



Teacher Guide
Mathematics
Grades 8 & High School

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About This Guide

This MSAA Sample Item Teacher Guide can help teachers use a subset of the sample items as a formative assessment tool, allowing teachers to understand what students may be able to know and do based on these items, and how teachers can respond to this information through instruction. This guide should be used in conjunction with the corresponding paper-based item PDF for the student and Directions for Test Administration (DTA) for the administrator.

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 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

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

*MC = multiple-choice
CR = constructed response

Domain	Standard	Learning Targets	Item Type*	Item Position
Data, Probability, and Statistics	8.DPS.1h1 Graph bivariate data using scatter plots and identify possible associations between the variables.	<ul style="list-style-type: none"> • Locate points on the x-axis and y-axis on an adapted grid (not necessarily numeric). • 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). • Graph a series of data points on a coordinate grid. • Identify the associations between the variables using supports. • Understand the following concepts and vocabulary: best fit line, variable, outliers. 	CR	5

*MC = multiple-choice
CR = constructed response

Sample Item 1

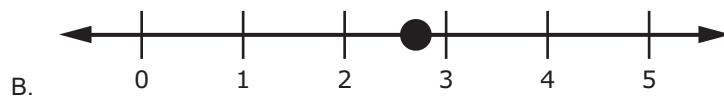
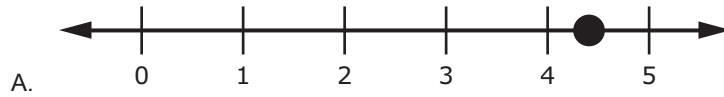
Alignment	Core Content Connector (CCC): 8.NO.1k3 Use approximations of irrational numbers to locate them on a number line.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize how values/ numbers can lie between whole number values on a number line.</p> <p>I can distinguish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

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?



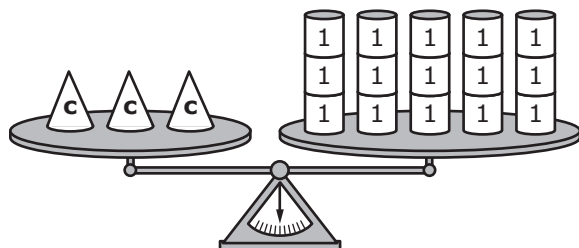
Sample Item 2

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

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**.

$$3c = 15$$

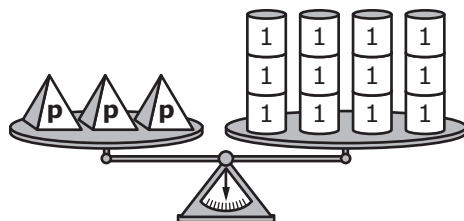
$$\frac{3c}{3} = \frac{15}{3}$$

$$c = 5$$

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.

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

How many cylinders have the same mass as one pyramid?

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

Sample Item 3

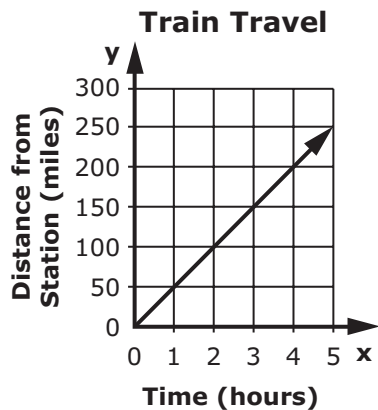
Alignment	Core Content Connector (CCC): 8.PRF.1f2 Describe or select the relationship between the two quantities given a line graph of a situation.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can use a graph to recognize the quantity in two sets, without counting, to determine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

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 three-dimensional shapes (i.e., cubes, spheres, and cylinders).	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can recognize attributes of a three-dimensional shape.</p> <p>I can multiply whole numbers, fractions, and decimals.</p> <p>I recognize that volume of three-dimensional 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"> • Task analysis for applying formula • Model-Lead-Test – Teacher models and provides guidance to support student learning. As students learn, they develop more independence with the skill or task. • Least-to-Most prompts – Increasing support as needed until the student has completed the task appropriately. • Fill cylinders and cones with water or rice to illustrate volume. Describe volume as what is “inside.” • Provide relevant, real-world examples and uses. 	<ul style="list-style-type: none"> • Cones, cylinders, cubes, and spheres in differing sizes and textures • Cardboard models that can be folded to make three-dimensional shapes • Partially completed formula • Calculator

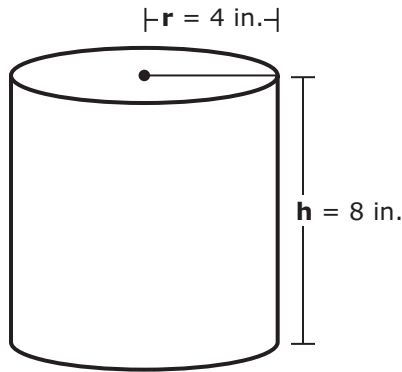
Calculator may be used on this item.

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. 16π cubic inches
- B. 128π cubic inches
- C. 448π cubic inches

Sample Item 5

Alignment	Core Content Connector (CCC): 8.DPS.1h 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 on 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, I 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"> • Task analysis for graphing bivariate data • Student adds points to data table (number of ice-cream cones sold compared to outside temperature). • The number of ice-cream cones is indicated along the y-axis; the temperature is indicated along the x-axis. • 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.” • 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.” • Using straws on the x- and y-axes, the student finds the coordinate on the graph represented by the data. • The student continues to plot more points (at least three points, not necessarily a perfect relationship). • Ask student to place string/straw/yarn along the points. • 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?” • Student describes the relationship between the two variables. “Warmer weather leads to more ice-cream cone sales.” • Explicitly teach three potential outcomes (e.g., as one variable increases, the other decreases; as one decreases, the other increases; there is no trend). • Multiple exemplars of the three outcomes • System of least prompts to graph data 	<ul style="list-style-type: none"> • Color-coded grid (e.g., uses colors rather numbers) • Raised grid • Graphing calculator • Manipulatives that show relationships (e.g., transparencies that highlight relationships, straight line object such as spaghetti to find best fit line) • Self-monitoring task analysis for student independence • Templates with sentence starters • Interactive whiteboard • Assistive technology

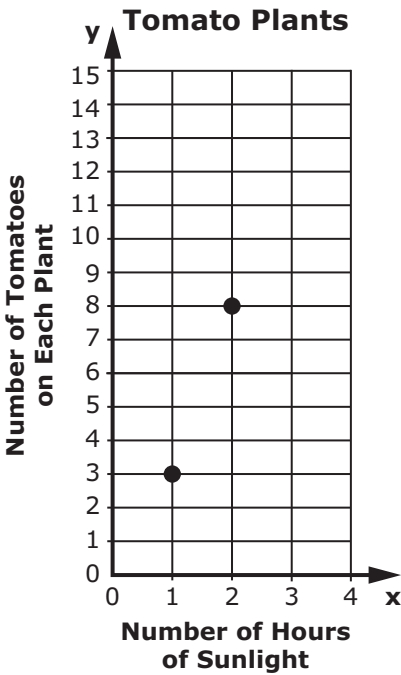
Calculator may be used on this item.
Provide student with printed cutout of scatter plot and small object.

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 High School

High School Blueprint Table

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

*MC = multiple-choice
 CR = constructed response

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

*MC = multiple-choice
CR = constructed response

Sample Item 1

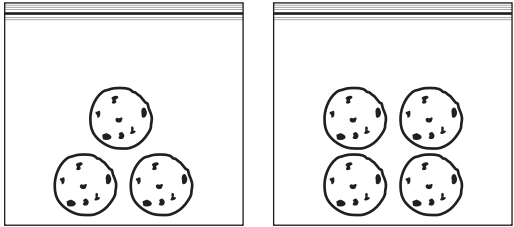
Alignment	Core Content Connector (CCC): H.PRF.2b2 Solve equations with one or two variables using equations or graphs.	
Learning Targets	Instructional Strategies	Scaffolds and Supports
<p>I can count and arrange a given number of objects into two sets in multiple combinations.</p> <p>I can solve equations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

Calculator may be used on this item.

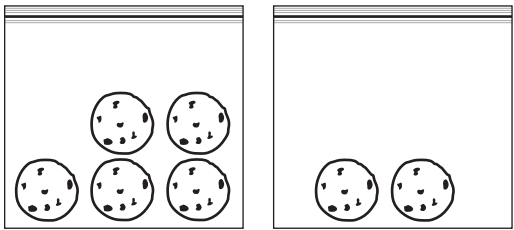
Item 1

Henry had 7 cookies and 2 bags.

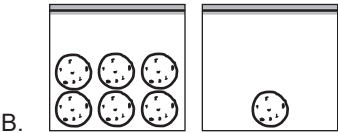
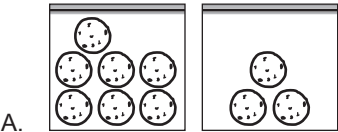
First, Henry put 3 cookies into one bag and 4 cookies into another bag.



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.”) $a^7 = a \times a \times a \times a \times a \times a \times a$ $= \text{aaaaaaa}$</p> <p>I can simplify an expression into expanded form: $(x^4)(x^3) = (\text{xxxx})(\text{xxx})$</p> <p>I can simplify an expression into the simplest form: $(x^4)(x^3) = (\text{xxxx})(\text{xxx}) =$ $(\text{xxxxxxx}) = x^7$</p> <p>I understand the following concepts, symbols, and vocabulary: expression, exponent, raising to a power.</p>	<ul style="list-style-type: none"> • Explicitly teach rules for simplification. • Multiple exemplars (example/non-example) expression with exponents 	<ul style="list-style-type: none"> • Templates • Calculator

Calculator may be used on this item.

Please hand student High School 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: $+$, $-$, \times, \div, $=$, linear, variable.</p>	<p>Task analysis</p> <ul style="list-style-type: none"> • 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. • Highlight key information in the problem; strike through irrelevant information. • Identify what question is being asked (define x). • Identify the facts. • Fill in the facts in the order presented in the story problem on the template. • Determine the operation(s) ($+$, $-$, \times, \div). • Identify what operation should be completed first. • Fill in the operation. • State the equation. • Solve for x. • Answer the problem statement. 	<ul style="list-style-type: none"> • Counters • Multiplication chart • Calculator

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"> • Understand vocabulary: figures, congruent, similar, corresponding, transformations, right angles, hypotenuse, leg. • Match concrete examples of congruent figures. • Match concrete examples of similar figures. • Use proportions to compare figures based on side lengths to determine similarity. 	<ul style="list-style-type: none"> • Physical models • Transparencies • Geometry software • Interactive whiteboards

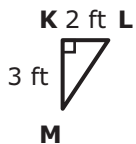
Calculator may be used on this item.

Please hand student High School Math Reference Sheet. Use Triangle 21.

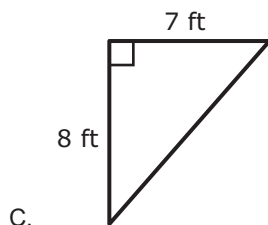
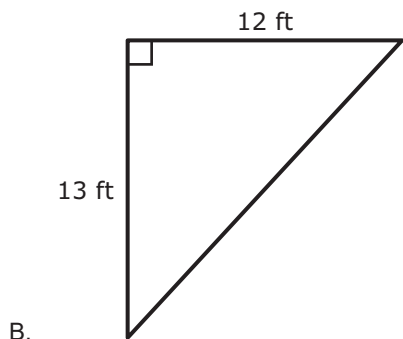
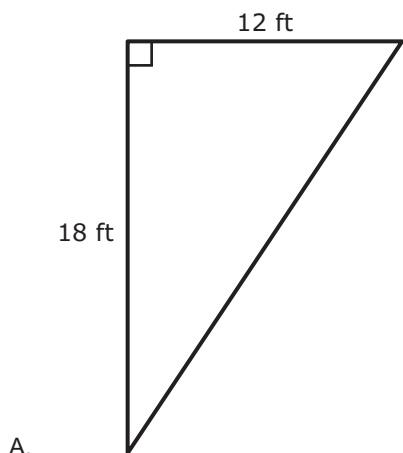
Item 4

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	Core Content Connector (CCC): H.DPS.1b1 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"> • Follow steps of task analysis to complete box plot, dot plots, or histograms (these can be found on the Internet or many calculators). • Model-Lead-Test – Teacher models and provides guidance to support student learning. As students learn, they develop more independence with the skill or task. 	<ul style="list-style-type: none"> • Technology (e.g., computers) • Graphing calculators • Self-monitoring task analysis for student independence

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.

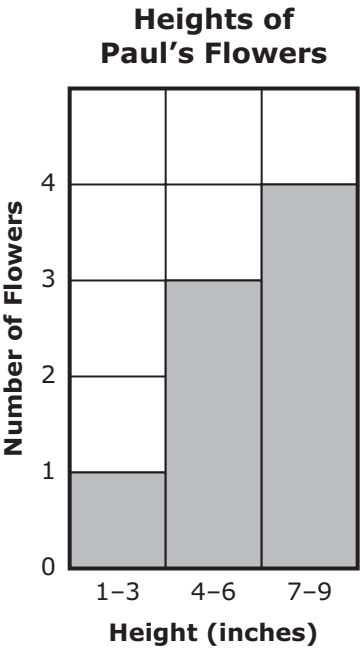
The data values are from 2 to 8 inches. The data can be divided into these equal-sized ranges:

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

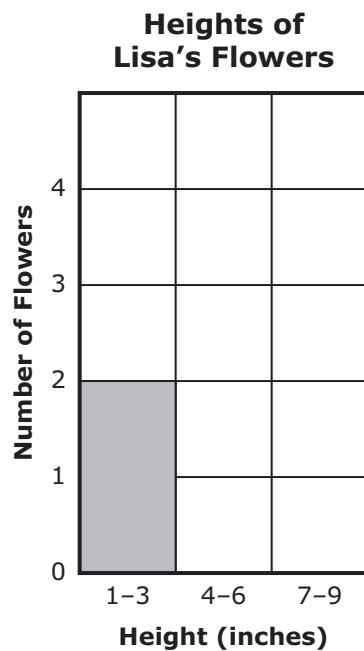
The data values are from 1 to 9 inches. The data can be divided into these equal-sized ranges:

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.

