio and Proportion	<b>6.ME.2a2</b> Solve one-step real world measurement problems involving unit rates with ratios of whole numbers when given the unit rate (3 inches of snow falls per hour, how much in 6 hours)	<ul style="list-style-type: none"> <li>Multiply using concrete objects.</li> <li>Divide using concrete objects.</li> <li>Use a ratio to solve a measurement conversion problem.</li> <li>Multiply whole numbers.</li> <li>Divide whole numbers.</li> <li>Use a pictorial representation of a ratio to solve problem.</li> </ul>	MC	4
The Number System	<b>6.NO.1d4</b> Select the appropriate meaning of a negative number in a real world situation	<ul style="list-style-type: none"> <li>Describe negative numbers as numbers less than zero.</li> <li>Understand less/same/more in context (e.g., temperature, ground level).</li> <li>Select pictorial representations of less than 0 in a real-world context.</li> </ul>	CR	5

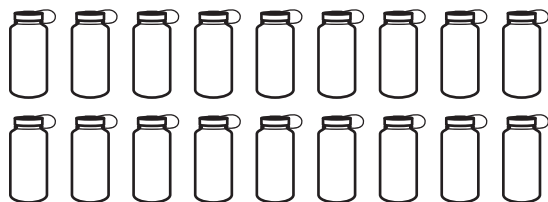
\*MC = multiple-choice  
CR = constructed response

## Sample Item 1

Alignment	Core Content Connector (CCC): 6.NO.2a6 Solve problems or word problems using up to three digit numbers and any of the four operations.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize the intended outcome of a word problem without an operation.</p> <p>I can combine (+) or decompose (–) with concrete objects; use counting to get the answers.</p> <p>I can combine (×) or decompose (÷) with concrete objects; use counting to get the answers.</p> <p>I can match the action of combining with vocabulary or the action of decomposing with vocabulary in a word problem.</p> <p>I can match the action of combining with vocabulary or the action of decomposing with vocabulary in a word problem.</p> <p>I understand that division is sharing or grouping numbers into equal parts and multiplication is the result of making some number of copies of the original.</p> <p>I can draw or use a representation of the word problem.</p> <p>I understand symbols +, –, ÷, =, and ×.</p> <p>I can identify a purpose to find a total (sum for addition or product for multiplication), remaining amount (difference for subtraction), or one component (number of sets or number within each set-dividend or divisor for division), depending on the words in the problem.</p> <p>I can translate wording into numeric equation.</p>	<ul style="list-style-type: none"> <li>• Task analysis for each type of problem</li> <li>• Use counting strategies.</li> <li>• Use number patterns (e.g., skip counting).</li> <li>• Modeling problem solving, identifying key words</li> <li>• Explicit teaching of borrowing and regrouping</li> <li>• Explicit teaching of carrying to the next place value</li> <li>• Explicit teaching of steps of multiplication, division, or long division (i.e., divide, multiply, subtract, drop down the next digit)</li> </ul>	<ul style="list-style-type: none"> <li>• Operation template to fill in the steps of the word problem  <math>(\quad \times \quad = \quad;</math>  <math>(\quad + \quad = \quad;</math>            a horizontal structure with boxes for carrying/regrouping)</li> <li>• Calculator</li> <li>• Interactive whiteboards or other technology to manipulate representations</li> <li>• Manipulatives or picture representations with symbols included</li> <li>• Highlighted text that provides important information/vocabulary</li> </ul>

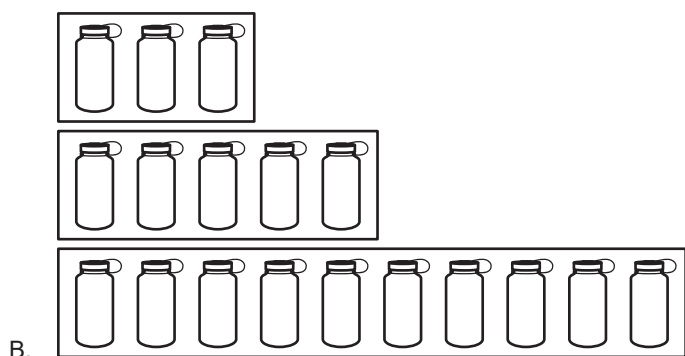
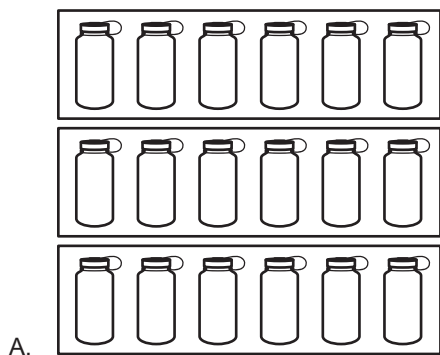
## Item 1

Mrs. Whitaker had 18 water bottles.



Mrs. Whitaker divided the water bottles into 3 equal groups.

Which picture shows the water bottles divided into 3 equal groups?





## Sample Item 2

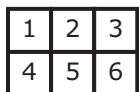
Alignment	Core Content Connector (CCC): 6.GM.1d1 Find the area of quadrilaterals.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can use square tiles to cover a rectangle.</p> <p>I can count the number of tiles to determine the area.</p> <p>I can use a formula to find area.</p> <p>I understand the following concepts and vocabulary: base, height, area, and quadrilateral.</p>	<ul style="list-style-type: none"> <li>• Explicit instruction on using formula to find area</li> <li>• Task analysis: Measure the length, put number in formula, measure height, put number in formula, use calculator to compute area</li> </ul>	<ul style="list-style-type: none"> <li>• Calculator</li> <li>• Template with formula</li> <li>• Ruler</li> <li>• Labeled figure (with numbers)</li> <li>• Grid or dot paper</li> <li>• iPad/iTouch Geo Board apps</li> <li>• 1x1 squares</li> <li>• Tiling with unit squares of the appropriate unit fraction side lengths:</li> </ul> <div data-bbox="1133 905 1349 953" data-label="Image"> </div> <ul style="list-style-type: none"> <li>• Geo Board</li> </ul> <div data-bbox="1133 1041 1349 1262" data-label="Image"> </div>

## Item 2

The area of a rectangle is the space inside the rectangle. This rectangle has been divided into unit squares.



You can count the number of unit squares inside a rectangle to find its area.



There are 6 unit squares inside the rectangle, so the area is 6 square units. This is a different rectangle that has been divided into unit squares.



What is the area of this rectangle in square units?

- A. 3 square units
- B. 10 square units

### Sample Item 3

Alignment	Core Content Connector (CCC): 6.DPS.1d3 Select statement that matches mean, mode, median, and spread of data for 1 measure of central tendency for a given data set.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify the lowest to highest value in a data set given a number line and matching symbols.</p> <p>I can arrange data from lowest to highest.</p> <p>I can identify the median.</p> <p>I can identify the representation of the mode.</p> <p>I can use concrete materials to produce the mean.</p> <p>I can identify the mode and the spread of the data using a line drawing of the distribution.</p> <p>I can calculate the mean using pre-slugged template of data points.</p> <p>I understand the following concepts and vocabulary: mean, mode, and spread of data.</p>	<ul style="list-style-type: none"> <li>• Task analysis using template (e.g., steps to find the mean)</li> <li>• Task analysis for the spread of the data</li> <li>• Explicit teaching of the definitions of mean, mode, and spread of data</li> <li>• Leveling the bars to find the mean (e.g., Given 6 groups of various numbers of cubes, students level the bars into 6 equal groups. The number within each group is the mean.)</li> </ul>	<ul style="list-style-type: none"> <li>• Calculator</li> <li>• Graphic organizer for mode</li> <li>• Raised line around the distribution of the data (e.g., wiki sticks)</li> <li>• Template for finding mean</li> <li>• Pre-slugged template</li> <li>• Interactive whiteboard</li> <li>• Computer software</li> <li>• Self-monitoring task analysis for student independence</li> </ul>

### Item 3

The mean is the average of a set of data.

This list shows the number of cups of water 5 students drank.

4, 5, 6, 7, 8

To find the mean, first add together the numbers.

$$4 + 5 + 6 + 7 + 8 = 30$$

The total number of cups of water these students drank was 30.

The last step to find the mean is to divide the total number of cups of water by the number of students.

$$30 \div 5 = 6$$

The mean number of cups of water students drank was 6.

This is a different list that shows the number of cups of juice 7 students drank.

1, 1, 1, 2, 2, 3, 4

The total number of cups of juice these students drank was 14.

The last step to find the mean is to divide the total number of cups of juice by the number of students.

Which equation shows the last step to find the mean number of cups of juice students drank?

A.  $14 \div 2 = 7$

B.  $14 \div 7 = 2$

C.  $14 + 7 = 21$

## Sample Item 4

Alignment	Core Content Connector (CCC): 6.ME.2a2 Solve real world measurement problems involving unit rates with ratios of whole numbers when given the unit rate (3 inches of snow falls per hour, how much in 6 hours).	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can multiply using concrete objects.</p> <p>I can divide using concrete objects.</p> <p>I can use a ratio to solve a measurement conversion problem.</p> <p>I can multiply whole numbers.</p> <p>I can divide whole numbers.</p> <p>I can use a pictorial representation of a ratio to solve problem.</p>	<ul style="list-style-type: none"> <li>• Task analysis for problem solving (formula)</li> <li>• Provide a calendar. The teacher says there are seven days in one week and counts out each day (1–7) and points to the calendar. Say, “Show me one week.” Say, “There are seven days in one week for a ratio of 7:1 (days:week). So, how many days are in three weeks?”</li> <li>• Rates such as miles per hour, ounces per gallon, and students per bus should be reinforced. Using ratio tables develops the concept of proportion. Compare equivalent ratios; present real-life problems involving measurement units that need to be converted; represent measurement conversions with models such as ratio tables, T-charts, or double number line diagrams.</li> </ul>	<ul style="list-style-type: none"> <li>• Premade function table</li> <li>• Conversion chart</li> <li>• Calendar</li> <li>• Calculator</li> <li>• Counters and graphic representation of ratios</li> </ul>

#### Item 4

Lee painted 4 equal-sized walls in 12 hours.

$$4 : 12$$

Lee painted each wall at the same rate.

How long did it take Lee to paint 1 wall?

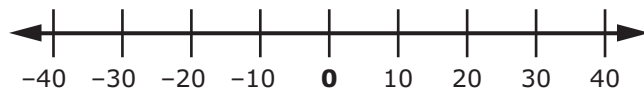
- A. 3 hours
- B. 4 hours
- C. 8 hours

## Sample Item 5

Alignment	Core Content Connector (CCC): 6.NO.1d4 Select the appropriate meaning of a negative number in a real world situation.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can describe negative numbers as numbers less than zero.</p> <p>I understand less/same/more in context of temperature, ground level, sea level.</p> <p>I can select pictorial representations of less than 0 in a real-world context.</p>	<ul style="list-style-type: none"> <li>Teach using real-world context: Use a poster and paint a tree with roots, a thermometer, or a boat on the ocean, with water and fish below. Use stories to talk about above and below ground/water level or freezing and the meaning of a negative value. Then introduce a number line and teach, beginning with zero. Numbers increase in value to the right and decrease in value to the left, becoming negative when to the left of zero.               <ul style="list-style-type: none"> <li>Other real-world activities: credit and debit examples, temperature, calories, supply/demand</li> </ul> </li> <li>Model the thinking within context (e.g., tug of war—could do it physically or on computer with number line, temperature, above/below sea level).</li> </ul>	<ul style="list-style-type: none"> <li>Visual template with vertical or horizontal number lines on the picture (e.g., Build a pool. Dig a 6-foot hole: Ground level would be 0, bottom of hole -6.)</li> <li>Interactive whiteboards or other technology to manipulate representations</li> </ul>

### Item 5

This number line shows positive and negative numbers.



The numbers to the right of 0 are positive.

The numbers to the left of 0 are negative.

The students in a class played a game. For incorrect answers, they lost points. Martin's final score was less than 0 points in the game.

Use the small object to show a point on the number line that could represent Martin's final score.

- A. The student provided the correct answer.
- B. The student did not provide the correct answer.



# **Mathematics Grade 7**

## Grade 7 Sample Item Blueprint

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
<b>Ratio and Proportion</b>	<b>7.NO.2f2</b> Determine if two quantities are in a proportional relationship using a table of equivalent ratios or points graphed on a coordinate plane. Analyze provided information (e.g., a graph or table) to describe the relationship between two quantities.	<ul style="list-style-type: none"> <li>Recognize the meaning of the placement of numbers in a proportion for a given situation.</li> <li>Represent the proportion of a subgroup of objects (e.g., red hats) to the total number of objects (red and green hats).</li> <li>Use a table with visuals or objects to represent proportions to determine whether two numbers (e.g., 10:1) are the same proportional relationship as previous numbers (e.g., 2:1, 4:2).</li> <li>Understand the following vocabulary: ratio (e.g., 2:1, 1:1), equivalent, coordinate plane.</li> </ul>	MC	1
<b>The Number System</b>	<b>7.NO.2i1</b> Solve multiplication problems with positive/negative numbers	<ul style="list-style-type: none"> <li>Divide an array of objects into groups to model the role of equal groups in a multiplication situation.</li> <li>Create an array of objects for the mathematical equation and match answer symbol (+ or -) following multiplication rules for an equation.</li> <li>Create pictorial array for the mathematical equation and match answer symbol (+ or -) following multiplication rules for an equation.</li> <li>Understand the following concepts, symbols, and vocabulary: positive number, negative number.</li> </ul>	MC	2
<b>Expressions and Equations</b>	<b>7.PRF.1g2</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities	<ul style="list-style-type: none"> <li>Identify situation in which quantities are equal or unequal.</li> <li>Record/replace a variable in an equation with a fact from a story on a graphic organizer.</li> <li>Create a pictorial array of a simple equation to translate wording.</li> <li>Understand the following concepts, vocabulary, and symbols: +, −, ×, ÷, =, ≠, &lt;, &gt;, equation, equal, and inequality.</li> </ul>	MC	3

\*MC = multiple-choice

CR = constructed response

Domain	Standard (Core Content Connectors)	Learning Targets	Item Type*	Item Position
Geometry	<b>7.ME.2d1</b> Apply formula to measure area and circumference of circles	<ul style="list-style-type: none"> <li>Identify the radius and diameter of a circle.</li> <li>Multiply decimals and whole numbers.</li> <li>Recognize the meaning of terms used in formulas as labeled representations related to circles.</li> <li>Understand the following concepts and vocabulary: circumference, area, pi, and radius.</li> </ul>	MC	4
Statistics and Probability	<b>7.DPS.1k1</b> Analyze graphs to determine or select appropriate comparative inferences about two samples or populations	<ul style="list-style-type: none"> <li>Understand basic information from simple graphs (e.g., interpret a bar graph using the understanding that the taller column on a graph has a higher frequency, the shorter column on a graph has a lower frequency).</li> <li>Identify a representation of two bar graphs (one category apiece) as having greater or less frequency of members/ events related to a single variable (e.g., compare number of boys in soccer to girls in two graphs).</li> <li>Make a comparison between two graphs.</li> <li>Identify a pictorial representation of two bar graphs (one category apiece) as having greater or less frequency of members/events related to a single variable (e.g., compare number of boys in soccer to girls in two graphs).</li> <li>Understand the concept, symbols, and vocabulary for: more, less, higher, and lower.</li> </ul>	CR	5

\*MC = multiple-choice  
CR = constructed response

## Sample Item 1

Alignment	<b>Core Content Connector (CCC): 7.NO.2f2</b> Determine if two quantities are in a proportional relationship using a table of equivalent ratios or points graphed on a coordinate plane. Analyze provided information (e.g., a graph or table) to describe the relationship between two quantities.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize the meaning of the placement of numbers in a proportion for a given situation.</p> <p>I can represent the proportion of a subgroup of objects to the total number of objects.</p> <p>I can use a table with visuals or objects to represent proportions to determine whether two numbers (e.g., 10:1) are the same proportional relationship as previous numbers (e.g., 2:1, 4:2).</p> <p>I know the following vocabulary: ratio, equivalent, and coordinate plane.</p>	<ul style="list-style-type: none"> <li>• Use counters or objects to demonstrate a proportion.</li> <li>• Generate a graph of values that are proportional.</li> <li>• Teach skill using a variety of context (e.g., measurement, prices, pizza slices per person).</li> </ul>	<ul style="list-style-type: none"> <li>• Calculator</li> <li>• Assistive technology</li> <li>• Interactive whiteboard</li> <li>• Computer software</li> <li>• Real-world/meaningful context</li> </ul>

### Item 1

This tally chart shows the number of coins Charlie had in his pocket.

**Coins in  
Charlie's Pocket**

Coin	Number of coins
Nickel	
Penny	<del>    </del>

Which coin did Charlie have more of?

- A. nickel
- B. penny

## Sample Item 2

Alignment	Core Content Connector (CCC): 7.NO.2i1 Solve multiplication problems with positive/negative numbers.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can create an array of objects into groups to model the role of equal groups in a multiplication situation.</p> <p>I can create an array of objects for the mathematical equation and match answer symbol (+ or -) following multiplication rules for an equation.</p> <p>I can create pictorial array for the mathematical equation and match answer symbol (+ or -) following multiplication rules for an equation.</p> <p>I understand the following concepts, symbols, and vocabulary: positive number and negative number.</p>	<ul style="list-style-type: none"> <li>• Explicit rules for multiplying positive and negative numbers (e.g., signs are same, product is positive; signs are different, product is negative)</li> <li>• Explicit instruction on multiplication</li> <li>• Task analysis (e.g., steps to solve multiplication problem and then add steps to review signs, apply rule, and select answer)</li> </ul>	<ul style="list-style-type: none"> <li>• Number line</li> <li>• Calculator</li> <li>• Cheat sheet of rules</li> <li>• Graphic organizer</li> <li>• Assistive technology</li> <li>• Manipulatives</li> <li>• Interactive whiteboard technology</li> </ul>

## Item 2

When a negative number is multiplied by a negative number, the answer is always a positive number.

$$(-) \times (-) = (+)$$

This is a multiplication problem.

$$(-3) \times (-7) = (\underline{\quad})$$

Start by multiplying 3 by 7 to solve this problem. The answer is 21. Then look at the symbols before the numbers 3 and 7. The answer is positive since both numbers have negative symbols.

$$(-3) \times (-7) = (+21)$$

This is a different multiplication problem.

$$(-9) \times (-4) = (\underline{\quad})$$

What does  $(-9) \times (-4)$  equal?

- A. **-36**
- B. **-13**
- C. **+36**

## Sample Item 3

Alignment	Core Content Connector (CCC): 7.PRF.1g2 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify situations in which quantities are equal or unequal.</p> <p>I can record/replace a variable in an equation with a fact from a story on a graphic organizer.</p> <p>I can create a pictorial array of a simple equation to translate wording.</p> <p>I understand the following concepts, vocabulary, and symbols: +, −, ×, ÷, =, ≠, &lt;, &gt;, equation, equal, and inequality.</p>	<ul style="list-style-type: none"> <li>• Explicitly teach equality vs. inequality.</li> <li>• Explicitly teach strategies for determining the operation required to solve a single step real-world problem.</li> <li>• Task analysis               <ul style="list-style-type: none"> <li>– Read a story problem that is personally relevant to the student.</li> <li>– Identify what question is being asked (define <b>x</b>).</li> <li>– Identify the facts and the operation (+, −, ×, ÷) in the story.</li> <li>– Provide graphic organizer or template to organize the facts and write.</li> <li>– Write an equation to solve for <b>x</b>.</li> <li>– Add, subtract, multiply, or divide the number/value to both sides of the equation.</li> <li>– Solve the equation for <b>x</b>.</li> <li>– Show the answer as <b>x</b> = ____.</li> </ul> </li> <li>• Explicit teaching of how to identify what question is being asked (e.g., what <b>x</b> represents in the story problem).</li> <li>• Provide an equation for which the student will determine a story problem.</li> <li>• Create a personally relevant story; provide graphic organizers as a means for organizing students' work; task analytic instruction to break down skills and chain them in order to isolate each step in solving the math task.</li> <li>• Adding and subtracting strategies</li> <li>• Multiplying and dividing strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Counters</li> <li>• Number lines</li> <li>• Multiplication tables</li> <li>• Calculator</li> <li>• Interactive whiteboard</li> </ul>



### Item 3

A variable is a letter or symbol that stands for an unknown quantity.

Andy had 45 books. He had 30 novels. The rest of the books were comic books.

This equation can be used to figure out how many comic books Andy had.

$$30 = 45 - c$$

The variable **c** in this equation stands for the number of comic books Andy had.

How many comic books did Andy have?

- A. 15 comic books
- B. 30 comic books
- C. 75 comic books

## Sample Item 4

Alignment	Core Content Connector (CCC): 7.ME.2d1 Apply formula to measure area and circumference of circles.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify the radius and diameter of a circle.</p> <p>I can multiply decimals and whole numbers.</p> <p>I can recognize the meaning of terms used in formulas as labeled representations related to circles.</p> <p>I understand the following concepts and vocabulary: circumference, area, pi, and radius.</p>	<ul style="list-style-type: none"> <li>• Task analysis with formula</li> <li>• Say, "Here is a circle. Here is the circumference." Trace the circumference with your finger. Direct the student, "Show me circumference."</li> <li>• Use picture cards and number sentences with formulas.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculator</li> <li>• Graphic of circle</li> <li>• Tiles to place inside of circle to represent area</li> <li>• Interactive whiteboard or other software</li> <li>• Rolling counter, string, or yarn to measure circumference</li> <li>• Assistive technology</li> <li>• Real-world materials</li> </ul>

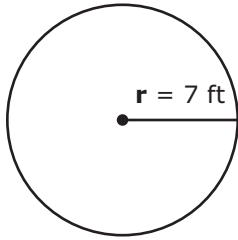
**Item 4**

This is the formula for finding the area of a circle.

$$\text{Area} = \pi \times r \times r$$

The variable  $r$  in this formula stands for the radius.

This circle has a radius of 7 feet.



What is the area of this circle in square feet?

- A.  $7\pi$  square feet
- B.  $14\pi$  square feet
- C.  $49\pi$  square feet

## Sample Item 5

Alignment	Core Content Connector (CCC): 7.DPS.1k1 Analyze graphs to determine or select appropriate comparative inferences about two samples or populations.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I understand basic information from simple graphs.</p> <p>I can identify a representation of two bar graphs as having greater or less frequency of members/events related to a single variable.</p> <p>I can make a comparison between two graphs.</p> <p>I can identify a pictorial representation of two bar graphs (one category apiece) as having greater or less frequency of members/events related to a single variable.</p> <p>I understand the concept, symbols, and vocabulary for: more, less, higher, and lower.</p>	<ul style="list-style-type: none"> <li>• Task analysis to analyze graph (e.g., look at 1st graph, identify the column of interest, mark, look at 2nd graph).</li> <li>• Identify the column of interest, mark, and determine the facts that the graph shows).</li> <li>• Group discussion forum, with teacher model, to create arguments based on graphs</li> <li>• Include discussions that model the analysis of two graphs and encourage student to provide evidence for the inference (e.g., note minimum and maximum values [range], use measures of central tendency, and note any key points and relationships in the graph or data set).</li> </ul>	<ul style="list-style-type: none"> <li>• Raised line around the distribution of the data (e.g., wiki sticks)</li> <li>• Assistive technology/voice output devices</li> <li>• Interactive whiteboard</li> <li>• Highlighters</li> <li>• Graphs that can be manipulated to make comparisons</li> <li>• Self-monitoring task analysis for student independence</li> <li>• Templates with sentence starters</li> </ul>

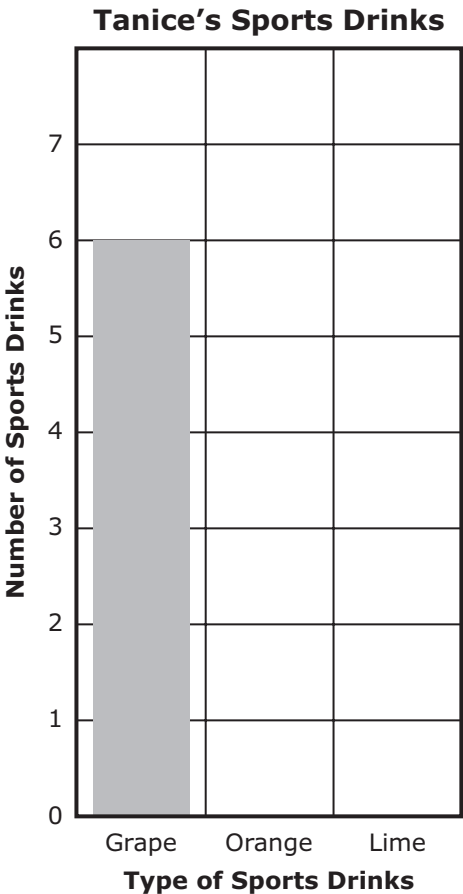
**Item 5**

This data table shows the numbers of different types of sports drinks in Tanice’s refrigerator.

**Tanice’s Sports Drinks**

Type of sports drink	Number of sports drinks
Grape	6
Orange	2
Lime	5

This incomplete bar graph can be used to show the same information as the data table.



The data table and bar graph show that Tanice had 6 grape sports drinks.

The data table shows that Tanice had 2 orange sports drinks.

Two tiles need to be moved into the column labeled “Orange” in the bar graph.

Now use the tiles to show how many lime sports drinks Tanice had. You may not need all of the tiles.

- A. The student provided the correct answer.
- B. The student did not provide the correct answer.





**Sample Item Teacher Guide**  
**Mathematics**  
**Grades 8 and 11**





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# About this Guide

This MSAA Sample Item Teacher Guide can help teachers use the newly released sample items as a formative assessment tool, allowing teachers to understand what students may be able to know and do based on the sample items, and how teachers can respond to this information through instruction. The MSAA newly released sample items are intended to be used for several different purposes, as outlined in the TAM, including to allow students to practice and become familiar with the testing platform and to ensure students are familiar with the item types and accessibility tools. These guides provide directions for using the sample items in an additional way: as an instructional tool.

## Guide Terminology

The MSAA Sample Item Teacher Guide for each grade band and content area include the following:

- **Sample Item Blueprint Table.** A high-level overview of the items in each set that shows the standard and learning targets the items align to, item type, and item position.
- **Item Information.** Information about item alignment, including learning targets, instructional strategies, and scaffolds and supports.
- **Student Item Thumbnail Image.** Item thumbnails are intended to help teachers easily identify the specific items in the guide as they administer the sample items through the online platform utilizing the Directions for Test Administration (DTA).

Item types in the sample item sets include the following:

- **Selected Response**
  - Multiple choice—Students select one answer from two or three possible choices
- **Constructed Response**
  - Constructed response—Students respond to a question by developing an answer rather than selecting an answer from answer options
- **Writing Prompt: ELA**
  - Open-response writing prompt—Students produce a permanent product in response to a prompt; for 2020–2021 released sample items, these will be found in grade 6 only.

## MSAA Sample Item Platform

To access MSAA's Sample Items, go to [www.msaaassessment.org/tap/sample-items](http://www.msaaassessment.org/tap/sample-items).

## Introduction to Formative Assessment

It is important to remember that formative assessment is not a test. It is a process, a practice that is part of instruction. In effective formative instruction, teachers use a variety of methods to determine what students understand and can do and adjust instruction accordingly.

## Formative Assessment Data

Students and teachers are the primary users of formative assessment data. These data have the greatest effect on learning and instruction because feedback for both student and teacher occurs over a very short or nearly instantaneous time period. This allows for adjustments in instruction, reteaching, and additional practice with learning targets to occur.

## How Best to Use the Mathematics Item Sets

The content in this section explains each component of the item sets and how they can best be incorporated into the classroom.

### Mathematics Blueprint Table

The math blueprint table/overview should be used to help select the sample item(s) that will provide the best evidence of student learning. The learning targets differentiate between the type of evidence each item will provide. The item type informs the type of interaction that the student will have to perform to respond to the item.

To obtain evidence of understanding for each grade-level standard, teachers can do the following:

- Access the sample items for the students' grade level.
- Use items individually as the learning targets are covered in class.
- Use the items in small groups to address a series of learning targets that focus on one standard.
- Use the entire sample item set to measure students' understanding of learning targets before, during, or after instruction.
- Review sample item sets from lower grades to build understanding of prerequisite skills for a given standard.
- Review sample item sets from higher grades to know how standard and item information build from the target grade.
- Use the sample items as models to create additional items to assess the standards.

### Next Steps for Formative Mathematics Item Data

After obtaining data that serve as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback.

After feedback is provided to students, educators should consider documenting the instructional modifications and supplementations provided to the students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how best to scaffold that learning. Teachers can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the student.

# **Mathematics Grade 8**

## Grade 8 Blueprint Table

Domain	Standard	Learning Targets	Item Type*	Item Position
<b>Number Operations (Real Numbers)</b>	<b>8.NO.1k3</b> Use approximations of irrational numbers to locate them on a number line.	<ul style="list-style-type: none"> <li>Recognize how values/numbers can lie between whole number values on a number line.</li> <li>Distinguish between rational and irrational numbers.</li> <li>Provide the decimal approximation of irrational numbers.</li> <li>Understand the concepts of <math>\pi</math> and square roots.</li> </ul>	MC	1
<b>Patterns, Relationships and Functions</b>	<b>8.PRF.1g3</b> Solve linear equations with 1 variable.	<ul style="list-style-type: none"> <li>Use manipulatives or graphic organizer to solve a problem.</li> <li>Identify the reciprocal operation in order to solve one step equations.</li> <li>Create a pictorial array of a simple equation to translate wording to solve for <math>x</math> or <math>y</math>.</li> <li>Understand the following concepts, vocabulary, and symbols: <math>+</math>, <math>-</math>, <math>\times</math>, <math>\div</math>, <math>=</math>, variable, equation.</li> </ul>	MC	2
<b>Patterns, Relationships and Functions</b>	<b>8.PRF.1f2</b> Describe or select the relationship between the two quantities given a line graph of a situation.	<ul style="list-style-type: none"> <li>Use a graph to recognize the quantity in two sets, without counting, to determine which is relatively larger.</li> <li>Define and identify positive linear relationships, negative linear relationships, and nonlinear relationships.</li> <li>Identify the relationship between variables shown in bar graphs, line graphs, line plots, and histograms.</li> </ul>	MC	3
<b>Perimeter, Area, and Volume Problems</b>	<b>8.ME.2d2</b> Apply the formula to find the volume of 3-dimensional shapes (i.e., cubes, spheres, and cylinders).	<ul style="list-style-type: none"> <li>Recognize attributes of a 3-dimensional shape.</li> <li>Multiply whole numbers, fractions, and decimals.</li> <li>Recognize that volume of 3-D shapes can be found by finding the area of the base and multiplying that by the height.</li> <li>Understand the following concepts and vocabulary: volume, cylinder, cone, height, radius, circumference, cube, sphere, side, <math>\pi</math>.</li> </ul>	MC	4

\*MC = multiple-choice

CR = constructed response

Domain	Standard	Learning Targets	Item Type*	Item Position
<b>Data, Probability and Statistics</b>	<b>8.DPS.1h1</b> Graph bivariate data using scatter plots and identify possible associations between the variables.	<ul style="list-style-type: none"> <li>• Locate points on the x-axis and y-axis on an adapted grid (not necessarily numeric).</li> <li>• Identify a similar distribution when given a choice of three (e.g., when shown a normal distribution, can select a second example of a normal distribution from three choices).</li> <li>• Graph a series of data points on a coordinate grid.</li> <li>• Identify the associations between the variables using supports.</li> <li>• Understand the following concepts and vocabulary: best fit line, variable, outliers.</li> </ul>	CR	5

\*MC = multiple-choice  
CR = constructed response

## Sample Item 1

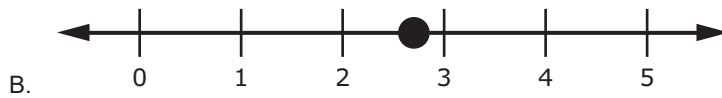
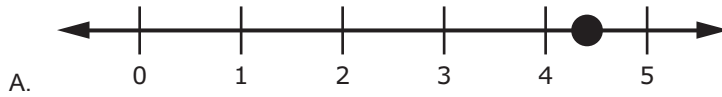
Alignment	Core Content Connector (CCC): 8.NO.1k3 Use approximations of irrational numbers to locate them on a number line.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize how values/ numbers can lie between whole number values on a number line.</p> <p>I can distinguish between rational and irrational numbers.</p> <p>I can provide the decimal approximation of irrational numbers.</p> <p>I understand the concepts of <math>\pi</math> and square roots.</p>	<ul style="list-style-type: none"> <li>• Use trial and error to determine the approximation of an irrational number.</li> <li>• Locate whole numbers on a number line.</li> <li>• Locate decimal numbers on a number line.</li> <li>• Locate fractions on a number line.</li> <li>• Use a calculator to find the square root of a number.</li> <li>• Use the square root of a number to place a value on the number line.</li> <li>• Round an irrational number to the nearest whole number, tenths place, hundredths place, or thousandths place.</li> <li>• Use manipulatives to represent whole numbers as a fraction (e.g., 3 whole circles each divided in half is equal to <math>6/2</math>).</li> <li>• Use manipulatives to represent a fraction.</li> <li>• Understand that the use of 3.14 for <math>\pi</math> is a rounded, approximated number (e.g., use <math>22/7</math> in a calculator to approximate <math>\pi</math>).</li> <li>• Identify the symbol for <math>\pi</math> in writing and on a calculator.</li> <li>• Understand the following concepts, symbols, and vocabulary: irrational numbers, rational numbers, fraction, decimal, <math>\pi</math>.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculator</li> <li>• Interactive whiteboard</li> <li>• Manipulatives</li> <li>• Number lines</li> </ul>

*Calculator may be used on this item.*

**Item 1**

The number 2.7 is an example of a number that is between two whole numbers.

Which number line has a point marked at 2.7?





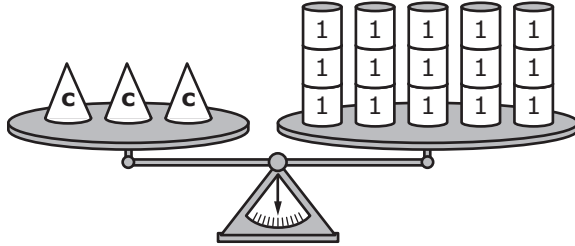
## Sample Item 2

Alignment	Core Content Connector (CCC): 8.PRF.1g3 Solve linear equations with 1 variable.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can use manipulatives or graphic organizer to solve a problem.</p> <p>I can identify the reciprocal operation in order to solve one step equations.</p> <p>I can create a pictorial array of a simple equation to translate wording to solve for <math>x</math> or <math>y</math>.</p> <p>I understand the following concepts, vocabulary, and symbols: <math>+</math>, <math>-</math>, <math>\times</math>, <math>\div</math>, <math>=</math>, variable, equation.</p>	<ul style="list-style-type: none"> <li>• Explicit strategy: Solve an equation by dividing both sides of the equation by the value in front of the variable and then simplify.</li> <li>• Use trial and error to determine the value of <math>x</math> or <math>y</math>. (Is the product too low, too high?)</li> <li>• Use arrays (e.g., <math>3y = 12</math>; When you have a total of 12 counters divided into three equal sets, how many tokens are in each set [= "<math>y</math>"]?).</li> <li>• Task analysis               <ul style="list-style-type: none"> <li>– Read the story problem.</li> <li>– Identify what question is being asked/what <math>x</math> represents (define "<math>x</math>").</li> <li>– Identify the facts and the operation (<math>+</math>, <math>-</math>, <math>\times</math>, <math>\div</math>) in a story to write an equation.</li> <li>– Solve the equation for "<math>x</math>."</li> <li>– Show the answer as "<math>x</math>" = ____.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Counters</li> <li>• Grids or graphic organizers to create arrays</li> <li>• Multiplication chart</li> <li>• Calculator</li> <li>• Interactive whiteboard</li> </ul>

Calculator may be used on this item.

**Item 2**

This is a picture of a balance scale.



The total mass of the cones on the left side is equal to the total mass of the cylinders on the right side.

Use this equation to find the mass of one cone. In this equation, the variable **c** stands for the mass of one cone.

$$\begin{array}{c} \triangle c \quad \triangle c \quad \triangle c \\ 3c \end{array} = \begin{array}{c} \begin{array}{|c|} \hline 1 \\ \hline 1 \\ \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline 1 \\ \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline 1 \\ \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline 1 \\ \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline 1 \\ \hline 1 \\ \hline \end{array} \\ 15 \text{ cylinders} \end{array}$$

Divide each side of the equation by 3 to find the mass of one cone, **c**.

$$3c = 15$$

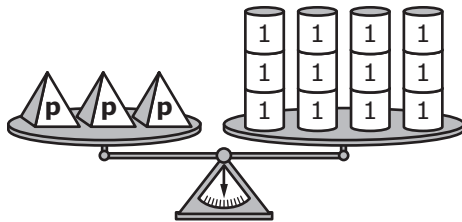
$$\frac{3c}{3} = \frac{15}{3}$$

$$c = 5$$

One cone has the same mass as 5 cylinders.

$$\begin{array}{c} \triangle c \\ c \end{array} = \begin{array}{c} \begin{array}{|c|} \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline \end{array} \begin{array}{|c|} \hline 1 \\ \hline \end{array} \\ 5 \text{ cylinders} \end{array}$$

This is a picture of a different balance scale. The total mass of the pyramids on the left side is equal to the total mass of the cylinders on the right side.



Use this equation to answer the question.

In this equation, the variable **p** stands for the mass of one pyramid.

$$3p = 12 \text{ cylinders}$$

How many cylinders have the same mass as one pyramid?

- A. 3 cylinders
- B. 4 cylinders
- C. 10 cylinders

### Sample Item 3

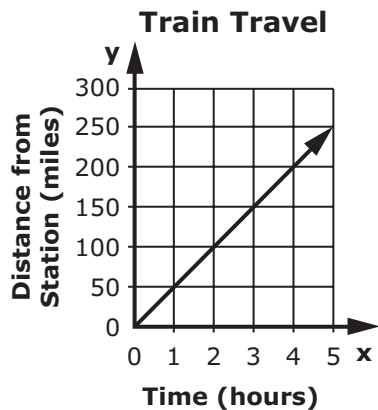
Alignment	Core Content Connector (CCC): 8.PRF.1f2 Describe or select the relationship between the two quantities given a line graph of a situation.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can use a graph to recognize the quantity in two sets, without counting, to determine which is relatively larger.</p> <p>I can define and identify positive linear relationships, negative linear relationships, and nonlinear relationships.</p> <p>I can Identify the relationship between variables shown in bar graphs, line graphs, line plots, and histograms.</p>	<ul style="list-style-type: none"> <li>• Identify a linear function on a graph as one that forms a straight line.</li> <li>• Identify a non-linear function on a graph as one that does not make a straight line.</li> <li>• Understand the following concepts, vocabulary and symbols: linear, non-linear, function.</li> <li>• Label a function on a graph as being either linear or non-linear.</li> <li>• Identify functions as linear or non-linear given a table or graph.</li> <li>• Identify characteristics of a graph.</li> <li>• Match a description to a graph.</li> <li>• Describe the situation that may account for the characteristics in the graph.</li> </ul>	<ul style="list-style-type: none"> <li>• Raised grid</li> <li>• Graphing calculator</li> <li>• Manipulatives that show relationships (e.g., transparencies that highlight relationships, straight line object such as spaghetti to find best fit line)</li> <li>• Interactive whiteboard</li> <li>• Assistive technology</li> </ul>

Calculator may be used on this item.

Please hand student Grade 8 Math Reference Sheet. Use Graph 84.

**Item 3**

This graph shows the relationship between the distance a train was from the station and time.



Which sentence describes the relationship between time and the distance the train was from the station?

- A. As the time **increased**, the distance the train was from the station **increased**.
- B. As the time **increased**, the distance the train was from the station **decreased**.
- C. As the time **decreased**, the distance the train was from the station **increased**.

## Sample Item 4

Alignment	Core Content Connector (CCC): 8.ME.2d2 Apply the formula to find the volume of 3-dimensional shapes (i.e., cubes, spheres, and cylinders)	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize attributes of a 3-dimensional shape.</p> <p>I can multiply whole numbers, fractions, and decimals.</p> <p>I recognize that volume of 3-D shapes can be found by finding the area of the base and multiplying that by the height.</p> <p>I understand the following concepts and vocabulary: volume, cylinder, cone, height, radius, circumference, cube, sphere, side, pi.</p>	<ul style="list-style-type: none"> <li>• Task analysis for applying formula</li> <li>• Model-Lead-Test – Teacher models and provides guidance to support student learning. As the student learns they develop more independence with the skill or task.</li> <li>• Least-to-Most prompts – Increasing support as needed until the student has completed the task appropriately.</li> <li>• Fill cylinders and cones with water or rice to illustrate volume. Describe volume as what is “inside.”</li> <li>• Provide relevant, real-world examples and uses.</li> </ul>	<ul style="list-style-type: none"> <li>• Cones, cylinders, cubes, and spheres in differing sizes and textures</li> <li>• Cardboard models that can be folded to make 3-dimensional shapes</li> <li>• Partially completed formula</li> <li>• Calculator</li> </ul>

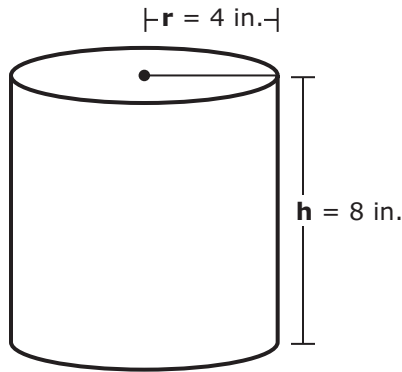
*Calculator may be used on this item.*

*Please hand student Grade 8 Math Reference Sheet. Use Volume Formula for Cylinders.*

**Item 4**

The volume of a cylinder is the amount of space inside it.

This is a picture of a cylinder.



This is the formula to find the volume of a cylinder.

$$\text{Volume} = \pi \times r \times r \times h$$

The radius,  $r$ , of the cylinder is 4 inches.

The height,  $h$ , of the cylinder is 8 inches.

Use the formula to find the volume of the cylinder.

$$\text{Volume} = \pi \times r \times r \times h$$

What is the volume of the cylinder in cubic inches?

- A.  $16\pi$  cubic inches
- B.  $128\pi$  cubic inches
- C.  $448\pi$  cubic inches

## Sample Item 5

Alignment	<b>Core Content Connector (CCC): 8.DPS.1h</b> Graph bivariate data using scatter plots and identify possible associations between the variables.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can locate points on the x-axis and y-axis an adapted grid (not necessarily numeric).</p> <p>I can identify a similar distribution when given a choice of three (e.g., when shown a normal distribution, can select a second example of a normal distribution from three choices).</p> <p>I can graph a series of data points on a coordinate grid.</p> <p>I can identify the associations between the variables using supports.</p> <p>I understand the following concepts and vocabulary: best fit line, variable, outliers.</p>	<ul style="list-style-type: none"> <li>• Task analysis for graphing bivariate data</li> <li>• Student adds points to data table (number of ice cream cones sold compared to outside temperature).</li> <li>• The number of ice cream cones is indicated along the y-axis; the temperature is indicated along the x-axis.</li> <li>• The student moves red marker on the y-axis to represent a value from the table. "Place the marker on the y-axis for this number of ice cream cones sold."</li> <li>• The student moves green marker on the x-axis to represent a value from the table. "Place the marker on the x-axis for this temperature."</li> <li>• Using straws on the x- and y-axes, the student finds the coordinate on the graph represented by the data.</li> <li>• The student continues to plot more points (at least three points, not necessarily a perfect relationship).</li> <li>• Ask student to place string/straw/yarn along the points.</li> <li>• Indicate the direction of the straw. Have the student look at the graph he/she made and ask: "How does the temperature relate to the number of ice cream cones sold?"</li> <li>• Student describes the relationship between the two variables. "Warmer weather leads to more ice cream cone sales."</li> <li>• Explicitly teach three potential outcomes (e.g., as one variable increases the other decreases; as one decreases the other increases; there is no trend).</li> <li>• Multiple exemplars of the three outcomes</li> <li>• System of least prompts to graph data</li> </ul>	<ul style="list-style-type: none"> <li>• Color-coded grid (e.g., uses colors rather numbers)</li> <li>• Raised grid</li> <li>• Graphing calculator</li> <li>• Manipulatives that show relationships (e.g., transparencies that highlight relationships, straight line object such as spaghetti to find best fit line)</li> <li>• Self-monitoring task analysis for student independence</li> <li>• Templates with sentence starters</li> <li>• Interactive whiteboard</li> <li>• Assistive technology</li> </ul>



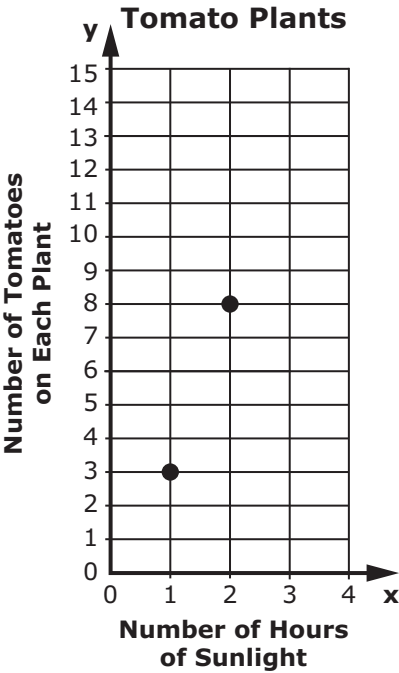
Calculator may be used on this item.  
Provide student with printed cutout of scatter plot and small object.

**Item 5**

This data table shows the number of tomatoes on four tomato plants exposed to different amounts of sunlight each day.

Tomato Plants	
Number of hours of sunlight	Number of tomatoes on each plant
1	3
2	8
3	11
4	13

This incomplete scatter plot can be used to show the same information as the data table.



The data table shows that the tomato plant with 1 hour of sunlight each day had 3 tomatoes.

The scatter plot also shows that the tomato plant with 1 hour of sunlight each day had 3 tomatoes because there is a point located at (1, 3).

The data table shows that the tomato plant with 2 hours of sunlight each day had 8 tomatoes.

The scatter plot also shows that the tomato plant with 2 hours of sunlight each day had 8 tomatoes because there is a point located at (2, 8).

The third row of the data table shows that the tomato plant with 3 hours of sunlight each day had 11 tomatoes, so the third data point is (3, 11). This information still needs to be plotted on the scatter plot.

This is a small object.

Use this small object to plot the point for the tomato plant that had 4 hours of sunlight each day.

# **Mathematics Grade 11**

## Grade 11 Blueprint Table

Domain	Standard	Learning Targets	Item Type*	Item Position
<b>Patterns, Relations, and Functions</b>	<b>H.PRF.2b2</b> Solve equations with one or two variables using equations or graphs.	<ul style="list-style-type: none"> <li>Count and arrange a given number of objects into two sets in multiple combinations.</li> <li>Solve equations with two variables using equations or graphs.</li> <li>Identify and graph the solutions (ordered pairs) on a graph of an equation in two variables.</li> </ul>	MC	1
<b>Number Operations (Real Numbers)</b>	<b>H.NO.1a1</b> Simplify expressions that include exponents.	<p>Identify expressions with exponents.</p> <ul style="list-style-type: none"> <li>Create a model with objects to show that the exponent of a number says how many times to use the number in a multiplication. (Substitute a chip for each “a.”)</li> <li><math>a^7 = a \times a \times a \times a \times a \times a \times a = aaaaaaa</math></li> <li>Simplify expression into expanded form: <math>(x^4)(x^3) = (xxxx)(xxx)</math></li> <li>Simplify expression into the simplest form: <math>(x^4)(x^3) = (xxxx)(xxx) = (xxxxxxx) = x^7</math></li> <li>Understand the following concepts, symbols, and vocabulary: expression, exponent, raising to a power.</li> </ul>	MC	2
<b>Patterns, Relations, and Functions</b>	<b>H.PRF.2b1</b> Translate a real-world problem into a one variable linear equation.	<ul style="list-style-type: none"> <li>Match an equation with one variable to a real-world context.</li> <li>Create a pictorial array of a simple equation to translate wording.</li> <li>Know the following vocabulary and symbols: +, −, ×, ÷, =, linear, variable.</li> </ul>	MC	3
<b>Geometry</b>	<b>H.GM.1b1</b> Use definitions to demonstrate congruency and similarity in figures.	<ul style="list-style-type: none"> <li>Identify the right angle, hypotenuse, or leg(s) of a right triangle.</li> <li>Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar.</li> <li>Explain using similarity transformation the meaning of similarity for triangles and the equality of all corresponding pairs and angles and the proportionality of all corresponding pairs of sides.</li> </ul>	MC	4

\*MC = multiple-choice  
CR = constructed response

Domain	Standard	Learning Targets	Item Type*	Item Position
<b>Data, Probability, and Statistics</b>	<b>H.DPS.1b1</b> Complete a graph given the data, using dot plots, histograms, or box plots.	<ul style="list-style-type: none"> <li>Match the source of the values at the bottom of the x-axis with the appropriate category of the related data table.</li> <li>Describe the elements within a graph (e.g., in a box plot, the line is the median, the line extending from each box is the lower and upper extreme, and the box shows the lower quartile and the upper quartile).</li> <li>Complete the steps of the task analysis to complete a box plot.</li> <li>Understand the following concepts and vocabulary: quartile, median, intervals, upper and lower extremes, box plot, histograms, dot plots.</li> </ul>	CR	5

\*MC = multiple-choice  
CR = constructed response

## Sample Item 1

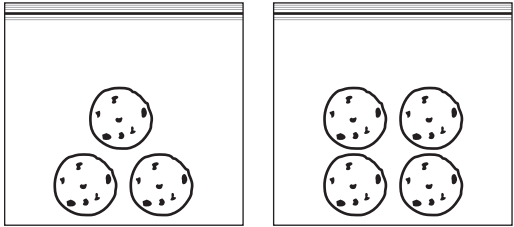
Alignment	Core Content Connector (CCC): H.PRF.2b2 Solve equations with one or two variables using equations or graphs.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can count and arrange a given number of objects into two sets in multiple combinations.</p> <p>I can solve equations with two variables using equations or graphs.</p> <p>I can identify and graph the solutions (ordered pairs) on a graph of an equation in two variables.</p>	<ul style="list-style-type: none"> <li>• Create a table of values from an equation.</li> <li>• Graph an equation using a table of values.</li> <li>• Locate coordinate pairs on a graph.</li> <li>• Understand ordered pairs.</li> <li>• Understand the following vocabulary: solution, variable, graph, and coordinate plane.</li> <li>• Understand that all solutions to an equation in two variables are contained on the graph of that equation.</li> </ul>	<ul style="list-style-type: none"> <li>• Counters</li> <li>• Multiplication chart</li> <li>• Calculator</li> <li>• Graph paper</li> </ul>

Calculator may be used on this item.

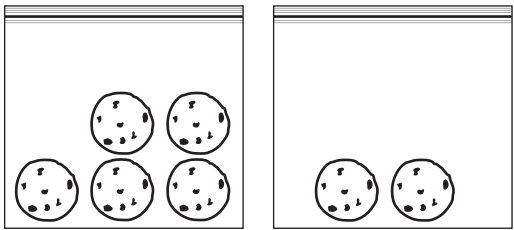
**Item 1**

Henry had 7 cookies and 2 bags.

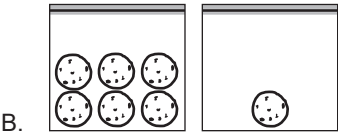
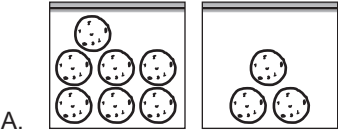
First, Henry put 3 cookies into one bag and 4 cookies into another bag.



Then, Henry decided to divide the 7 cookies differently. He put 5 cookies into one bag and 2 cookies into another bag.



Which picture shows another way Henry could divide the 7 cookies into 2 bags?



Sample Item 2		
Alignment	Core Content Connector (CCC): H.NO.1a1 Simplify expressions that include exponents.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify expressions with exponents.</p> <p>I can create a model with objects to show that the exponent of a number says how many times to use the number in a multiplication. (Substitute a chip for each “a.”)</p> $a^7 = a \times a \times a \times a \times a \times a \times a$ $= aaaaaaa$ <p>I can simplify expression into expanded form:  <math>(x^4)(x^3) = (xxxx)(xxx)</math></p> <p>I can simplify expression into the simplest form:  <math>(x^4)(x^3) = (xxxx)(xxx) =</math>  <math>(xxxxxxx) = x^7</math></p> <p>I understand the following concepts, symbols, and vocabulary: expression, exponent, raising to a power.</p>	<ul style="list-style-type: none"> <li>• Explicitly teach rules for simplification.</li> <li>• Multiple exemplars (example/non-example) expression with exponents</li> </ul>	<ul style="list-style-type: none"> <li>• Templates</li> <li>• Calculator</li> </ul>

*Calculator may be used on this item.*

*Please hand student Grade 11 Math Reference Sheet. Use Equation 12.*

**Item 2**

An exponent tells how many times the base number will appear in a multiplication expression.

This is an expression with an exponent.

$$2^3$$

The exponent 3 indicates that the base number 2 will appear three times in the multiplication expression that is used to find the value of  $2^3$ .

$$2^3 = 2 \times 2 \times 2$$

The value of  $2^3$  is 8.

$$2^3 = 8$$

This is another expression with an exponent.

$$5^3$$

This equation is used to find the value of  $5^3$ .

$$5^3 = \_ \times \_ \times \_$$

What is the value of  $5^3$ ?

- A. 15
- B. 53
- C. 125



### Sample Item 3

Alignment	Core Content Connector (CCC): H.PRF.2b1 Translate a real-world problem into a one variable linear equation.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can match an equation with one variable to a real-world context.</p> <p>I can create a pictorial array of a simple equation to translate wording.</p> <p>I know the following vocabulary and symbols: <math>+</math>, <math>-</math>, <math>\times</math>, <math>\div</math>, <math>=</math>, linear, variable.</p>	<p><b>Task analysis</b></p> <ul style="list-style-type: none"> <li>• Present the story problem based on a real-world, relevant context and provide a template for recording facts/operation to solve the real-world problem.</li> <li>• Highlight key information in the problem; strike through irrelevant information.</li> <li>• Identify what question is being asked (define <math>x</math>).</li> <li>• Identify the facts.</li> <li>• Fill in the facts in the order presented in the story problem on the template.</li> <li>• Determine the operation(s) (<math>+</math>, <math>-</math>, <math>\times</math>, <math>\div</math>).</li> <li>• Identify what operation should be completed first.</li> <li>• Fill in the operation.</li> <li>• State the equation.</li> <li>• Solve for <math>x</math>.</li> <li>• Answer the problem statement.</li> </ul>	<ul style="list-style-type: none"> <li>• Counters</li> <li>• Multiplication chart</li> <li>• Calculator</li> </ul>

*Calculator may be used on this item.*

**Item 3**

An art teacher had 15 paintbrushes. Then she bought some boxes of paintbrushes. Each box had 8 paintbrushes in it. Now the art teacher has 71 paintbrushes.

Which equation can be used to find **b**, the number of boxes of paintbrushes the art teacher bought?

- A.  $8b + 71 = 15$
- B.  $15 + 8b = 71$
- C.  $15b + 8 = 71$

## Sample Item 4

Alignment	Core Content Connector (CCC): H.GM.1b1 Use definitions to demonstrate congruency and similarity in figures.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can identify the right angle, hypotenuse, or leg(s) of a right triangle.</p> <p>I can use the definition of similarity in terms of similarity transformations to decide if two given figures are similar.</p> <p>I can explain using similarity transformation the meaning of similarity for triangles and the equality of all corresponding pairs and angles and the proportionality of all corresponding pairs of sides.</p>	<ul style="list-style-type: none"> <li>• Understand vocabulary: figures, congruent, similar, corresponding, transformations, right angles, hypotenuse, leg.</li> <li>• Match concrete examples of congruent figures.</li> <li>• Match concrete examples of similar figures.</li> <li>• Use proportions to compare figures based on side lengths to determine similarity.</li> </ul>	<ul style="list-style-type: none"> <li>• Physical models</li> <li>• Transparencies</li> <li>• Geometry software</li> <li>• Interactive whiteboards</li> </ul>

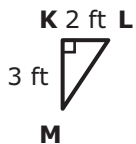
Calculator may be used on this item.

Please hand student Grade 11 Math Reference Sheet. Use Triangle 21.

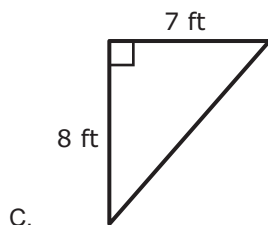
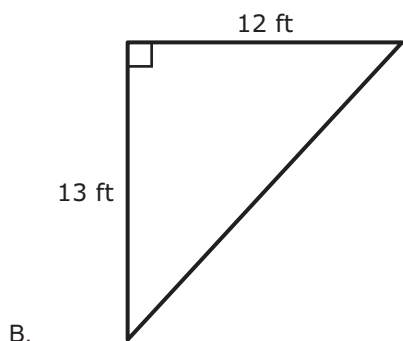
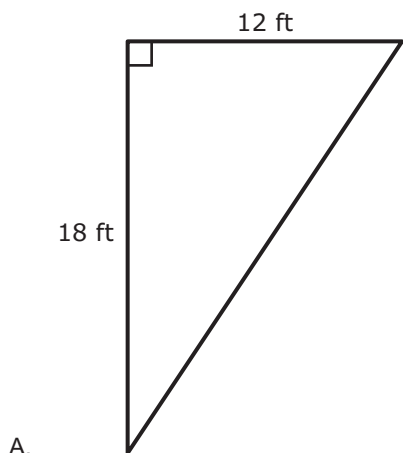
**Item 4**

Triangles are similar when the ratios of the lengths of their corresponding sides are equal.

This is triangle **KLM**.



Which triangle is similar to triangle **KLM**?



## Sample Item 5

Alignment	<b>Core Content Connector (CCC): H.DPS.1b1</b> Complete a graph given the data, using dot plots, histograms, or box plots.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can match the source of the values at the bottom of the x-axis with the appropriate category of the related data table.</p> <p>I can describe the elements within a graph (e.g., in a box plot, the line is the median, the line extending from each box is the lower and upper extreme, and the box shows the lower quartile and the upper quartile).</p> <p>I can complete the steps of the task analysis to complete a box plot.</p> <p>I understand the following concepts and vocabulary: quartile, median, intervals, upper and lower extremes, box plot, histograms, dot plots.</p>	<ul style="list-style-type: none"> <li>• Follow steps of task analysis to complete box plot, dot plots, or histograms (these can be found on Internet or many calculators).</li> <li>• Model-Lead-Test – Teacher models and provides guidance to support student learning. As the student learns they develop more independence with the skill or task.</li> </ul>	<ul style="list-style-type: none"> <li>• Technology (e.g., computers)</li> <li>• Graphing calculators</li> <li>• Self-monitoring task analysis for student independence</li> </ul>

Calculator may be used on this item.  
Provide student with printed histogram and tile cutouts.

**Item 5**

A histogram is a graph that uses bars to display data.

This list of data values shows the heights of the flowers in Paul's garden.

**Heights of Paul's Flowers  
(inches)**

2, 4, 5, 6, 7, 7, 8, 8

To make a histogram, divide the data into equal-sized ranges.

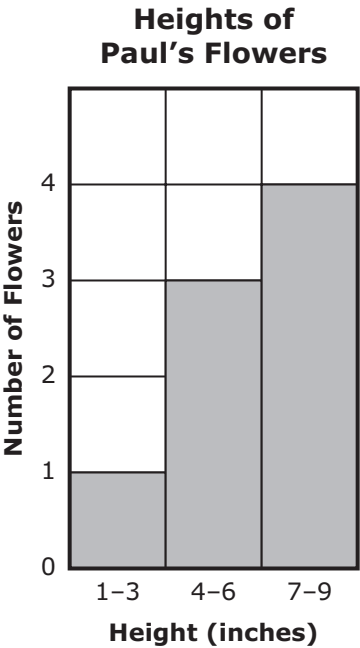
The data values are from 2 to 8 inches. The data can be divided into these equal-sized ranges:

1 to 3 inches

4 to 6 inches

7 to 9 inches

This histogram shows the same information as the list of data. The height of each bar shows the number of flowers in each range.



In this histogram, the first bar shows there is one flower in the range of 1 to 3 inches.

The second bar shows there are three flowers in the 4-to-6-inch range.

The third bar shows there are four flowers in the 7-to-9-inch range.

This is a different problem.

This list of data values shows the heights of the flowers in Lisa's garden.

**Heights of Lisa's Flowers  
(inches)**

1, 3, 4, 6, 6, 7, 8, 9

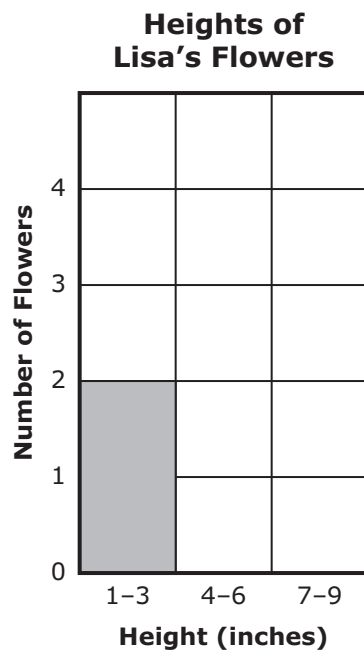
The data values are from 1 to 9 inches. The data can be divided into these equal-sized ranges:

1 to 3 inches

4 to 6 inches

7 to 9 inches

This incomplete histogram shows the heights of Lisa's flowers.



The height of each bar shows the number of flowers in each range.

The first bar in this histogram shows there are 2 flowers with a height of 1 to 3 inches.

The list of data shows there are 3 flowers with a height of 4 to 6 inches.

The second bar in this histogram is completed in this way.

Complete the histogram to show the number of Lisa's flowers with a height of 7 to 9 inches.

These are tiles to use to complete the histogram. You may not need all of the tiles.

