COMMON CORE ASSESSMENT COMPARISON FOR MATHEMATICS

GRADE 8

August 2013

Prepared by:

Delaware Department of Education
Accountability Resources Workgroup
401 Federal Street, Suite 2
Dover, DE 19901

12/3/2013
Document Control #: 2013/07/03

Table of Contents

INTRODUCTION **1**

THE NUMBER SYSTEM (NS) **6**

Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers. ***7***

8.NS.1 – Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. 7

8.NS.2 – Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. 8

EXPRESSIONS AND EQUATIONS (EE) **9**

Cluster: Work with radicals and integer exponents. ***10***

8.EE.1 – Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. 10

8.EE.2 – Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that 2 is irrational. 12

8.EE.3 – Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.* 15

Cluster: Understand the connections between proportional relationships, lines, and linear equations. ***18***

8.EE.5 – Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* 18

8.EE.6 – Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. 20

Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations. ***21***

8.EE.7 – Solve linear equations in one variable. 21

8.EE.8 – Analyze and solve pairs of simultaneous linear equations. 25

FUNCTIONS (F) **29**

Cluster: Define, evaluate, and compare functions. ***30***

8.F.1 – Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.) 30

8.F.2 – Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* 33

8.F.3 – Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.* 35

Cluster: Use functions to model relationships between quantities. ***36***

8.F.4 – Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x*, *y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. 36

8.F.5 – Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. 38

GEOMETRY (G) **42**

Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software. ***43***

8.G.1 – Verify experimentally the properties of rotations, reflections, and translations: 43

8.G.2 – Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. 45

8.G.3 – Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. 49

8.G.4 – Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. 54

8.G.5 – Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.* 58

Cluster: Understand and apply the Pythagorean Theorem. ***59***

8.G.6 – Explain a proof of the Pythagorean Theorem and its converse. 59

8.G.7 – Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. 61

8.G.8 – Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. 65

Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones and spheres. ***66***

8.G.9 – Know the formulas for the volume of cones, cylinders and spheres and use them to solve real-world and mathematical problems. 66

STATISTICS AND PROBABILITY (SP) **71**

Cluster: Investigate patterns of association in bivariate data. ***72***

8.SP.1 – Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 72

8.SP.2 – Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. 74

8.SP.3 – Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* 76

8.SP.4 – Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?* 79

ANSWER KEY AND ITEM RUBRICS **82**

The Number System (NS) ***83***

Expressions and Equations (EE) ***84***

Functions (F) ***92***

Geometry (G) ***98***

Statistics and Probability (SP) ***115***

SECTION 3: PERFORMANCE TASKS **121**

Grade 8 Performance Tasks **122**

INTRODUCTION

The purpose of this document is to illustrate the differences between the Delaware Comprehensive Assessment System (DCAS) and the expectations of the next-generation Common Core State Standard (CCSS) assessment in Mathematics. A side-by-side comparison of the current design of an operational assessment item and the expectations for the content and rigor of a next-generation Common Core mathematical item are provided for each CCSS. The samples provided are designed to help Delaware's educators better understand the instructional shifts needed to meet the rigorous demands of the CCSS. This document does not represent the test specifications or blueprints for each grade level, for DCAS, or the next-generation assessment.

For mathematics, next-generation assessment items were selected for CCSS that represent the shift in content at the new grade level. Sites used to select the next-generation assessment items include:

- Smarter Balanced Assessment Consortium
- Partnership of Assessment of Readiness for College and Career
- Illustrative Mathematics
- Mathematics Assessment Project

Using released items from other states, a DCAS-like item, aligned to the same CCSS, was chosen. These examples emphasize the contrast in rigor between the previous Delaware standards, known as Grade-Level Expectations, and the Common Core State Standards.

Section 1, DCAS-Like and Next-Generation Assessment Comparison, includes content that is in the CCSS at a different "rigor" level. The examples are organized by the CCSS. For some standards, more than one example may be given to illustrate the different components of the standard. Additionally, each example identifies the standard and is separated into two parts. Part A is an example of a DCAS-like item, and Part B is an example of a next-generation item based on CCSS.

Section 2 includes at least one Performance Task that addresses multiple aspects of the CCSS (content and mathematical practices).

How to Use Various Aspects of This Document

- Analyze the way mathematics standards are conceptualized in each item or task.
- Identify the instructional shifts that need to occur to prepare students to address these more rigorous demands. Develop a plan to implement the necessary instructional changes.
- Notice how numbers (e.g., fractions instead of whole numbers) are used in the sample items.
- Recognize that the sample items and tasks are only one way of assessing the standard.
- Understand that the sample items and tasks do not represent a mini-version of the next-generation assessment.
- Instruction should address "focus," coherence," and "rigor" of mathematics concepts.
- Instruction should embed mathematical practices when teaching mathematical content.

- For grades K–5, calculators should not be used as the concepts of number sense and operations are fundamental to learning new mathematics content in grades 6–12.
- The next-generation assessment will be online and the scoring will be done electronically. It is important to note that students may not be asked to show their work and therefore will not be given partial credit. It is suggested when using items within this document in the classroom for formative assessments, it is good practice to have students demonstrate their methodology by showing or explaining their work.

Your feedback is welcome. Please do not hesitate to contact Katia Foret at katia.foret@doe.k12.de.us or Rita Fry at rita.fry@doe.k12.de.us with suggestions, questions, and/or concerns.

* The Smarter Balanced Assessment Consortium has a 30-item practice test available for each grade level (3-8 and 11) for mathematics and ELA (including reading, writing, listening, and research). These practice tests allow students to experience items that look and function like those being developed for the Smarter Balanced assessments. The practice test also includes performance tasks and is constructed to follow a test blueprint similar to the blueprint intended for the operational test. The Smarter Balanced site is located at: http://www.smarterbalanced.org/.

Priorities in Mathematics

Grade	Priorities in Support of Rich Instruction and Expectations of Fluency and Conceptual Understanding
K–2	Addition and subtraction, measurement using whole number quantities
3–5	Multiplication and division of whole numbers and fractions
6	Ratios and proportional reasoning; early expressions and equations
7	Ratios and proportional reasoning; arithmetic of rational numbers
8	Linear algebra

Common Core State Standards for Mathematical Practices

Mathematical Practices		Student Dispositions:	Teacher Actions to Engage Students in Practices:
Essential Processes for a Productive Math Thinker	**1. Make sense of problems and persevere in solving them**	▪ Have an understanding of the situation ▪ Use patience and persistence to solve problem ▪ Be able to use different strategies ▪ Use self-evaluation and redirections ▪ Communicate both verbally and written ▪ Be able to deduce what is a reasonable solution	▪ Provide open-ended and rich problems ▪ Ask probing questions ▪ Model multiple problem-solving strategies through Think-Aloud ▪ Promote and value discourse ▪ Integrate cross-curricular materials ▪ Promote collaboration ▪ Probe student responses (correct or incorrect) for understanding and multiple approaches ▪ Provide scaffolding when appropriate ▪ Provide a safe environment for learning from mistakes
	6. Attend to precision	▪ Communicate with precision—orally and written ▪ Use mathematics concepts and vocabulary appropriately ▪ State meaning of symbols and use them appropriately ▪ Attend to units/labeling/tools accurately ▪ Carefully formulate explanations and defend answers ▪ Calculate accurately and efficiently ▪ Formulate and make use of definitions with others ▪ Ensure reasonableness of answers ▪ Persevere through multiple-step problems	▪ Encourage students to think aloud ▪ Develop explicit instruction/teacher models of thinking aloud ▪ Include guided inquiry as teacher gives problem, students work together to solve problems, and debrief time for sharing and comparing strategies ▪ Use probing questions that target content of study ▪ Promote mathematical language ▪ Encourage students to identify errors when answers are wrong
Reasoning and Explaining	**2. Reason abstractly and quantitatively**	▪ Create multiple representations ▪ Interpret problems in contexts ▪ Estimate first/answer reasonable ▪ Make connections ▪ Represent symbolically ▪ Talk about problems, real-life situations ▪ Attend to units ▪ Use context to think about a problem	▪ Develop opportunities for problem-solving strategies ▪ Give time for processing and discussing ▪ Tie content areas together to help make connections ▪ Give real-world situations ▪ Demonstrate thinking aloud for students' benefit ▪ Value invented strategies and representations ▪ More emphasis on the process instead of on the answer
	3. Construct viable arguments and critique the reasoning of others	▪ Ask questions ▪ Use examples and counter examples ▪ Reason inductively and make plausible arguments ▪ Use objects, drawings, diagrams, and actions ▪ Develop ideas about mathematics and support their reasoning ▪ Analyze others arguments ▪ Encourage the use of mathematics vocabulary	▪ Create a safe environment for risk-taking and critiquing with respect ▪ Provide complex, rigorous tasks that foster deep thinking ▪ Provide time for student discourse ▪ Plan effective questions and student grouping ▪ Probe students

Mathematical Practices		Students:	Teacher(s) promote(s) by:
Modeling and Using Tools	**4. Model with mathematics**	▪ Realize that mathematics (numbers and symbols) is used to solve/work out real-life situations ▪ Analyze relationships to draw conclusions ▪ Interpret mathematical results in context ▪ Show evidence that they can use their mathematical results to think about a problem and determine if the results are reasonable—if not, go back and look for more information ▪ Make sense of the mathematics	▪ Allowing time for the process to take place (model, make graphs, etc.) ▪ Modeling desired behaviors (think alouds) and thought processes (questioning, revision, reflection/written) ▪ Making appropriate tools available ▪ Creating an emotionally safe environment where risk-taking is valued ▪ Providing meaningful, real-world, authentic, performance-based tasks (non-traditional work problems) ▪ Promoting discourse and investigations
	5. Use appropriate tools strategically	▪ Choose the appropriate tool to solve a given problem and deepen their conceptual understanding (paper/pencil, ruler, base ten blocks, compass, protractor) ▪ Choose the appropriate technological tool to solve a given problem and deepen their conceptual understanding (e.g., spreadsheet, geometry software, calculator, web 2.0 tools) ▪ Compare the efficiency of different tools ▪ Recognize the usefulness and limitations of different tools	▪ Maintaining knowledge of appropriate tools ▪ Modeling effectively the tools available, their benefits, and limitations ▪ Modeling a situation where the decision needs to be made as to which tool should be used ▪ Comparing/contrasting effectiveness of tools ▪ Making available and encouraging use of a variety of tools
Seeing Structure and Generalizing	**7. Look for and make use of structure**	▪ Look for, interpret, and identify patterns and structures ▪ Make connections to skills and strategies previously learned to solve new problems/tasks independently and with peers ▪ Reflect and recognize various structures in mathematics ▪ Breakdown complex problems into simpler, more manageable chunks ▪ "Step back" or shift perspective ▪ Value multiple perspectives	▪ Being quiet and structuring opportunities for students to think aloud ▪ Facilitating learning by using open-ended questions to assist students in exploration ▪ Selecting tasks that allow students to discern structures or patterns to make connections ▪ Allowing time for student discussion and processing in place of fixed rules or definitions ▪ Fostering persistence/stamina in problem solving ▪ Allowing time for students to practice
	8. Look for and express regularity in repeated reasoning	▪ Identify patterns and make generalizations ▪ Continually evaluate reasonableness of intermediate results ▪ Maintain oversight of the process ▪ Search for and identify and use shortcuts	▪ Providing rich and varied tasks that allow students to generalize relationships and methods and build on prior mathematical knowledge ▪ Providing adequate time for exploration ▪ Providing time for dialogue, reflection, and peer collaboration ▪ Asking deliberate questions that enable students to reflect on their own thinking ▪ Creating strategic and intentional check-in points during student work time

For classroom posters depicting the Mathematical Practices, please see: http://seancarberry.cmswiki.wikispaces.net/file/detail/12-20math.docx

THE NUMBER SYSTEM (NS)

Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers.

8.NS.1 – Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

DCAS-Like

1A

Which of the following is an irrational number?

A. $\sqrt{21}$

B. 2.59×105

C. $\sqrt{81}$

D. $-\frac{1}{3}$

Next-Generation

1B

A student made this conjecture and found two examples to support the conjecture.

If a rational number is not an integer, then the square root of the rational number is irrational.

For example, $\sqrt{3.6}$ is irrational and $\sqrt{\frac{1}{2}}$ is irrational.

Provide two examples of non-integer rational numbers that show that the conjecture is **false**.

Example 1:

Example 2:

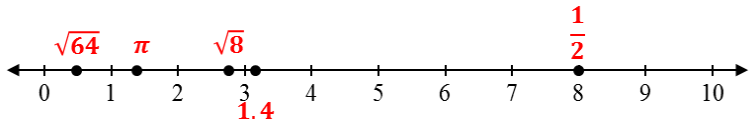
8.NS.2 – Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

DCAS-Like

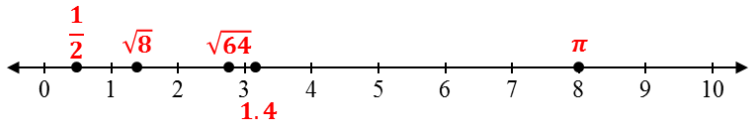
2A

Graph the numbers $\sqrt{8}$, 1.4, $\sqrt{64}$, $\frac{1}{2}$, and π on a number line. Then order the numbers from least to greatest.

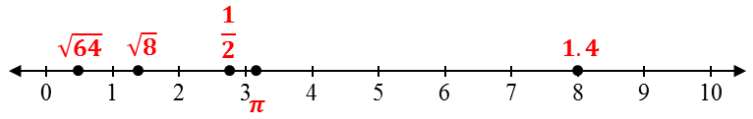
A.



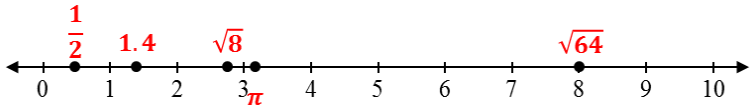
B.



C.



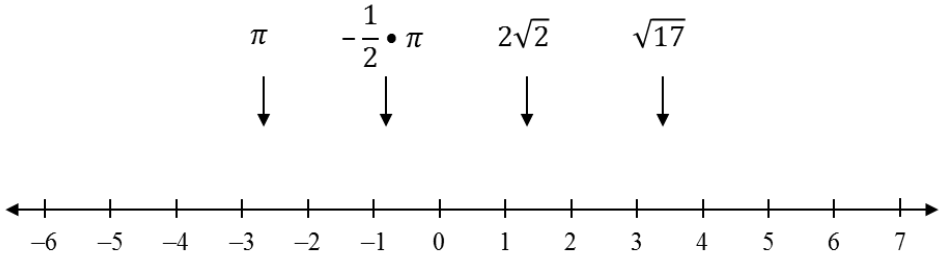
D.



Next-Generation

2B

Without using your calculator, label approximate locations for the following numbers on the number line.



EXPRESSIONS AND EQUATIONS (EE)

Cluster: Work with radicals and integer exponents.

8.EE.1 – Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.

DCAS-Like

3A

Which of the following expressions is ***not*** equivalent to $\frac{1}{25}$?

A. $5^3 \times 5^{-5}$

B. $5^{-1} \times 5^{-1}$

C. $5^{-3} \times 5$

D. $5^{-2} \times 5^4$

Next-Generation

3B

Select **all** of the expressions that have a value between 0 and 1.

a. $8^7 \bullet 8^{-12}$

b. $\frac{7^4}{7^{-3}}$

c. $\left(\frac{1}{3}\right)^2 \bullet \left(\frac{1}{3}\right)^9$

d. $\frac{(-5)^6}{(-5)^{10}}$

8.EE.1 – Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.

DCAS-Like

4A

Which of the following is equivalent to $5^2 + 5^2$?

A. 10^2

B. 5^4

C. 20

D. 2×5^2

Next-Generation

4B

Part A

Type numbers in the boxes below to complete the pattern of exponents and equivalent values.

10^5 = 100,000

10^4 = 10,000

10^3 = 1,000

$10^{\square}$ = _____

$10^{\square}$ = _____

$10^{\square}$ = _____

$10^{\square}$ = _____

Part B

Write a number on the line below that is equivalent to the expression.

$10^{-5} \times 10^2 \times 10^0$ = _____

8.EE.2 – Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

DCAS-Like

5A

$$\begin{aligned} 1+3 &= 4 \\ 1+3+5 &= 9 \\ 1+3+5+7 &= 16 \\ 1+3+5+7+9 &= 25 \end{aligned}$$

According to the pattern suggested by the four examples above, how many consecutive odd integers are required to give a sum of 144?

A. 9

B. 12

C. 15

D. 36

Next-Generation

5B

Ashley and Brandon have different methods for finding square roots.

Ashley's Method

To find the square root of x, find a number so that the product of the number and itself is x. For example, $2 \bullet 2 = 4$, so the square root of 4 is 2.

Brandon's Method

To find the square root of x, multiply x by $\frac{1}{2}$. For example, $4 \bullet \frac{1}{2} = 2$, so the square root of 4 is 2.

Which student's method is **not** correct?

- ❑ Ashley's method
- ❑ Brandon's method

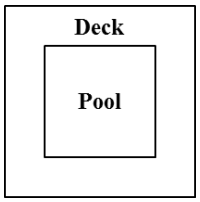
Explain why the method you selected is **not** correct.

8.EE.2 – Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

DCAS-Like

6A

Randal's dad is installing a new pool in their backyard. The pool is a square and has an area of 121 ft^2. Randal's dad will then build a 4 ft wide deck to surround the pool. What is the outside perimeter of the deck?



A. 28 ft

B. 100 ft

C. 76 ft

D. 44 ft

Next-Generation

6B

Use the numbers shown to make the equations true. Each number can be used only one. To use a number, drag it to the appropriate box in an equation.

4	8	10	64	100	1000

a. $\sqrt{\square} = \square$

b. $\sqrt[3]{\square} = \square$

8.EE.2 – Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

DCAS-Like

7A

Which is the solution to the following equation?

$$x^3 = \frac{27}{125}$$

A. $x = 0.216$

B. $x = \frac{1}{5}$

C. $x = \frac{9}{41}$

D. $x = \frac{3}{5}$

Next-Generation

7B

Classify the numbers as perfect squares and perfect cubes. To classify a number, drag it to the appropriate column in the chart. Numbers that are neither perfect squares nor perfect cubes should **not** be placed in the chart.

1	64	96	125	200	256	333	361

Perfect Squares but Not Perfect Cubes	Both Perfect Squares and Perfect Cubes	Perfect Cubes but Not Perfect Cubes

8.EE.3 – Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*

DCAS-Like

8A

The population of Greenville is approximately 75 times the population of Fairview. There are 3.75×10^5 people living in Greenville. Approximately how many people are living in Fairview.

A. 5×10^3

B. 5×10^4

C. 8×10^6

D. 8×10^7

Next-Generation

8B

3908 Nyx is an asteroid between Mars and Jupiter. Let d represent the approximate distance from 3908 Nyx to the Sun.

The average distance from Venus to the Sun is about 7×10^7 miles. The average distance from Jupiter to the Sun is about 5×10^8 miles.

At a certain time of year, the square distance from 3908 Nyx to the Sun is equal to the product of the average distance from Venus to the Sun and the average distance from Jupiter to the Sun. This equation can be used to find the distance from 3908 Nyx to the Sun, d, at this time of year.

$$d^2 = (7 \times 10^7)(5 \times 10^8)$$

Solve the equation for d. Round your answer to the nearest million.

$d =$ _____ miles

8.EE.3 – Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*

DCAS-Like

9A

A scientist measured the wavelength of an orange light wave as 0.000000615 meters. A second scientist measured the wavelength of a green light wave as 5.6×10^{-7} meters. How must longer, in meters, was the orange light wave than the green light wave?

A. 5.5×10^{-14}

B. 5.5×10^{-8}

C. 5.5×10^{-7}

D. 5.5×10^{-6}

Next-Generation

9B

The average distance from Jupiter to the Sun is about 5×10^8 miles. The average distance from Venus to the Sun is about 7×10^7 miles.

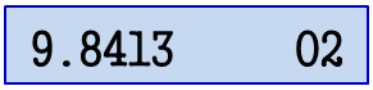
The average distance from Jupiter to the Sun is about how many times as great as the average distance from Venus to the Sun? Show your work.

_____ miles

8.EE.4 – Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

DCAS-Like

10A



The figure above represents a calculator display showing a number in scientific notation. What is the number?

A. 0.098413

B. 19.6826

C. 98.413

D. 984.13

Next-Generation

10B

A light-year is a unit of distance. It is the distance that light travels in 1 year. For example, the distance from the North Star to Earth is about 434 light-years because it takes about 434 years to travel from the North Star to Earth.

The table lists five stars in the constellation Cassiopeia and their approximate distances, in light-years, from Earth.

Light travels at a speed of 3×10^8 meters per second. Highlight each star in the table that is between 7×10^{17} meters and 3×10^{18} meters from Earth. Click the name of a star to highlight it.

Star	Distance from Earth in Light-Years
Schedar	228.56
Caph	54.46
Tsih	613.08
Ruchbah	99.41
Segin	441.95

Cluster: Understand the connections between proportional relationships, lines, and linear equations.

8.EE.5 – Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

DCAS-Like

11A

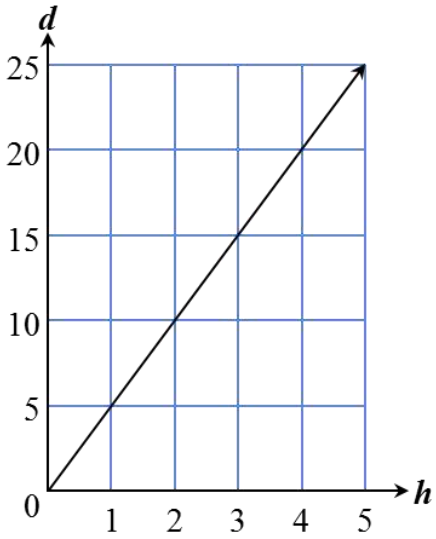
The table shows the relationship between the number of hours, *h*, John has been hiking and the total distance, *d*, he has traveled in kilometers.

John

h	0	1	2	3	4	5
d	0	4	8	12	16	20

The graph shows the distance Sara hiked over the same time period.

Sara



Who hikes faster?

A. Sara

B. John

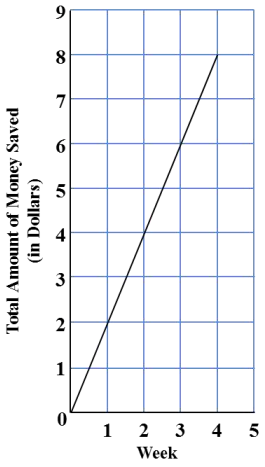
C. They hike at the same rate

D. There is not enough information to determine

11B

Three students saved money for four weeks.

Antwan saved the same amount of money each week for 4 weeks. He made this graph to show how much money he saved.



Carla saved the same amount of money each week for 4 weeks. She made this table to show how much money she saved.

Week	Total Amount of Money Saved
1	$1.75
2	$3.50
3	$5.25
4	$7.00

Omar saved the same amount of money each week for 4 weeks. He wrote the equation below to show how much he saved. In the equation, S is the total amount of money saved, in dollars, and w is the number of weeks.

$$S = 2.5w$$

Identify the student who saved the greatest amount of money each week and the student who saved the least amount of money each week. To select a student, drag the student's name into the box next to the appropriate description.

Antwan	Carla	Omar

Student Name	Student Description
	Student who saved the greatest amount of money each week.
	Student who saved the least amount of money each week.

8.EE.6 – Use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.

DCAS-Like

12A

x	*y*
–8	–42
–3	–17
0	–2
6	28

If a line contains the points in the table above, what is the equation of the line?

A. $y = -2x + 5$

B. $y = 2x - 5$

C. $y = 5x - 2$

D. $y = -5x - 2$

Next-Generation

12B

Mr. Perry's students used pairs of points to find the slopes of lines. Mr. Perry asked Avery how she used the pairs of points listed in this table to find the slope of a line.

x	*y*
8	18
20	45

Avery said, "The easiest way to find the slope is to divide *y* by *x*. The slope of this line is $\frac{18}{8}$, or $\frac{9}{4}$."

Part A

Show another way to find the slope of the line that passes through the points listed in the table. Your way must be different from Avery's way.

Part B

Write an example that shows that Avery's "divide *y* by *x*" method will not work to find the slope of **any** line.

Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations.

8.EE.7 – Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

DCAS-Like

13A

If $d = 110$ and $a = 20$ in the formula $d = \frac{a}{2}(2t - 1)$, then what is the value of t?

A. $\frac{15}{22}$

B. $\frac{15}{8}$

C. $\frac{111}{20}$

D. 6

13B

Consider the equation $3(2x + 5) = ax + b$.

Part A

Find one value for a and one value for b so that there is exactly one value of x that makes the equation true.

$a =$ _____

$b =$ _____

Explain your reasoning.

Part B

Find one value for a and one value for b so that there are infinitely many values of x that make the equation true.

$a =$ _____

$b =$ _____

Explain your reasoning.

8.EE.7 – Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

DCAS-Like

14A

$$\frac{2}{3}(2x-1)+2\frac{1}{3}=7+\frac{1}{2}x$$

Which step would **not** be a possible first step for solving this equation algebraically?

A. Multiplying every term in the equation by 6

B. Subtracting $2\frac{1}{3}$ from 7

C. Subtracting $\frac{1}{2}x$ from $2x$

D. Multiplying –1 by $\frac{2}{3}$

Next-Generation

14B

Three students solved the equation $3(5x-14)=18$ in different ways, but each student arrived at the correct answer. Select all of the solutions that show a correct method for solving the equation.

a.
$$\begin{aligned} 3(5x-14) &= 18 \\ 8x-14 &= 18 \\ +14 &\quad +14 \\ \frac{8x}{8} &= \frac{32}{8} \\ x &= 4 \end{aligned}$$

b.
$$\begin{aligned} \cancel{\tfrac{1}{3}}\cdot 3(5x-14) &= 18\cdot\cancel{\tfrac{1}{3}} \\ 5x-14 &= 6 \\ +14 &\quad +14 \\ \frac{5x}{5} &= \frac{20}{5} \\ x &= 4 \end{aligned}$$

c.
$$\begin{aligned} 3(5x-14) &= 18 \\ \frac{15x}{15}-\frac{42}{15} &= \frac{18}{15} \\ +\frac{42}{15} &\quad +\frac{42}{15} \\ x &= \frac{60}{15} \\ x &= 4 \end{aligned}$$

8.EE.7 – Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

DCAS-Like

15A

Solve $10y + 7 - 4y = -5 + 6y + 22$. Tell whether the equation has infinitely many solutions or no solution.

A. Infinitely many solutions

B. Only one solution

C. Two solutions

D. No solutions

Next-Generation

15B

For each linear equation in this table, indicate whether the equation has no solution, one solution, or infinitely many solutions.

Equation	No Solution	One Solution	Infinitely Many Solutions
a. $\boldsymbol{7x + 21 = 21}$	○	○	○
b. $\boldsymbol{12x + 15 = 12x - 15}$	○	○	○
c. $\boldsymbol{-5x - 25 = 5x + 25}$	○	○	○

8.EE.8 – Analyze and solve pairs of simultaneous linear equations.

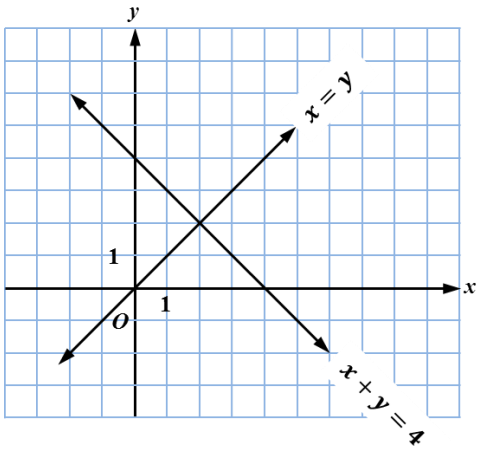
a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*

c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

DCAS-Like

16A



Which point is the solution to both equations shown on the graph above?

A. (0, 0)

B. (0, 4)

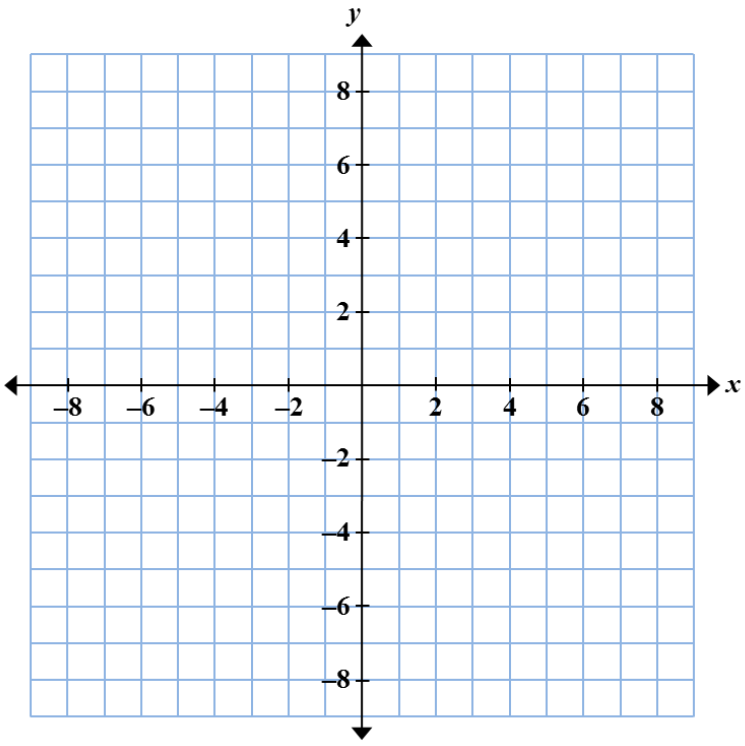
C. (1, 1)

D. (2, 2)

16B

Part A

The solution of a system of two linear equations is (–3, 1). On this coordinate grid, graph two lines that could be the graphs of the two linear equations in the system.



Part B

The computer has labeled the lines you graphed a and b.

What is the equation of line a? _____

What is the equation of line b? _____

8.EE.8 – Analyze and solve pairs of simultaneous linear equations.

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*

c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

DCAS-Like

17A

$$\begin{cases} x + 2y = 1 \\ 2x - y = 7 \end{cases}$$

In the solution of the system of equations above, what is the value of x?

A. –1

B. 2

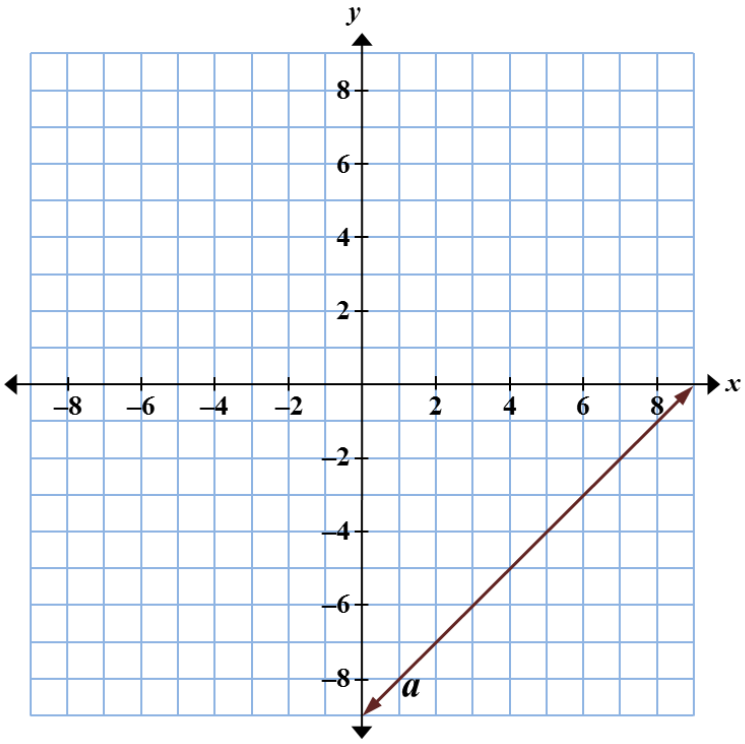
C. 3

D. 4

17B

Line a is shown on the coordinate grid. Construct line b on the coordinate grid so that:

- Line a and line b represent a system of linear equations with a solution of (7, –2).
- The slope of line b is greater than –1 and less than 0.
- The y-intercept of line b is positive.



FUNCTIONS (F)

Cluster: Define, evaluate, and compare functions.

8.F.1 – Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.)

DCAS-Like

18A

In which table is y a function of x?

A.

x	y
–3	6
2	5
3	2
2	3

B.

x	y
–1	0
5	2
7	3
5	4

C.

x	y
2	–1
3	0
4	–5
5	7

D.

x	y
0	6
–1	3
2	4
–1	5

Next-Generation

18B

Fill in each x-value and y-value in the table below to create a relation that is **not** a function.

x	y

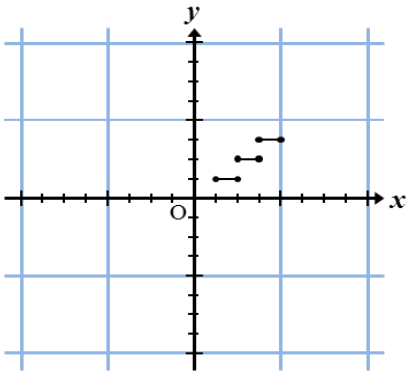
8.F.1 – Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.)

DCAS-Like

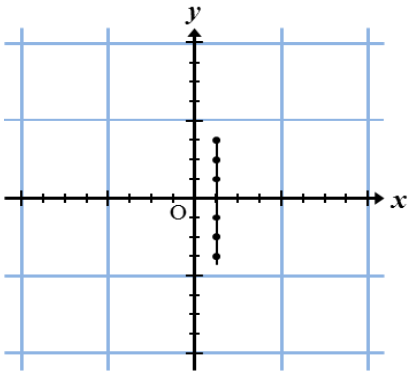
19A

Which of the following could be the graph of a function?

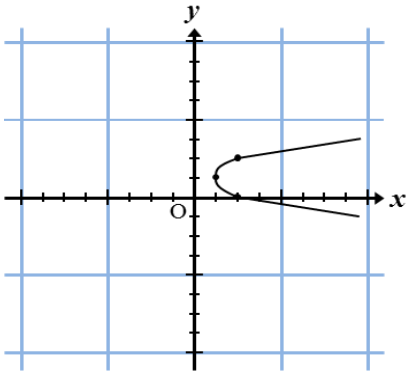
A.



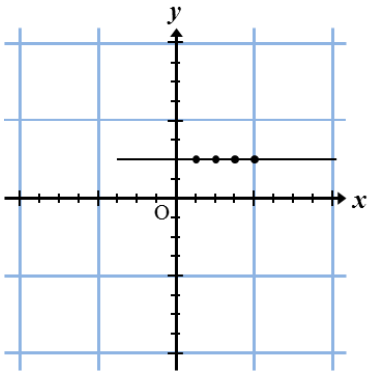
B.



C.



D.

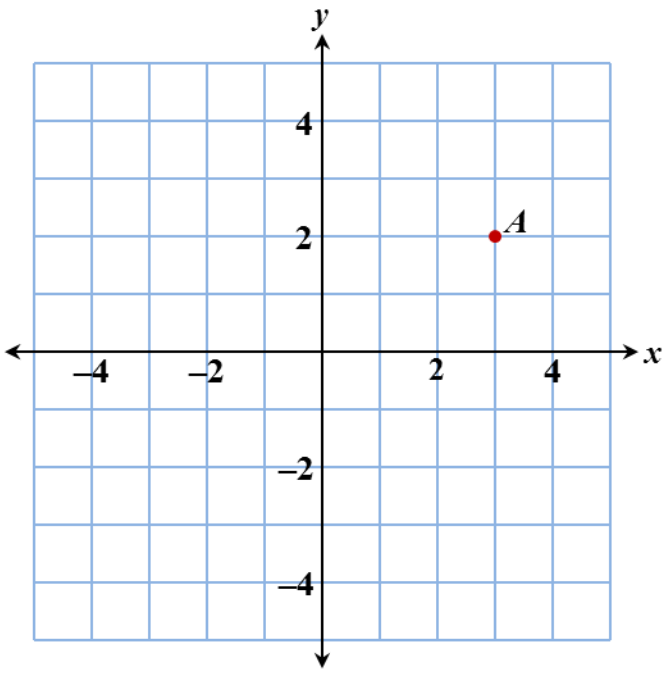


19B

Point A is plotted on the xy-coordinate plane below. You must determine the location of point C given the following criteria:

- Point C has integer coordinates.
- The graph of line $\overleftrightarrow{AC}$ is **not** a function.

Click on the xy-coordinate plane below to place a point that could represent point C.



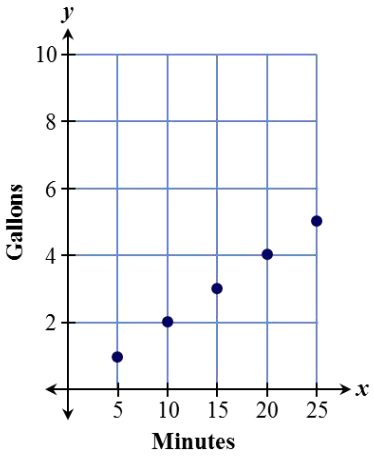
8.F.2 – Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

DCAS-Like

20A

Rain is flowing into two containers at different rates. The figure below shows the volume of water in each container at different times.

Container 1



Container 2

Minutes	Gallons
5	2
10	4
15	6
20	8
25	10

What is the difference in the rate of change between the two containers?

A. $\frac{1}{5}$ gallon per minute

B. $\frac{3}{5}$ gallon per minute

C. $\frac{5}{2}$ gallon per minute

D. $\frac{15}{2}$ gallon per minute

20B

Sam wants to take his MP3 player and his video game player on a car trip. An hour before they plan to leave, he realized that he forgot to charge the batteries last night. At that point, he plugged in both devices so they can charge as long as possible before they leave.

Sam knows that his MP3 player has 40% of its battery life left and that the battery charges by an additional 12 percentage points every 15 minutes.

His video game player is new, so Sam doesn't know how fast it is charging, but he recorded the battery charge for the first 30 minutes after he plugged it in.

Time Charging (minutes)	0	10	20	30
Video Game Player Battery Charge (%)	20	32	44	56

a. If Sam's family leaves as planned, what percent of the battery will be charged for each of the two devices when they leave?

b. How much time would Sam need to charge the battery 100% on both devices?

8.F.3 – Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*

DCAS-Like

21A

Which function is nonlinear?

A. $y = \frac{3x+1}{2}$

B. $y = -x$

C. $y = 2x(x - 4)$

D. $y = \frac{1}{2}x - 7$

Next-Generation

21B

Samir was assigned to write an example of a linear functional relationship. He wrote this example for the assignment.

> The relationship between the year and the population of a county when the population increases by 10% each year.

Part A

Complete the table below to create an example of the population of a certain county that is increasing by 10% each year.

Year	Population of a Certain County
0	
1	
2	
3	
4	

Part B

State whether Samir's example represents a linear functional relationship. Explain your reasoning.

Cluster: Use functions to model relationships between quantities.

8.F.4 – Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x*, *y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

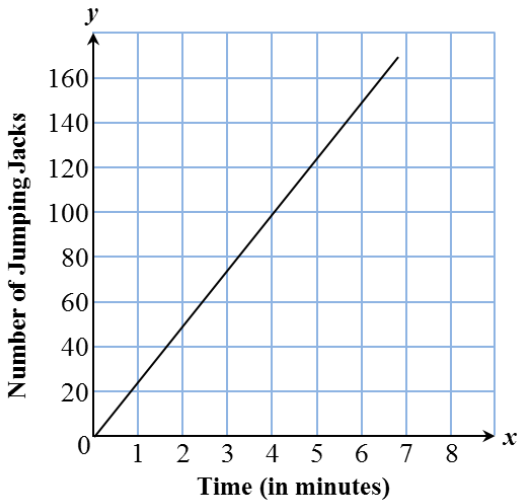
DCAS-Like

22A

Alicia and Melissa did jumping jacks. The table below shows the number of jumping jacks that Alicia had done in different amounts of time.

Alicia	**Time (minutes)**	1	2	3	4	5	6	7	8
	Jumping Jacks	30	60	90	120	150	180	210	240

The graph below shows the number of jumping jacks Melissa had done in different amounts of time.



Which choice **best** describes the difference between the rates at which the girls did jumping jacks?

A. Melissa did 6 more jumping jacks per minute than Alicia.

B. Alicia did 6 more jumping jacks per minute than Melissa.

C. Melissa did 5 more jumping jacks per minute than Alicia.

D. Alicia did 5 more jumping jacks per minute than Melissa.

22B

The total cost of an order of shirts from a company consists of the cost of each shirt plus a one-time design fee. The cost of each shirt is the same regardless of how many shirts are ordered.

The company provides the following examples to customers to help them estimate the total cost of an order of shirts:

- 50 shirts cost $349.50
- 500 shirts cost $2370

Part A

Based on the examples, what is the cost of each shirt, **not** including the one-time design fee?

$_____

Explain how you found your answer.

Part B

What is the cost of the one-time design fee? $_____

Explain how you found your answer.

8.F.5 – Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

DCAS-Like

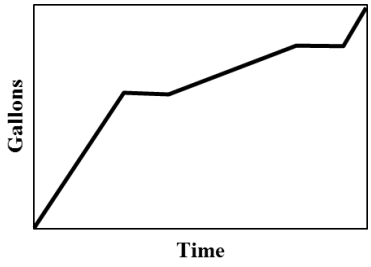
23A

Mr. Jones filled his swimming pool with water.

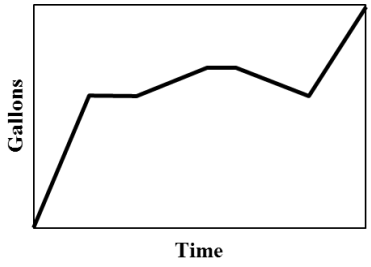
- Mr. Jones began filling the pool at a constant rate.
- He turned off the water for a while.
- He then turned the water back on at a slower constant rate.
- Mr. Jones turned off the water again for a while.
- He then turned the water back on at the first rate.

Which graph **best** represents Mr. Jones filling the pool?

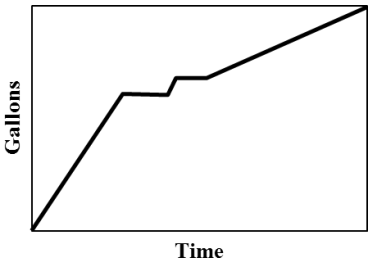
A.



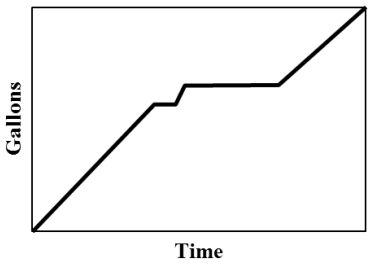
B.



C.



D.

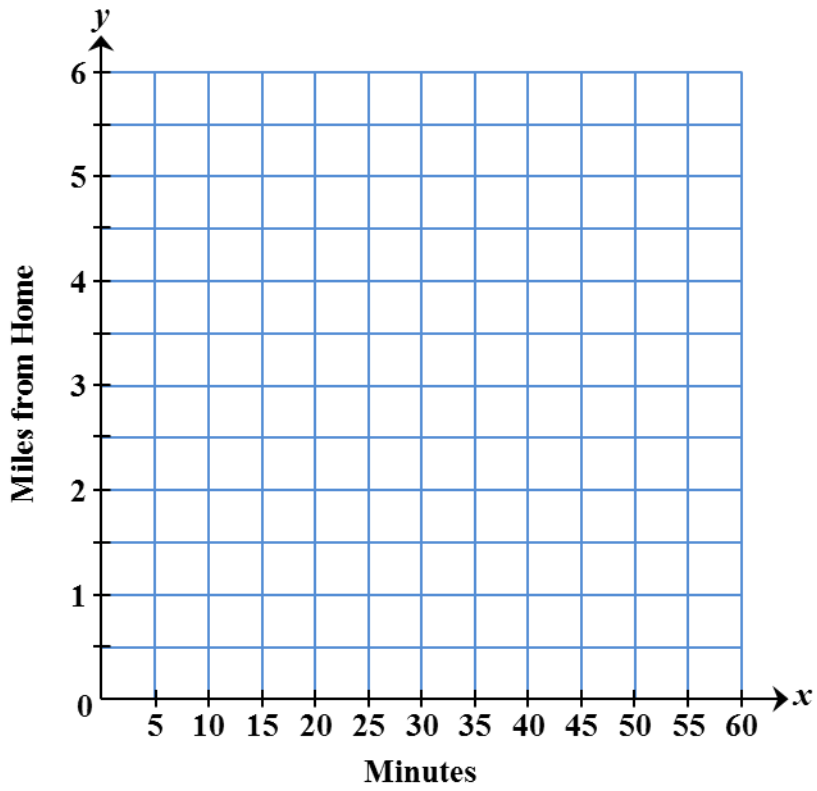


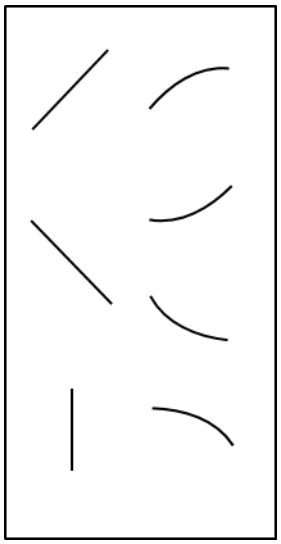
23B

Carla rode her bike to her grandmother's house. The following information describes her trip:

- For the first 5 minutes, Carla rode fast and then slowed down. She rode 1 mile.
- For the next 15 minutes, Carla rode at a steady pace until she arrived at her grandmother's house. She rode 3 miles.
- For the next 10 minutes, Carla visited her grandmother.
- For the next 5 minutes, Carla rode slowly at first but then began to ride faster. She rode 1 mile.
- For the last 10 minutes, Carla rode fast. She rode 3 miles at a steady pace.

Graph each part of Carla's trip. To graph part of her trip, first click the correct line type in the box. Then click in the graph to add the starting point and the ending point for that part of her trip. Repeat these steps until a graph of Carla's entire trip has been created.



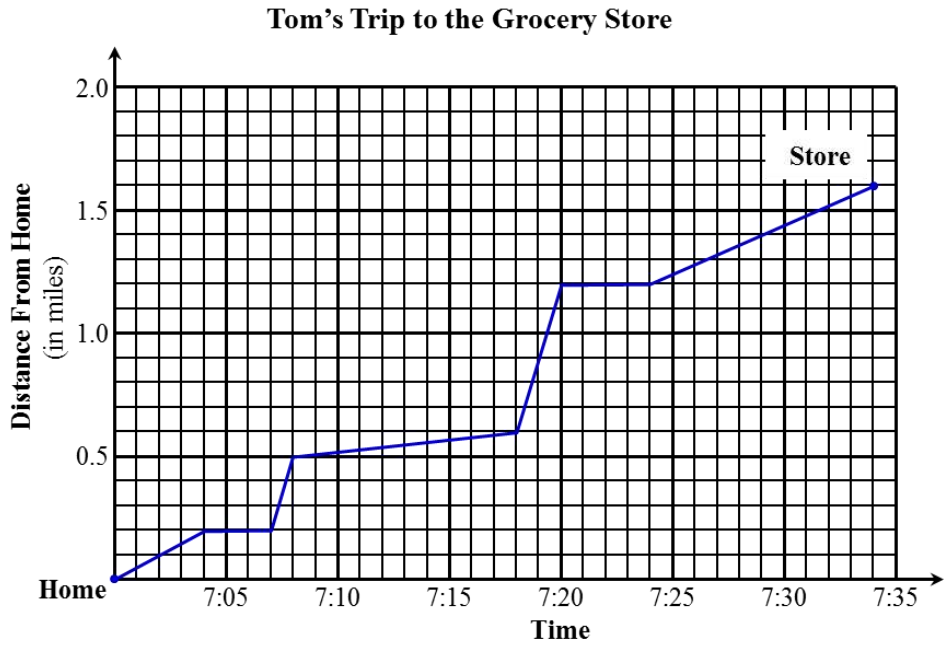


8.F.5 – Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

DCAS-Like

24A

Tom went to the grocery store. The graph below shows Tom's distance from home during his trip.



Tom stopped twice to rest on his trip to the store. What is the total amount of time that he spent resting?

A. 5 minutes

B. 7 minutes

C. 8 minutes

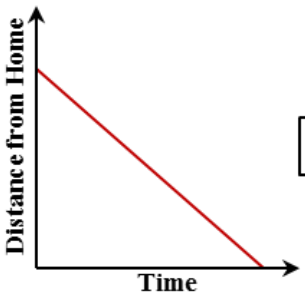
D. 10 minutes

Next-Generation

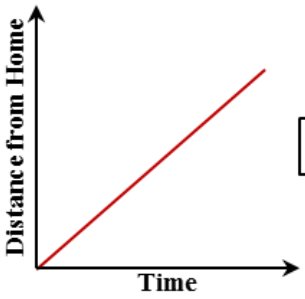
24B

Each day, Maria walks from home to school and then from school to home. The graphs that follow show the distance that Maria is from home at different times during the walk.

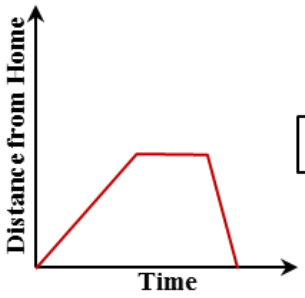
Match the graphs to the descriptions of Maria's walk shown to the right of the graphs. Next to each graph, enter the letter (a, b, c, or d) of the description that best matches the graph.



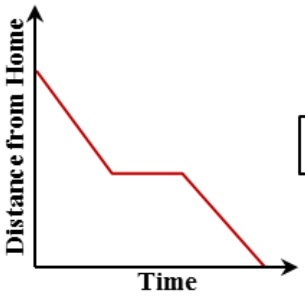
a. Maria walks from school to her friend's house. She visits her friend for a while. Then, she walks the rest of the way home.



b. Maria walks from home to school at a constant rate.



c. Maria starts to walk from home to school. She stops to see whether she has her homework. She realizes she forgot her homework and runs back home to get it.



d. Maria walks from school to home at a constant rate.

GEOMETRY (G)

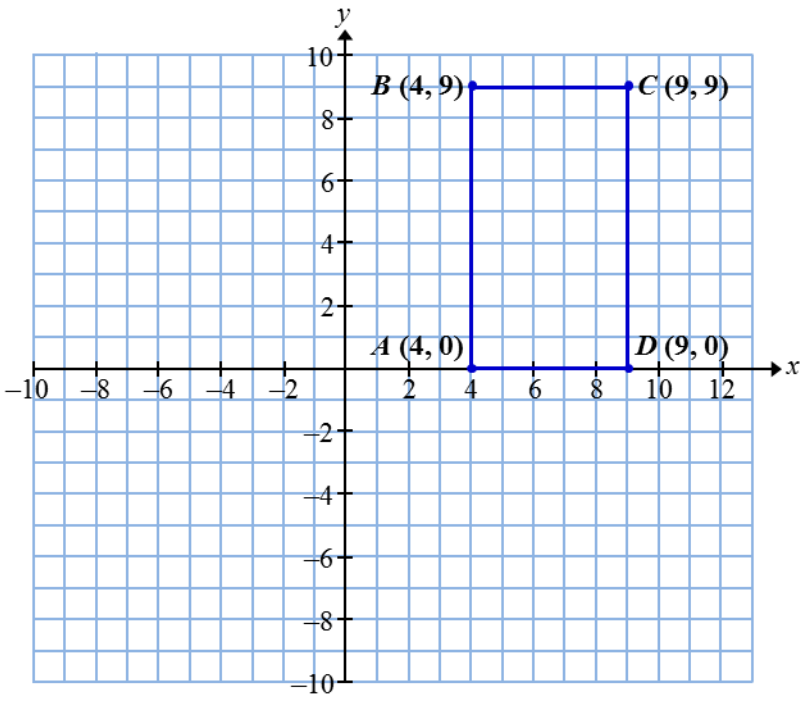
Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

8.G.1 – Verify experimentally the properties of rotations, reflections, and translations:
a. Lines are taken to lines, and line segments to line segments of the same length.
b. Angles are taken to angles of the same measure.
c. Parallel lines are taken to parallel lines.

DCAS-Like

25A

Rectangle $ABCD$ is shown in the coordinate plane below. Rectangle $RVTS$ (not shown) has coordinates $R(0, 4)$, $V(–9, 4)$, $T(–9, 9)$, and $S(0, 9)$. Which of the following is true about rectangles $ABCD$ and $RVTS$?



A. $ABCD \cong RVTS$ since the image when $ABCD$ is reflected over the y-axis is $RVTS$.

B. $ABCD \ncong RVTS$ since the image when $ABCD$ is reflected over the y-axis is <u>not</u> $RVTS$.

C. $ABCD \cong RVTS$ since the image when $ABCD$ is rotated 90° counterclockwise about the origin is $RVTS$.

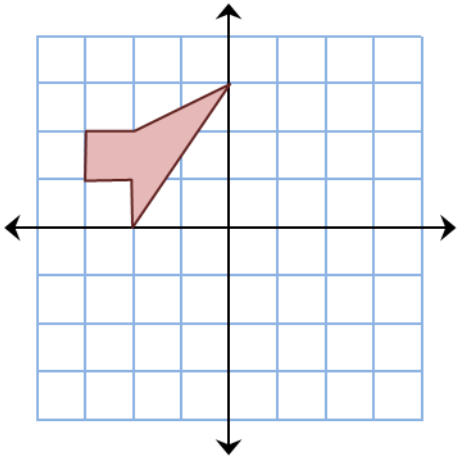
D. $ABCD \ncong RVTS$ since the image when $ABCD$ is rotated 90° counterclockwise about the origin is <u>not</u> $RVTS$.

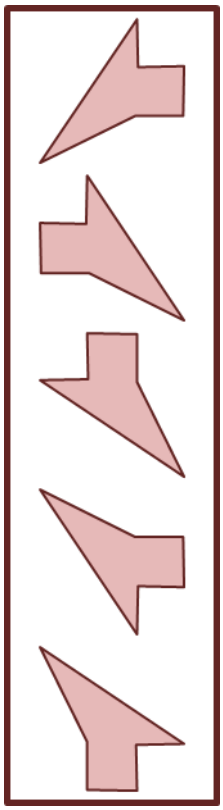
25B

Aaron is drawing some designs for greeting cards. He divides a grid into 4 quadrants and starts by drawing a shape in one quadrant. He then reflects the shape into the other three quadrants.

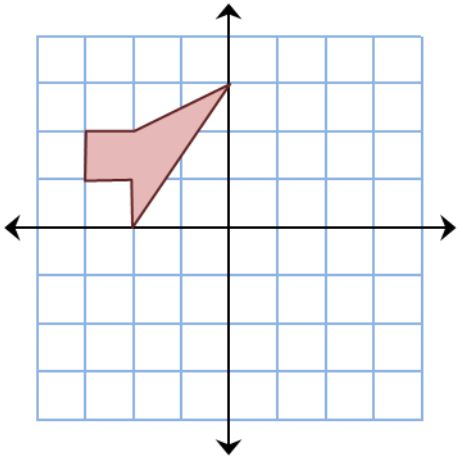
Finish Aaron's first design by dragging the appropriate shape in the bar to:

a. Reflect the shape over the vertical line; and then





b. Reflect both shapes formed in item a. over the horizontal line.

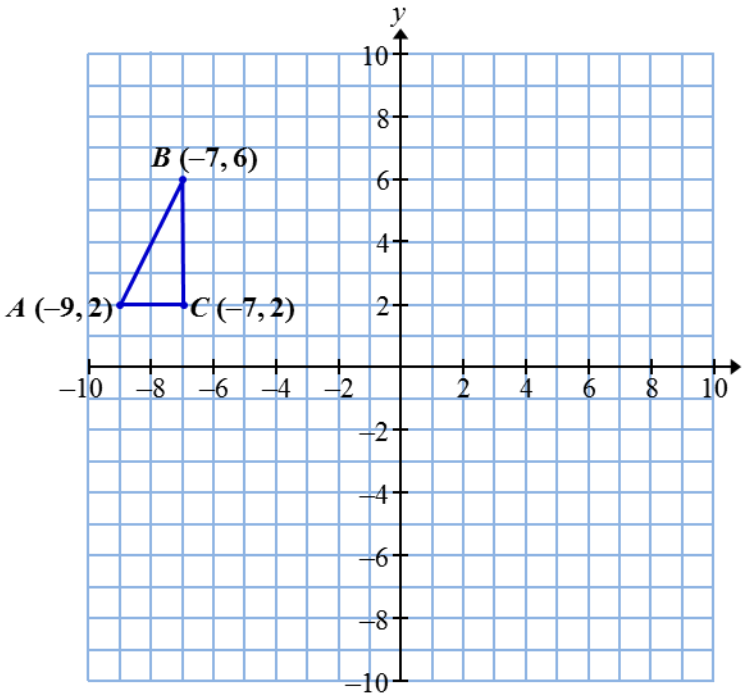


8.G.2 – Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

DCAS-Like

26A

Triangle ABC is shown in the coordinate plane below. Triangle XYZ (not shown) is located in the coordinate plane with vertices at points X (9, 0), Y (7, 4), and Z (7, 0).



Which of the following transformations shows that triangle ABC is congruent to triangle XYZ?

A. Triangle ABC is translated 7 units to the right and 2 units down.

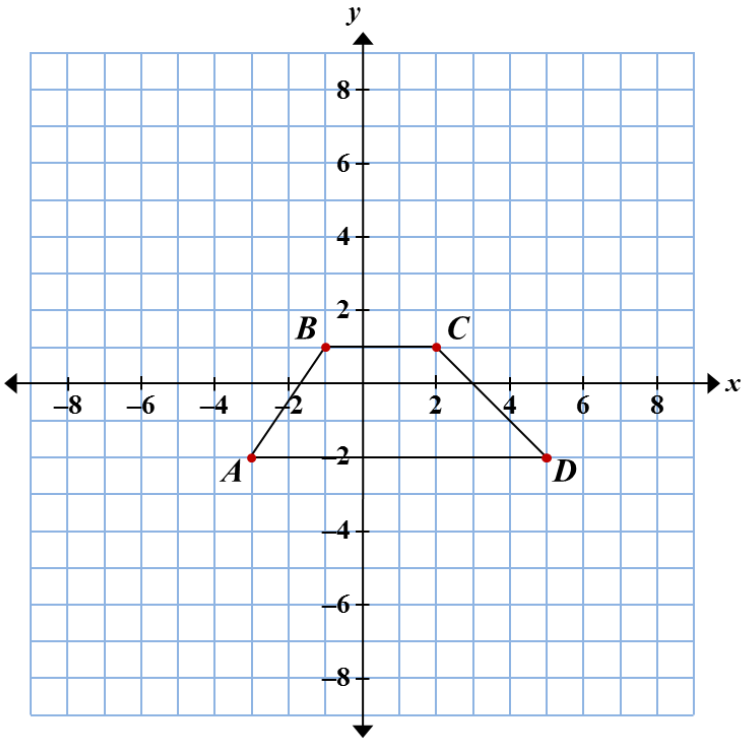
B. Triangle ABC is translated 14 units to the right and 2 units down.

C. Triangle ABC is reflected over the x-axis and translated 2 units down.

D. Triangle ABC is reflected over the y-axis and translated 2 units down.

26B

Trapezoid $ABCD$ is shown on this coordinate grid. Translate trapezoid $ABCD$ 6 units to the left and 5 units up and graph the image of $ABCD$ on the grid.

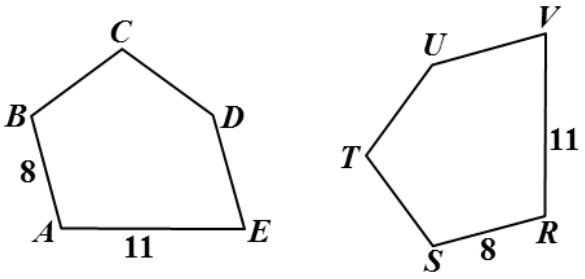


To graph the image, plot the vertices of the image on the coordinate grid and then connect the vertices with line segments.

8.G.2 – Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

DCAS-Like

27A



In the figure above, polygons $ABCDE$ and $RSTUV$ are congruent. Which side must have the same length as side BC?

A. CD

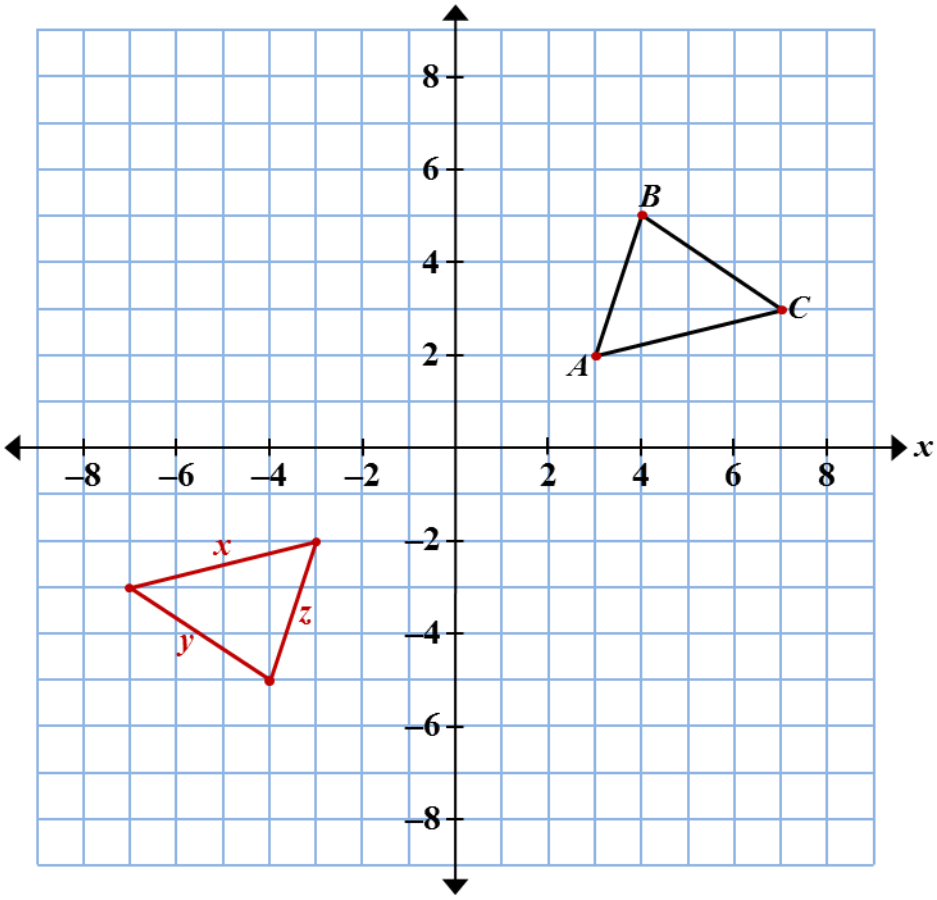
B. DE

C. ST

D. TU

27B

Triangle ABC on this coordinate grid was created by joining points A (3, 2), B (4, 5), and C (7, 3) with line segments.



Triangle ABC was reflected over the x-axis and then reflected over the y-axis to form the red triangle, where x, y, and z represent the lengths of the sides of the red triangle.

Click the appropriate boxes in the table to show which sides of the triangles have equal lengths.

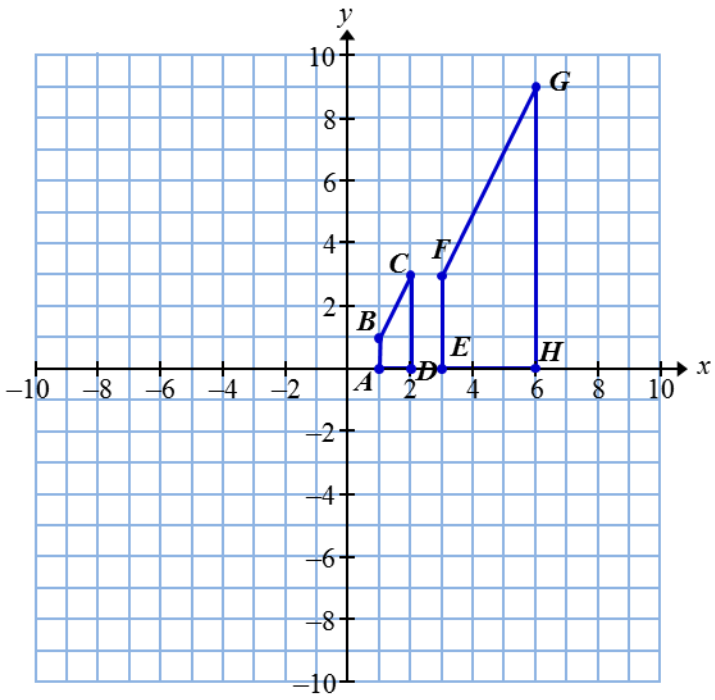
	x	*y*	*z*
AB			
AC			
BC			

8.G.3 – Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

DCAS-Like

28A

Quadrilateral $ABCD$, shown in the coordinate plane below, is dilated with the center at the origin to form quadrilateral $EFGH$. What is the scale factor of the dilation?



A. $\frac{1}{4}$

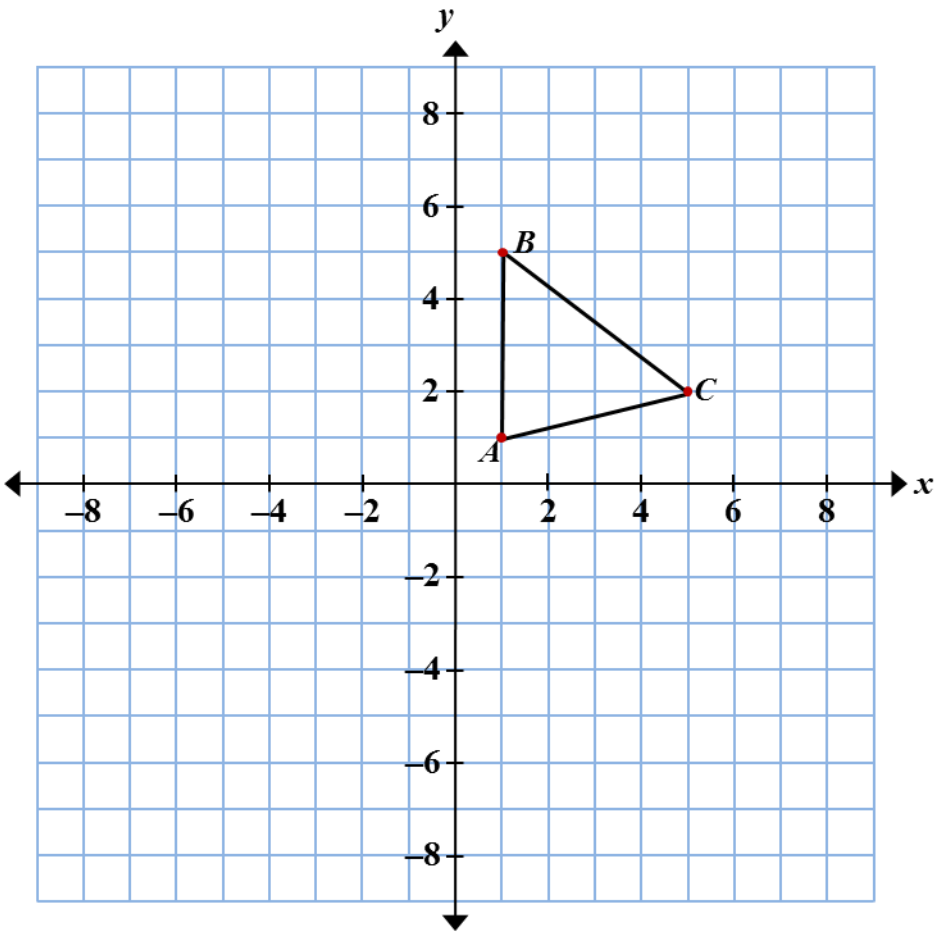
B. $\frac{1}{3}$

C. 3

D. 4

28B

Triangle ABC is shown on this coordinate grid.



Triangle ABC is dilated with the origin as the center of the dilation. Which ordered pair could represent the image of point C (5, 2) after the dilation?

a. (2.5, 1)

b. (5, –2)

c. (7.5, 4.5)

d. (–1, –4)

8.G.3 – Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

DCAS-Like

29A

The point (3, 7) is a vertex of a triangle. When the triangle is reflected over the y-axis, what are the coordinates of the image of the vertex?

A. (–3, –7)

B. (–3, 7)

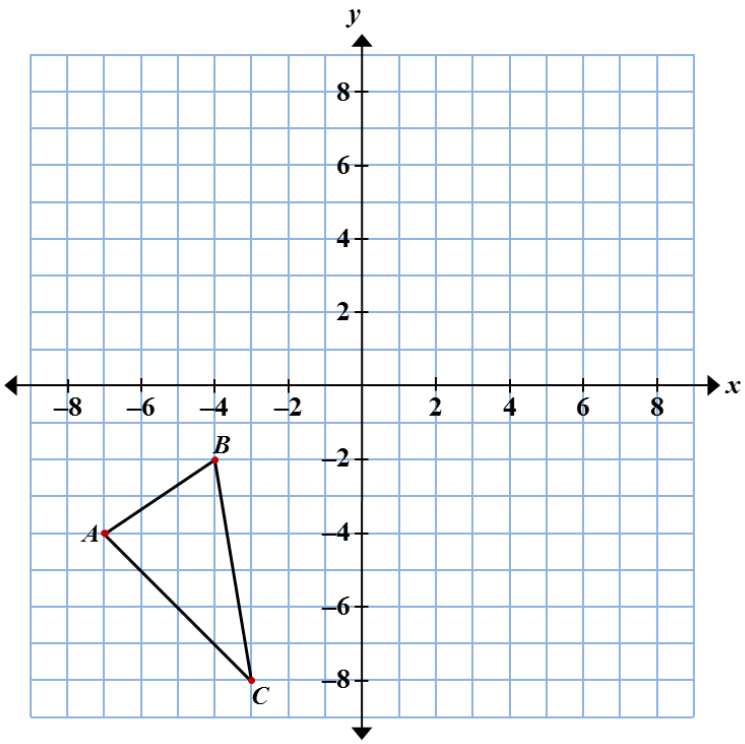
C. (3, –7)

D. (7, 3)

Next-Generation

29B

Triangle ABC is shown on this coordinate grid.



Part A

ΔABC is rotated 180 degrees clockwise about the origin to form ΔDEF. What are the coordinates of the vertices of ΔDEF?

$D(\_\_\_, \_\_\_)$ $E(\_\_\_, \_\_\_)$ $F(\_\_\_, \_\_\_)$

Part B

What conjecture can be made about the relationship between the coordinates of the vertices of an original shape and the coordinates of the vertices of the image of the shape when it is rotated 180 degrees clockwise about the origin?

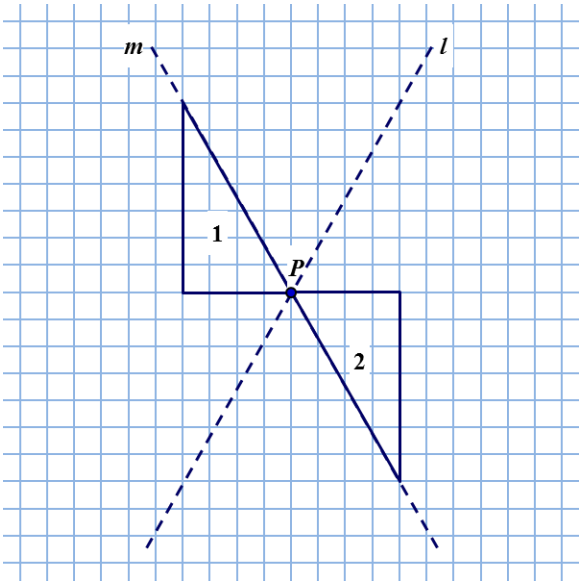
You must demonstrate that the conjecture is always true or that there is at least one example in which the conjecture is not true.

8.G.3 – Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

DCAS-Like

30A

The figure below shows two triangles, labeled 1 and 2.



Which one of the following describes a way to move triangle 1 so that it completely covers triangle 2?

A. Turn (rotate) 180 degrees about point P.

B. Flip (reflect) over line l.

C. Slide (translate) 5 units to the right followed by 8 units down.

D. Flip (reflect) over line m.

Next-Generation

30B

A student made this conjecture about reflections on an xy coordinate plane.

> When a polygon is reflected over the y-axis, the x-coordinates of the corresponding vertices of the polygon and its image are opposite, but the y-coordinates are the same.

Develop a chain of reasoning to justify or refute the conjecture. You must demonstrate that the conjecture is always true or that there is at least one example in which the conjecture is not true. You may include one or more graphs in your response.

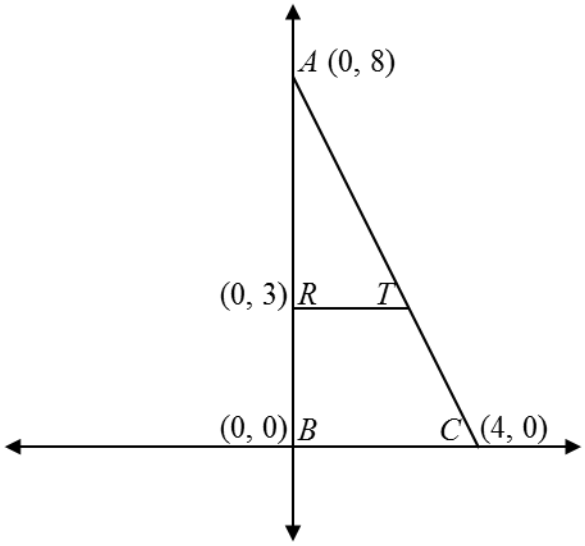
To include a graph to support your reasoning, put your cursor where you want the graph to be, and then click the Graph icon to insert a graph.

8.G.4 – Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

DCAS-Like

31A

In the diagram below, ΔABC is similar to ΔART.



What is the scale factor from ΔABC to ΔART?

A. 0.375

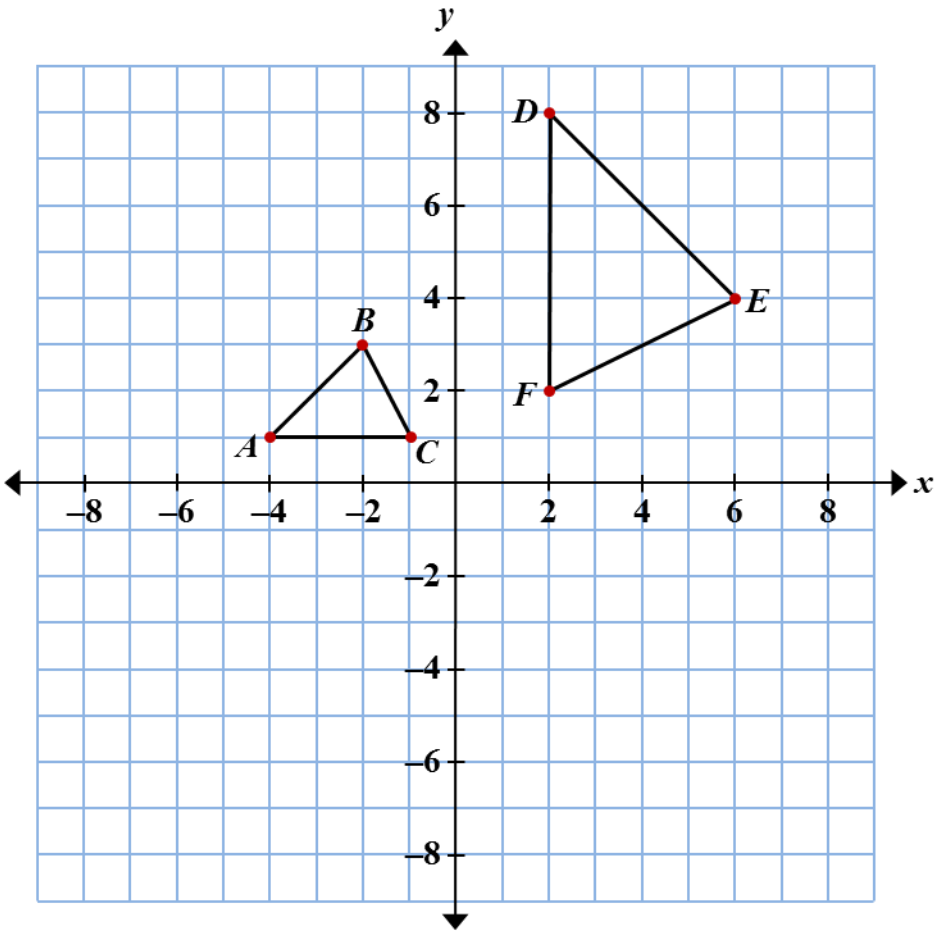
B. 0.625

C. 1.6

D. 2.5

31B

Triangles ABC and DEF are shown on this coordinate grid.



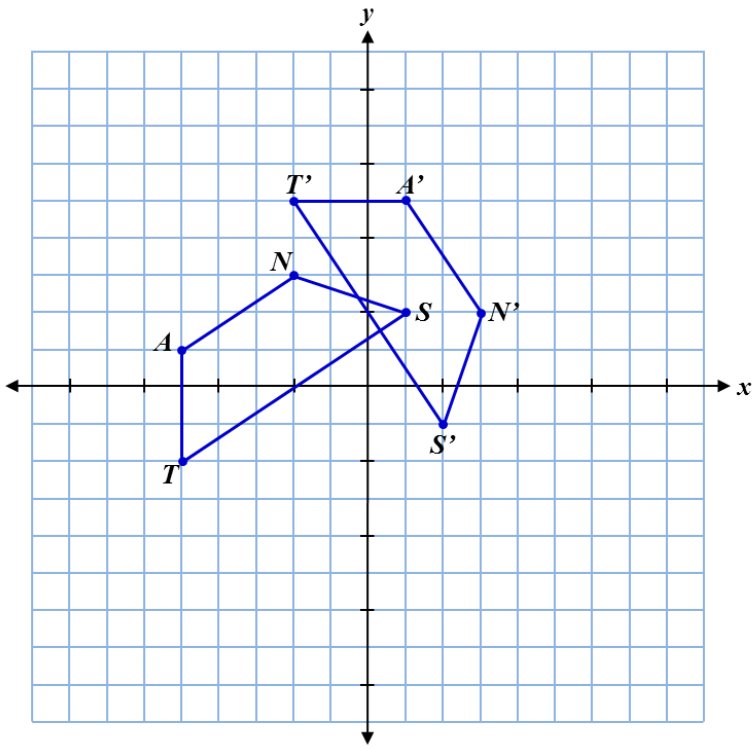
Describe a sequence of transformations that verifies these triangles are geometrically similar.

8.G.4 – Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

DCAS-Like

32A

The transformation below maps trapezoid $TANS$ onto trapezoid $T'A'N'S'$ using a rotation. Are the pre-image and image congruent?



A. No, rotation is not a rigid transformation, and it is impossible to prove the two images are congruent.

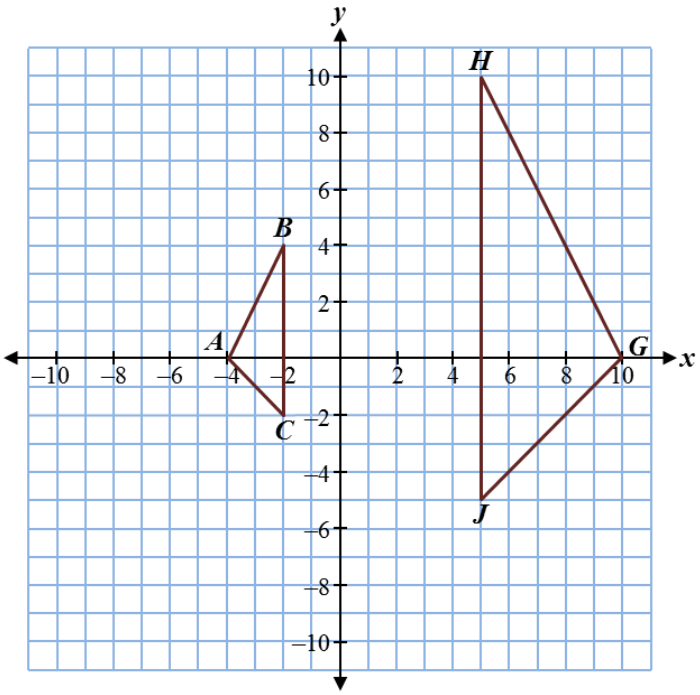
B. Yes, rotation is a turn, and therefore, the image and pre-image are congruent.

C. No, they do look the same, but you cannot prove they are the same.

D. Yes, rotation is a congruent transformation, and therefore, the image and pre-image are congruent.

32B

A transformation is applied to ΔABC to form ΔDEF (not shown). Then, a transformation is applied to ΔDEF to form ΔGHJ.



Part A

Graph ΔDEF on the xy-coordinate plane.

Part B

Describe the transformation applied to ΔABC to form ΔDEF.

Part C

Describe the transformation applied to ΔDEF to form ΔGHJ.

Part D

Select one statement that applies to the relationship between ΔGHJ and ΔABC.

- ❑ ΔGHJ is congruent to ΔABC.
- ❑ ΔGHJ is similar to ΔABC.
- ❑ ΔGHJ is neither congruent nor similar to ΔABC.

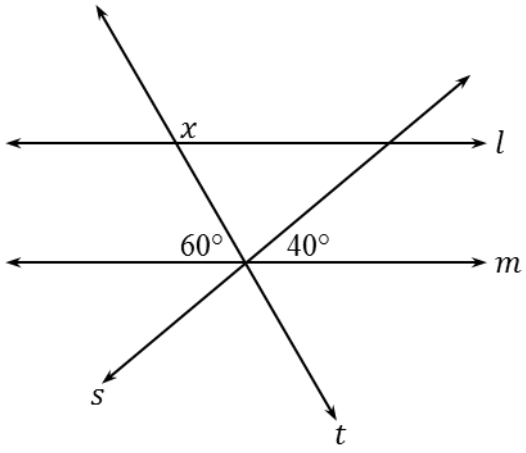
Explain your reasoning.

8.G.5 – Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.*

DCAS-Like

33A

Lines l and m are parallel to one another and cut by transversals s and t.



What is the value of x?

A. 40°

B. 80°

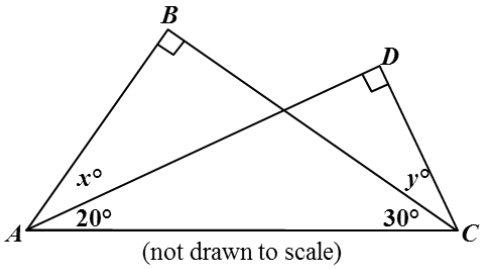
C. 120°

D. 140°

Next-Generation

33B

Right triangle ABC and right triangle ACD overlap as shown below. Angle DAC measures 20°, and the angle BCA measures 30°.



(not drawn to scale)

What are the values of x and y?

$x =$ _____ degrees y= _____ degrees

Cluster: Understand and apply the Pythagorean Theorem.

8.G.6 – Explain a proof of the Pythagorean Theorem and its converse.

DCAS-Like

34A

What kind of triangle is it when $a^2 + b^2 < c^2$?

A. Right triangle

B. Obtuse triangle

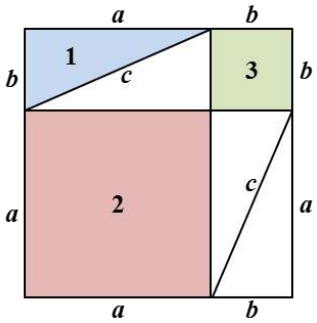
C. Acute triangle

D. None of the above

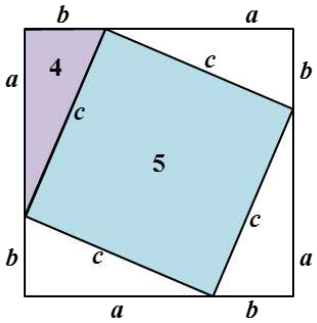
Next-Generation

34B

Use the two diagrams to answer the question.



Square X



Square Y

The diagram shows two congruent squares divided in different ways. For both squares, each side has been divided into the same two lengths, a and b.

Part A

Give the area of each shaded region in terms of a, b, and/or c.

Area 1 =	
Area 2 =	
Area 3 =	
Area 4 =	
Area 5 =	

Part B

The diagram provides a basis for proving the Pythagorean Theorem for right triangles, $a^2 + b^2 = c^2$, where a and b are the lengths of the legs of the right triangle and c is the length of the hypotenuse.

The statements in the table prove that $a^2 + b^2 = c^2$. For each statement write a brief justification of the truth of the statement in the right-hand column.

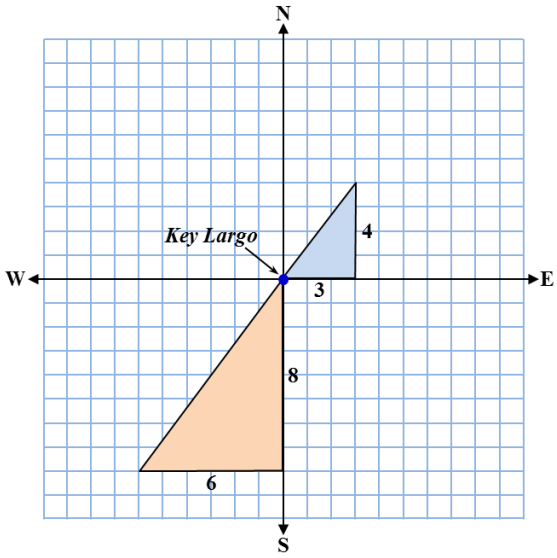
Step	Statement	Justification
1	Each side of each square is divided into the same two parts, a and b.	Given
2	Squares X and Y are congruent.	Given
3	Area of Square X = Square Y	Squares X and Y are congruent.
4	Area of Square X = $a^2 + b^2 + 4\left(\frac{ab}{2}\right) = a^2 + b^2 + 2ab$	
5	Area of Square Y = $c^2 + 4\left(\frac{ab}{2}\right) = c^2 + 2ab$	
6	$a^2 + b^2 + 2ab = c^2 + 2ab$	
7	$a^2 + b^2 = c^2$	

8.G.7 – Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

DCAS-Like

35A

Two sailboats leave Key Largo, Florida. One of the sailboats travels 3 miles east and then 4 miles north. The second sailboat travels 8 miles south and 6 miles west.



How far apart, in miles, are the boats?

A. 14 miles

B. 15 miles

C. 17 miles

D. 21 miles

Next-Generation

35B

Students in a class are using their knowledge of the Pythagorean Theorem to make conjectures about triangles. A student makes the conjectures shown below.

> A triangle has side lengths x, y, and z. If $x < y < z$ and $x^2 + y^2 < z^2$, the triangle is an obtuse triangle.

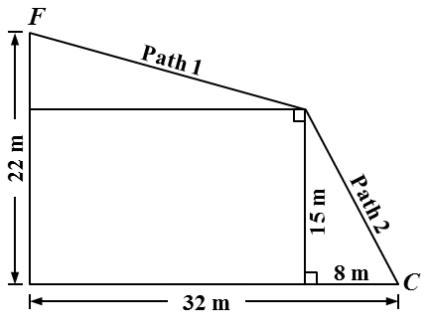
Use the Pythagorean Theorem to develop a chain of reasoning to justify or refute the conjecture. You must demonstrate that the conjecture is always true or that there is at least one example in which the conjecture is not true.

8.G.7 – Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

DCAS-Like

36A

Fernando followed two diagonal paths, Paths 1 and 2, to get from his house, *F*, to a neighborhood corner store, *C*, as shown below.



What is the total distance of the two paths, in meters (m), from *F* to *C*?

A. 35 meters

B. 42 meters

C. 56 meters

D. 60 meters

36B

Part A

Triangle STV has sides with lengths of 7, 11, and 14 units. Determine whether this triangle is a right triangle.

Show all work necessary to justify your answer.

Part B

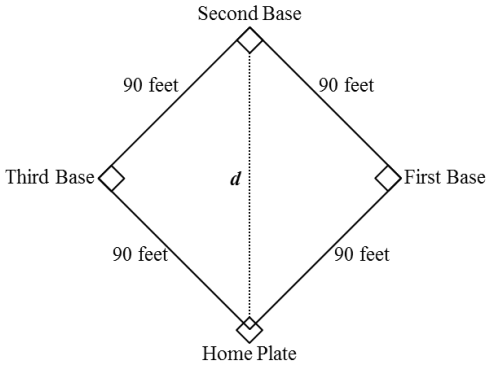
A right triangle has a hypotenuse with a length of 15. The lengths of the legs are whole numbers. What are the lengths of the legs? Show your work.

8.G.7 – Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

DCAS-Like

37A

The distance between the bases on a baseball diamond is 90 feet as shown below:



What is the distance (*d*), in feet, between home plate and second base? Round your answer to the nearest whole number.

A. 90

B. 127

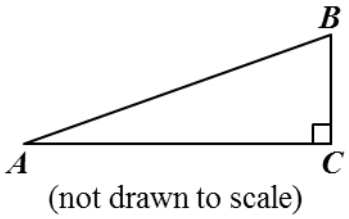
C. 135

D. 180

Next-Generation

37B

In right triangle ABC, side AC is longer than side BC. The boxed numbers represent the possible side lengths of triangle ABC.



7	**8**
15	**17**
18	**20**
24	**25**

Identify three boxed numbers that could be the side lengths of triangle ABC. Select the number you chose to represent the length of each side.

a. *BC* = _____

b. *AC* = _____

c. *AB* = _____

8.G.8 – Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

DCAS-Like

38A

What is the midpoint of the segment joining the points (4, –2) and (–8, 6)?

A. (6, 4)

B. (–6, –4)

C. (2, 2)

D. (–2, 2)

Next-Generation

38B

Doug is a dog, and his friend Bert is a bird. They live in Salt Lake City, where the streets are $\frac{1}{16}$ miles apart and arranged in a square grid. They are both standing at 6th and L. Doug can run at an average speed of 30 miles per hour through the streets of Salt Lake, and Bert can fly at an average speed of 20 miles per hour. They are about to race to 10th and E.

a. Who do you predict will win and why?

b. Draw the likely paths that Doug and Bert will travel.

c. What will you need to compare in order to determine the winner?

d. Devise a plan to calculate these without measuring anything.

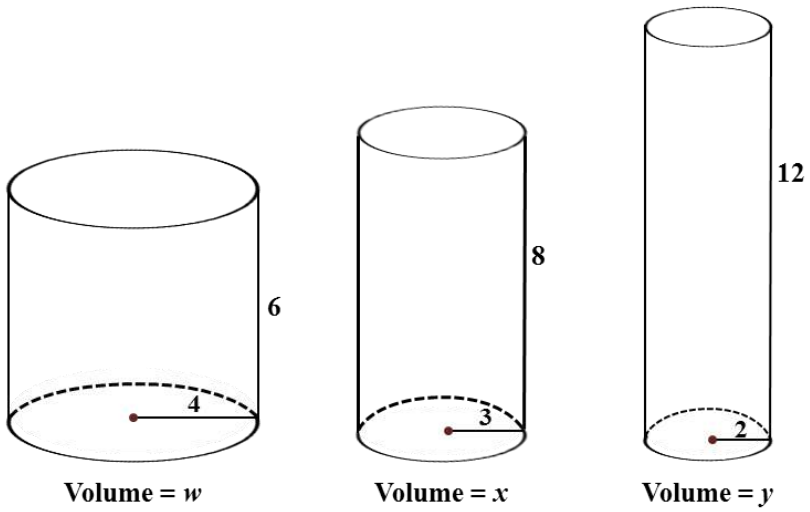
e. Who will win the race?

Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.

8.G.9 – Know the formulas for the volume of cones, cylinders and spheres and use them to solve real-world and mathematical problems.

DCAS-Like

39A



In the figures above, the radius and height of each right circular cylinder are given. If w, x, and y represent the respective volumes of the cylinders, which of the following statements is true?

A. $y = w = x$

B. $y < x < w$

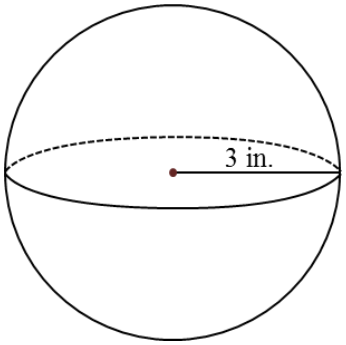
C. $y < w < x$

D. $w < y < x$

39B

Part A

This sphere has a 3-inch radius.

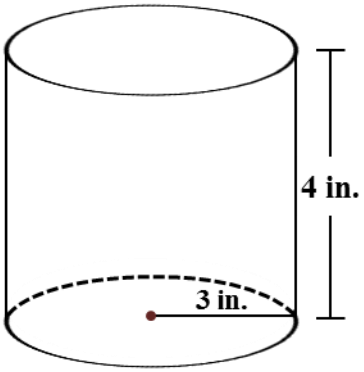


What is the volume, in cubic inches, of the sphere?

Volume = _____ cubic inches

Part B

The right cylinder has a radius of 3 inches and a height of 4 inches.



What is the volume, in cubic inches, of the cylinder?

Volume = _____ cubic inches

Part C

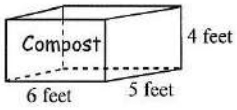
Lin claims that the volume of any sphere with a radius of r inches is always equal to the volume of a cylinder with a radius of r inches and a height of h inches, when $h = \frac{4}{3}r$. Show all work necessary to justify Lin's claim.

8.G.9 – Know the formulas for the volume of cones, cylinders and spheres and use them to solve real-world and mathematical problems.

DCAS-Like

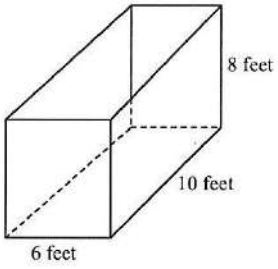
40A

Laura made a compost bin with the dimensions shown.

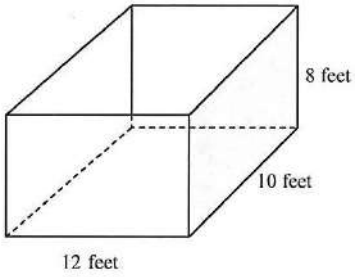


She wants to double the volume of the bin. Which of the following bins will have a volume that is twice the volume of Laura's bin?

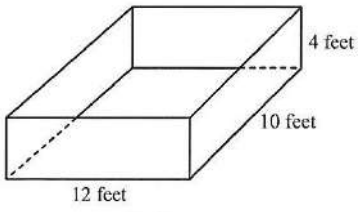
A.



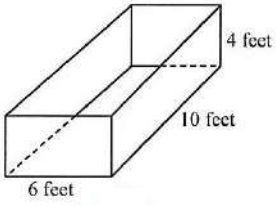
B.



C.



D.



Next-Generation

40B

Juan needs a right cylindrical storage tank that holds between 110 and 115 cubic feet of water.

Using whole numbers only, provide the radius and height for 3 different tanks that hold between 110 and 115 cubic feet of water.

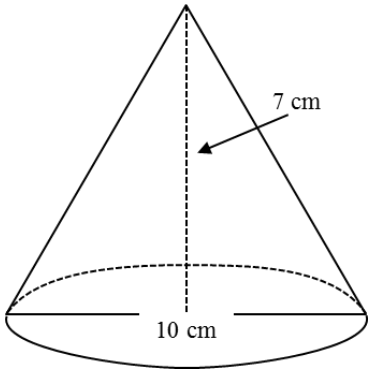
Tank #1	Tank #2	Tank #3
radius = _____ ft.	radius = _____ ft.	radius = _____ ft.
height = _____ ft.	height = _____ ft.	height = _____ ft.

8.G.9 – Know the formulas for the volume of cones, cylinders and spheres and use them to solve real-world and mathematical problems.

DCAS-Like

41A

What is the *approximate* volume of the cone below?



A. 70 cm^3

B. 183 cm^3

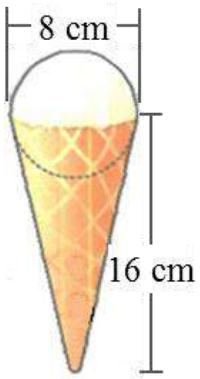
C. 549 cm^3

D. 733 cm^3

Next-Generation

41B

Use the diagram of the ice cream cone to answer the question.



IceScream is a manufacturer of premade ice cream cones and is looking for a new design to set itself apart from the competition. IceScream's creative director has proposed a waffle cone 16 centimeters high and 8 centimeters in diameter with a sphere of ice cream that has the same diameter set in the cone. The company president asks two questions about the design:

1. If all the ice cream melted, is the waffle cone large enough to hold all the liquid?
2. How many filled cones will they be able to make using a 100-liter batch of ice cream? (1 liter = 1,000 cm^3)

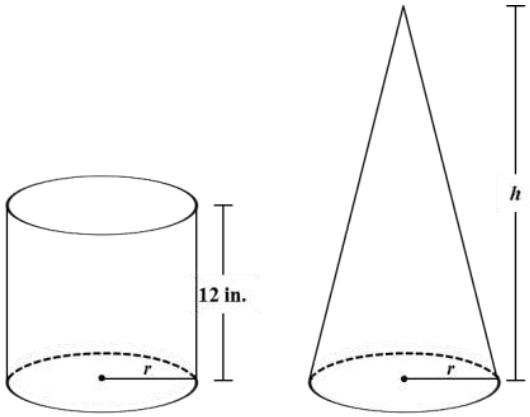
As a junior engineer in the company, you are asked to determine the answers to the president's questions. Show your work, including units.

8.G.9 – Know the formulas for the volume of cones, cylinders and spheres and use them to solve real-world and mathematical problems.

DCAS-Like

42A

The right cylinder and right cone shown below have the same radius and volume. The cylinder has a height of 12 inches.



What is *h*, the height of the cone?

A. 18 inches

B. 24 inches

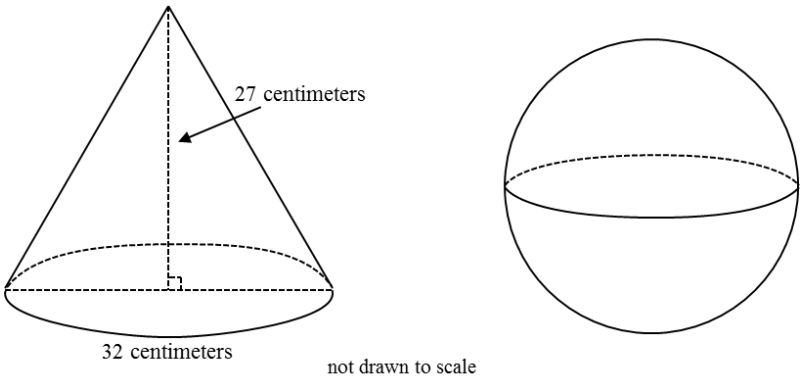
C. 36 inches

D. 42 inches

Next-Generation

42B

The cone and sphere have equal volumes.



What is the radius of the sphere? _____ centimeters

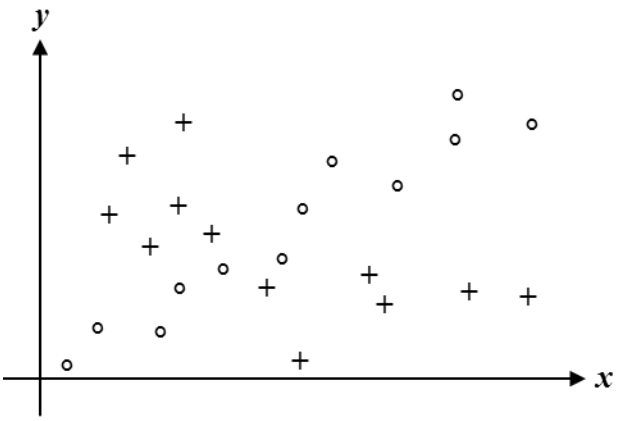
STATISTICS AND PROBABILITY (SP)

Cluster: Investigate patterns of association in bivariate data.

8.SP.1 – Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

DCAS-Like

43A



Legend
+ represents a data point in group *R*.
° represents a data point in group *S*.

The scatterplot above shows data for groups *R* and *S*. Which of the following statements is true about the correlation between the *x* and *y* values of group *R* and the correlation between the *x* and *y* values of group *S*?

A. The *x* and *y* values appear to be negatively correlated in both *R* and *S*.

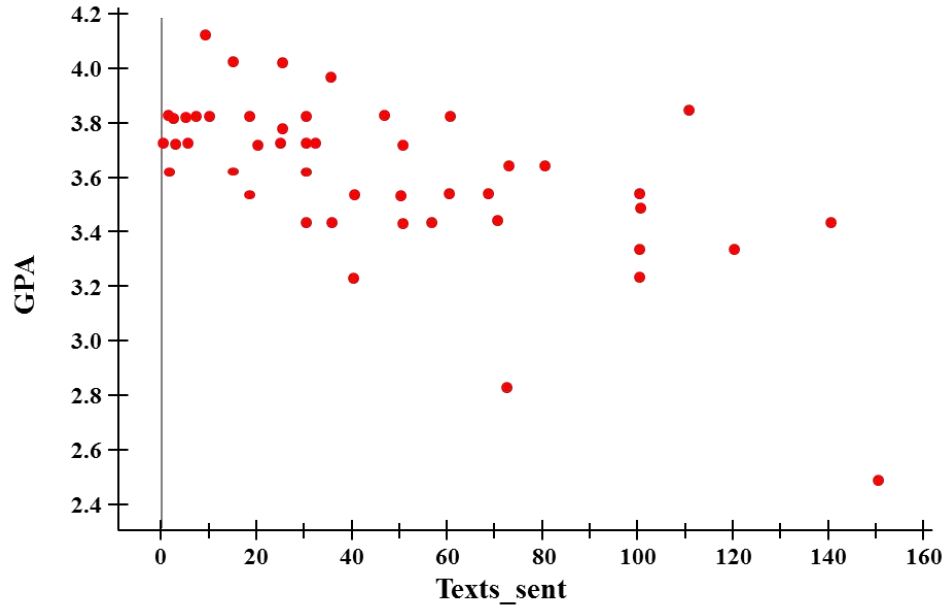
B. The *x* and *y* values appear to be positively correlated in both *R* and.

C. The *x* and *y* values appear to be negatively correlated in *R* but positively correlated in *S*.

D. The *x* and *y* values appear to be positively correlated in *R* but negatively correlated in *S*.

43B

Megan suspects that there is a relationship between the number of text messages high school students send and their academic achievement. To explore this, she asks each student in a random sample of 52 students from her school how many text messages he or she sent yesterday and what his or her target grade point average (GPA) was during the most recent marking period. The data are summarized in the scatter plot of number of text messages sent versus GPA shown below.



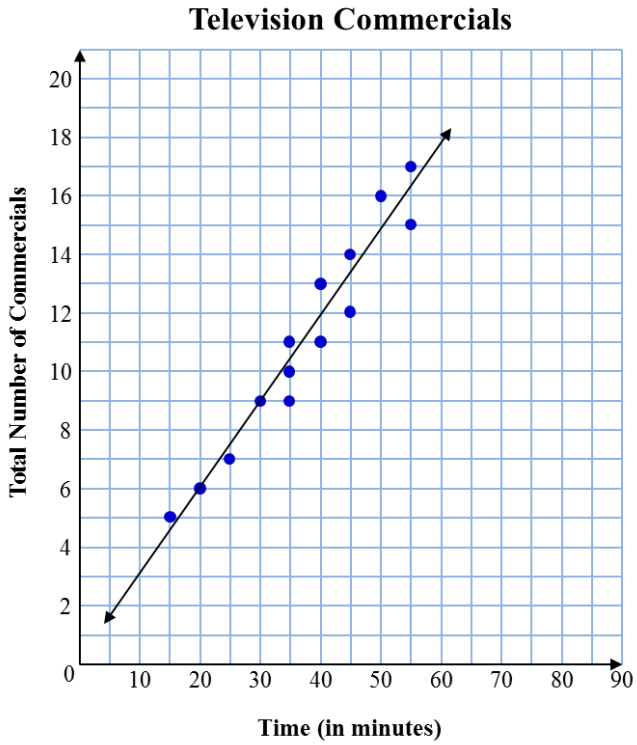
Describe the relationship between number of text messages sent and GPA. Discuss both the overall pattern and any deviations from the pattern.

8.SP.2 – Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

DCAS-Like

44A

Mary collected data each day on how many commercials she saw and how long she watched TV. She displayed her data in a scatter plot.



According to the trend line show in in the scatter plot, *about* how many commercials will Mary see if she watches TV for $1\frac{1}{2}$ hours?

A. 19

B. 27

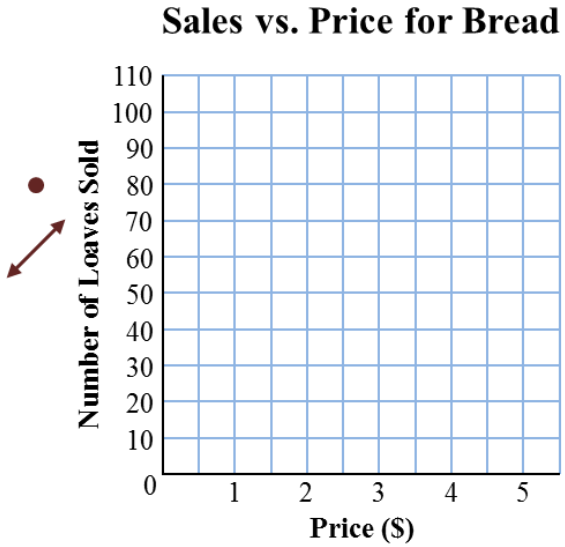
C. 39

D. 90

44B

A bakery collected data on the price they charged for a loaf of bread and the number of loaves sold at that price.

Sales vs. Price for Bread	
Price	**Number of Loaves**
$2.00	105
$3.00	80
$3.50	63
$4.00	45
$4.50	6



Part A

Graph the data with the point tool and then draw a trend line for the data.

To draw a point or a line, drag the appropriate tool to the grid. Position a selected line by dragging the handles. To remove a point or line, drag it outside of the grid.

Part B

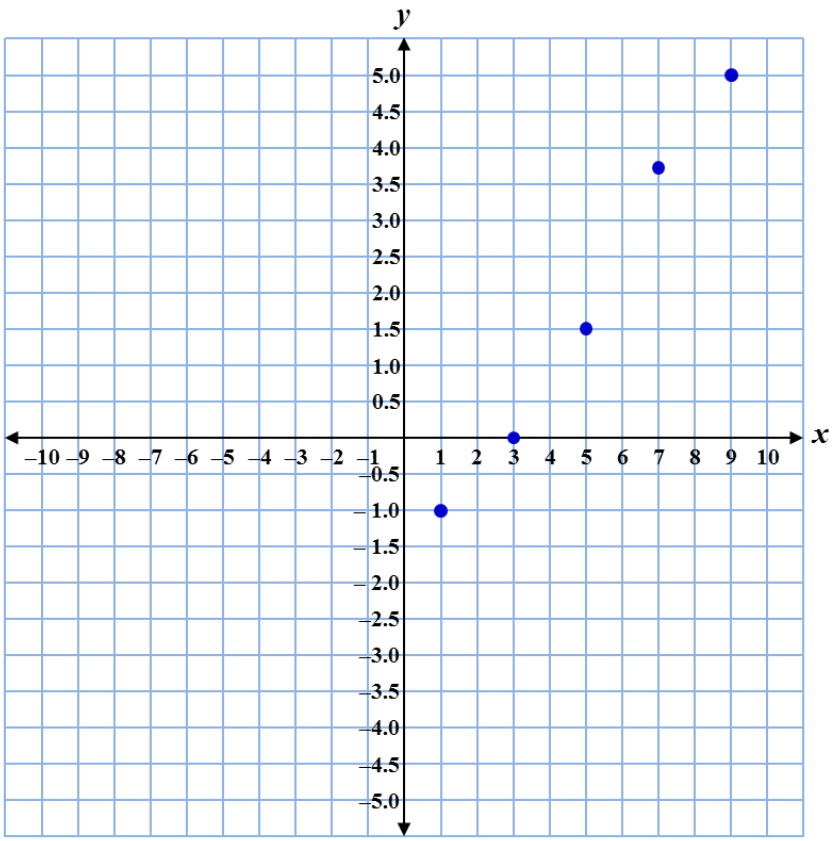
In what price range does your trend line do a good job of predicting sales? Outside of this range, what differences are there between your trend line and actual sales? Explain your reasoning.

8.SP.3 – Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*

DCAS-Like

45A

Which equation best fits the data shown in the scatter plot below?



A. $y = \frac{1}{4}x - 1$

B. $y = \frac{1}{2}x - \frac{1}{2}$

C. $y = \frac{3}{4}x - 2$

D. $y = x - 3$

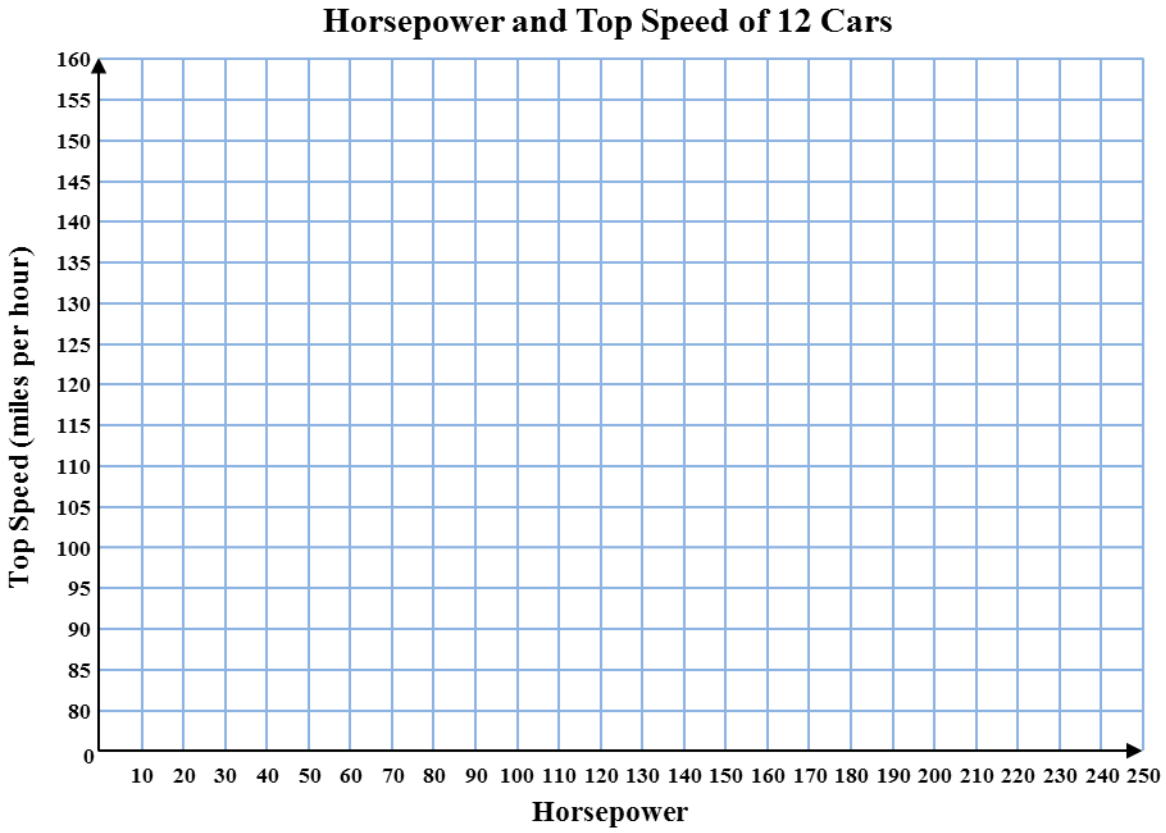
45B

This table shows the horsepower and top speed of 12 cars.

Horsepower	Top Speed (miles per hour)
165	122
150	117
90	109
49	96
70	105
62	98
245	148
140	114
103	112
180	133
130	115
145	120

Part A

Construct a scatter plot of the data from the table on the graph below.



Part B

Draw a line of best fit on the graph for the data points graphed.

Part C

Based on the graph you drew, how much more horsepower is needed to increase the top speed of a car by 5 miles per hour?

_____ more horsepower

Explain how you found your answer.

8.SP.4 – Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

DCAS-Like

46A

The table shows the game system that eighty 8th graders chose to be their favorite:

	***X*Box**	**Play Station**	**Wii**	**Total**
Boys	21	14	5	40
Girls	6	14	20	40
Total	27	28	25	80

Of the eighty 8th graders surveyed, what percentage is girls who prefer Wii?

A. 22.5%

B. 25%

C. 32.5%

D. 50%

46B

Jacob surveyed 25 adults to ask whether they had at least one child under the age of 18 and whether they had at least one pet. This table shows the results of the survey.

Adult	At Least One Child Under the Age of 18		At Least One Pet	
	Yes	No	Yes	No
A	☑		☑	
B		☑		☑
C	☑			☑
D		☑		☑
E		☑	☑	
F		☑		☑
G		☑	☑	
H	☑		☑	
I	☑		☑	
J	☑			☑
K		☑		☑
L	☑		☑	
M		☑	☑	
N	☑		☑	
O		☑		☑
P	☑		☑	
Q		☑		☑
R	☑		☑	
S		☑		☑
T	☑		☑	
U		☑	☑	
V	☑		☑	
W		☑		☑
X		☑	☑	
Y		☑	☑	

Part A

Use the results of the survey to complete this table.

At Least One Pet	At Least One Child Under the Age of 18	
	Yes	**No**
Yes		
No		

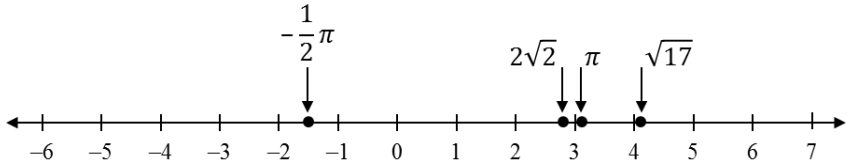
Part B

Jacob made the conjecture that there is a possible association between whether an adult has at least one child under the age of 18 and whether the adult has at least one pet.

State whether the results of the survey provide evidence that adults who have at least one child under the age of 18 also tend to have at least one pet. Explain your answer.

ANSWER KEY AND ITEM RUBRICS

The Number System (NS)

DCAS-Like Answer	Next-Generation Solution
1A: A (8.NS.1)	**1B:** Example 1: 2.25 Example 2: $\frac{1}{4}$
2A: D (8.NS.2)	**2B:** a. π is slightly greater than 3. b. $-\frac{1}{2}\pi$ is slightly less than -1.5. c. $\left(2\sqrt{2}\right)^2 = 4 \bullet 2 = 8$ and $3^2 = 9$, so $2\sqrt{2}$ is slightly less than 3. d. $\sqrt{16} = 4$, so $\sqrt{17}$ is slightly greater than 4. 

Expressions and Equations (EE)

DCAS-Like Answer	Next-Generation Solution
3A: D (8.EE.1)	**3B:** *Key and Distractor Analysis* a. Yes – Students may think that a negative exponent means that the number is negative, not that the number is between 0 and 1. b. No – The expression is equal to 7^7, so it is greater than 1. Students may make mistakes when funding the exponent of the equivalent expression. c. Yes – Students may think that since the base is raised to such a high exponent it will be greater than 1, but since the base is between 0 and 1, the value of the expression is between 0 and 1. d. Yes – Students may miscalculate the exponent of the equivalent expression or forget that the expression will be positive because the exponent is even.
4A: D (8.EE.1)	**4B:** *Part A* $10^2 = 100$ $10^1 = 10$ $10^0 = 1$ $10^{-1} = 0.1$ $10^{-2} = 0.01$ *Part B* answer is 0.001 *Scoring Notes* ▪ Fractions may be used in place of decimals in Part A ▪ Fractions or exponential form may be used in place of decimals in Part B *Points Assigned* ▪ 1 point for correct answers in the first three cells in Part A ▪ 1 point for correct answers in the last two cells in Part A ▪ 1 point for correct value in Part B

DCAS-Like Answer	Next-Generation Solution
5A: B (8.EE.2)	**5B:** Brandon's method is not correct. Brandon's method works for the square root of 4, but it would not work for the square root of 36. Half of 36 is 18, but the square root of 36 is 6 since 6 times 6 equals 36. Ashley describes the correct way to find the square root of a number. *Scoring Rubric* **2 points:** The student shows a thorough understanding of how to identify correct reasoning regarding square roots. Each part of the response is complete and correct. **1 point:** The student shows a partial understanding of how to identify correct reasoning regarding square roots. The student recognizes that Brandon's method is not correct but attempts to explain why Ashley's method is correct instead of showing why Brandon's method is not correct. **0 points:** The student shows inconsistent or no understanding of how to identify correct reasoning regarding square roots. Responding only that Brandon's method is not correct is not sufficient to earn any points.
6A: C (8.EE.2)	**6B:** a. (64, 8) or (100, 10) b. (64, 4) or (1000, 10)

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>7A: D
(8.EE.2)</td><td>7B:
<table>
<tr><th>Perfect Squares but Not Perfect Cubes</th><th>Both Perfect Squares and Perfect Cubes</th><th>Perfect Cubes but Not Perfect Cubes</th></tr>
<tr><td>256

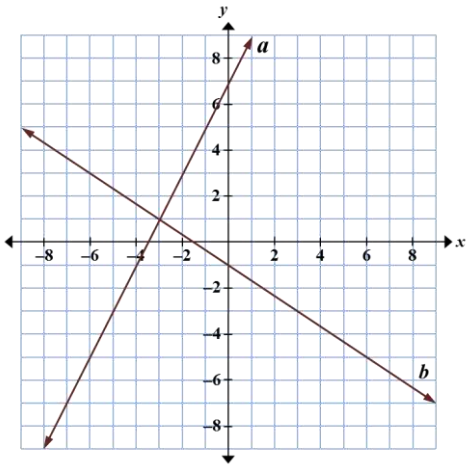
361</td><td>1

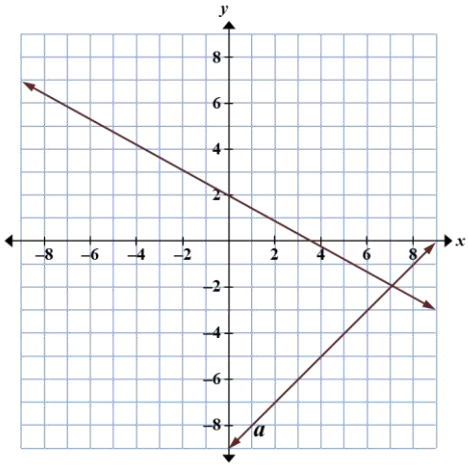
64</td><td>125</td></tr>
</table>
Scoring Rubric
Responses to this item will receive 0-2 points based on the following:
2 points: The student shows a thorough understanding of classifying positive integers as perfect squares, perfect cubes, or neither. The student places all the perfect squares and perfect cubes in the correct regions of the table and does not identify any of the other numbers as perfect squares or perfect cubes.
1 point: The student shows a partial understanding of classifying positive integers as perfect squares, perfect cubes, or neither. The student places all the perfect squares and perfect cubes in the table but makes one or two errors by not realizing that 1 and 64 are both perfect squares and perfect cubes.
0 points: The student shows inconsistent or no understanding of classifying positive integers as perfect squares, perfect cubes, or neither. The student misclassifies perfect squares as perfect cubes, perfect cubes as perfect squares, or identifies numbers that are neither perfect squares nor perfect cubes as perfect squares or perfect cubes.</td></tr>
<tr><td>8A: D
(8.EE.3)</td><td>8B:
$d = 187{,}000{,}000$</td></tr>
<tr><td>9A: B
(8.EE.3)</td><td>9B:
Any number between 7 and 7.143 inclusive.</td></tr>
<tr><td>10A: D
(8.EE.4)</td><td>10B:
Key: Schedar and Ruchbah</td></tr>
<tr><td>11A: A
(8.EE.5)</td><td>11B:
Key: Omar and Carla</td></tr>
</table>

DCAS-Like Answer	Next-Generation Solution
12A: C (8.EE.6)	**12B** *Sample Top-Score Response* *Part A:* $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{45-18}{20-8} = \frac{27}{12} = \frac{9}{4}$ *Part B:* If Mr. Perry asked the class to find the slope of the line through (1, 1) and (2, 3), you can find the actual slope by using the formula and get $\frac{3-1}{2-1} = \frac{2}{1} = 2$, but Avery's method will not work because she would either say the slope is $\frac{1}{1} = 1$ or $\frac{3}{2} = 1.5$. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows thorough understanding of the slope of lines. The student correctly finds the slope in a different way and provides an example where Avery's method does not work. **1 point:** The student shows partial understanding of the slope of lines. The student makes one or two mathematical errors when finding the slope in a different way but provides an example where Avery's method does not work. OR The student correctly finds the slope in a different way but is unable to provide an example where Avery's method does not work. **0 points:** The student shows inconsistent or no understanding of the slope of lines. If the student demonstrates a conceptual misunderstanding of slope in Part A, the score is 0 regardless of the example given in Part B.

DCAS-Like Answer	Next-Generation Solution
13A: D (8.EE.7)	**13B:** *Sample Top-Score Response* *Part A* $a = 5; b = 16$ When you put these number in for a and b, you get a solution of $x = 1$. *Part B* $a = 6; b = 15$ When you put these numbers in for a and b, you get a solution of $0 = 0$, so there are infinitely many solutions, not just one. *Scoring Rubric* Responses to this item will receive 0-3 points based on the following: **3 points:** The student shows a thorough understanding of the number of possible solutions of linear equations. The student gives acceptable values for a and b in both parts and provides complete and correct explanations. **2 points:** The student shows a partial understanding of the number of possible solutions of linear equations. The student must show at least some understanding in Part B to earn 2 points (e.g., Part A is incorrect and Part B is correct, or Part A and the values for a and b in Part B are correct but the explanation in Part B is incorrect). **1 point:** The student shows a limited understanding of the number of possible solutions of linear equations. Part A is correct, but inconsistent or no understanding is shown in Part B. **0 points:** The student shows inconsistent or no understanding of the number of possible solutions of linear equations.

DCAS-Like Answer	Next-Generation Solution
14A: C (8.EE.7)	**14B:** *Key and Distractor Analysis* a. This solution is the simplest to follow, but the method is incorrect. b. Key. Although the method in this solution is correct, it is not the most commonly used method for solving equations like this, so students may think it is incorrect. c. Key. Although the method in this solution is correct, it is not the most commonly used method for solving equations like this, so students may think it is incorrect.
15A: D (8.EE.7)	**15B:** *Key and Distractor Analysis* a. One solution. This is designed to be an easy equation to solve to help students enter the problem. Answering this question correctly demonstrates minimal understanding. b. No solution. Students may think there is no difference between adding 15 on the left side and subtracting 15 on the right side. c. One solution. Students may think there are infinitely many solutions because the left side is the negative of the right side. This item is worth 1 point because all of the concepts used to answer it correctly are linked.

DCAS-Like Answer	Next-Generation Solution
16A: D (8.EE.8)	**16B:** *Sample Top-Score Response* *Part A*  *Part B* Line a: $y = 2x + 7$ Line b: $y = -\frac{2}{3}x - 1$ *Scoring Rubric* Responses to this item will receive 0-3 points based on the following: **3 points:** The student shows a thorough understanding of the solutions of systems of equations and writing the equations of lines from a graph. The two lines intersect at the point (–3, 1) and both of the equations given are correct. **2 points:** The student shows a partial understanding of the solutions of systems of equations and writing the equations of lines from a graph. The response shows two lines that intersect at the point (–3, 1) but one or both equations given are incorrect.

DCAS-Like Answer	Next-Generation Solution
	1 point: The student shows a limited understanding of the solutions of systems of equations and writing the equations of lines from a graph. The response shows two lines that do NOT intersect at the point (–3, 1) but both equations given are correct. **0 points:** The student shows inconsistent or no understanding of the solutions of systems of equations and writing the equations of lines from a graph. The response shows two lines that do NOT intersect at point (–3, 1) and there is an error in at least one of the equations of the lines.
17A: C (8.EE.8)	**17B:** *Sample Top-Score Response* 

Functions (F)

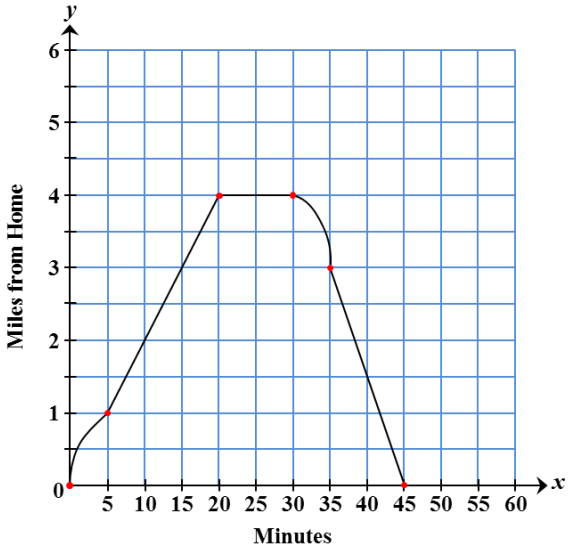
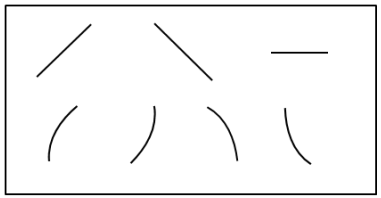
<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>18A: C
(8.F.1)</td><td>18B:
Sample Top-Score Response
<table>
<tr><th>x</th><th>y</th></tr>
<tr><td>4</td><td>0</td></tr>
<tr><td>4</td><td>1</td></tr>
<tr><td>4</td><td>2</td></tr>
<tr><td>4</td><td>3</td></tr>
<tr><td>4</td><td>4</td></tr>
</table>
Scoring Rubric
Responses to this item will receive 0-1 point based on the following:
1 point: The student shows a thorough understanding of the definition of a function. The student creates a relation that is not a function.
0 points: The student shows no understanding of the definition of a function. The student creates a relation that is a function.</td></tr>
<tr><td>19A: D
(8.F.1)</td><td>19B:
Key and Distractor Analysis:
For the correct answer, students must choose a point that is an ordered pair of integers along the line $x = 3$.</td></tr>
</table>

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>20A: A
(8.F.2)</td><td>
20B:
One possible solution using tables:
a. Since the video game player's battery charge is given in a table, we can extend the table and see what value it will give after 60 minutes. Note that the rate of change of the data in the table is constant—for every 10 minutes the charge increases by 12 percentage points. Assuming that this pattern continues, we have:
<table>
<tr><td>Time Charging (minutes)</td><td>0</td><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td></tr>
<tr><td>Video Game Player Battery Charge (%)</td><td>20</td><td>32</td><td>44</td><td>56</td><td>68</td><td>80</td><td>92</td></tr>
</table>
We can make a similar table for the MP3 player:
<table>
<tr><td>Time Charging (minutes)</td><td>0</td><td>15</td><td>30</td><td>45</td><td>60</td></tr>
<tr><td>MP3 Player Battery Charge (%)</td><td>40</td><td>52</td><td>64</td><td>76</td><td>88</td></tr>
</table>
b. We can see from the table above that the MP3 player would be fully charged in another 15 minutes; we just have to add one more column to the table to find that answer.
The video game player will need less than 10 minutes to fully charge, since we are only missing 8 percentage points after 60 minutes. To be exact, using the rate of increase, we will need $\frac{2}{3}$ of 10 minutes, which is just under 7 minutes.
</td></tr>
</table>

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>21A: C
(8.F.3)</td><td>
21B:
Sample Top-Score Response
Part A
<table>
<tr><th>Year</th><th>Population of a Certain County</th></tr>
<tr><td>0</td><td>100,000</td></tr>
<tr><td>1</td><td>110,000</td></tr>
<tr><td>2</td><td>121,000</td></tr>
<tr><td>3</td><td>133,100</td></tr>
<tr><td>4</td><td>146,410</td></tr>
</table>
Part B
Samir’s example is not a linear functional relationship. The population does not increae by the same amount each year, so the relationship is not linear.

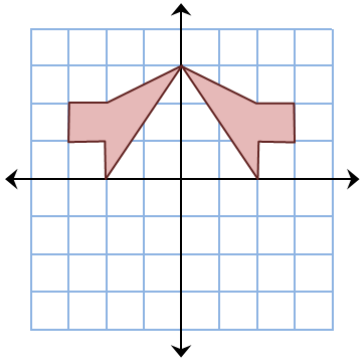
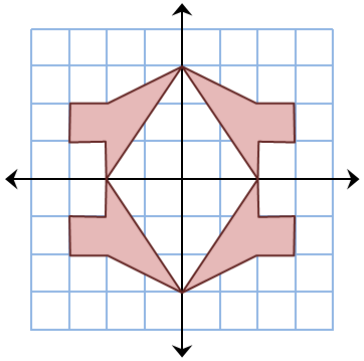
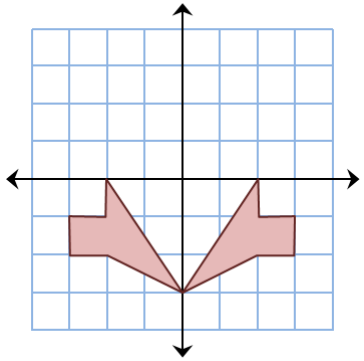
Scoring Rubric
Responses to this item will receive 0-2 points based on the following:
2 points: The student shows a thorough understanding of how to distinguish between linear and nonlinear relationships. The student correctly completes the table showing a 10% increase in population each year, states that the relationship is not linear, and provides a clear and complete explanation of why the relationship is not linear. Rounding to the nearest whole number for the population is permitted.
1 point: The student shows a partial understanding of how to distinguish between linear and nonlinear relationships. The student makes calculation errors in the table but gives a response in Part B that corresponds with the numbers in the table OR the student completes the table correctly but provides an incorrect explanation in Part A.
0 points: The student shows inconsistent or no understanding of how to distinguish between linear and nonlinear relationships. The student makes major errors when completing the table and gives a response in Part B that does not correspond to the values entered in the table.
</td></tr>
</table>

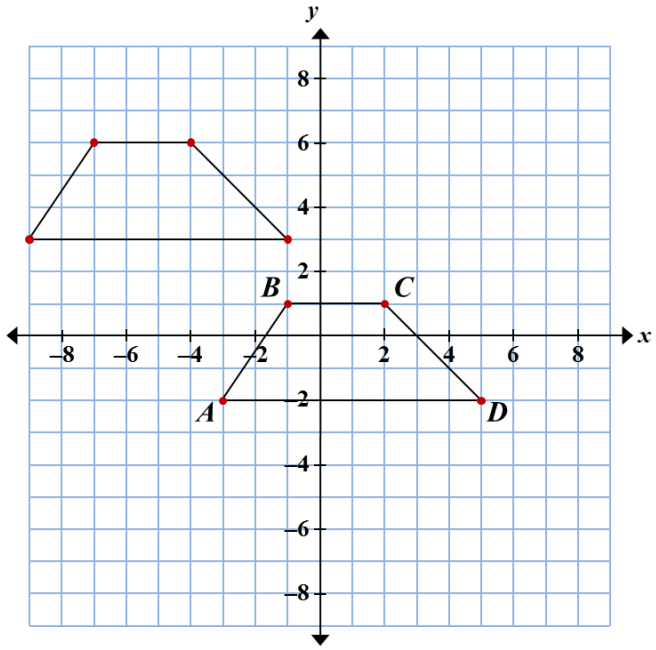
DCAS-Like Answer	Next-Generation Solution
22A: D (8.F.4)	**22B:** *Sample Top-Score Response* *Part A* $4.49—450 more shirts cost $2020.50 more, and $2020.50 divided by 450 is $4.49. *Part B* $125—Since each shirt costs $4.49, 50 shirts cost $224.50, which means that the design fee is $125. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows a thorough understanding of how to use a function to model a relationship between quantities. The numerical responses are equal to the answers given in the Sample Top-Score Response and the explanations are complete and correct. **1 point:** The student shows a partial understanding of how to use a function to model a relationship between quantities. One numerical response and the corresponding explanation are correct. **0 points:** The student shows inconsistent or no understanding of how to use a function to model a relationship between quantities.

DCAS-Like Answer	Next-Generation Solution
23A: A (8.F.5)	**23B:** *Sample Top-Score Response*   *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows a thorough understanding of how to sketch the graph of a function based on a verbal description. The student's response matches the Sample Top-Score Response. **1 point:** The student shows a partial understanding of how to sketch the graph of a function based on a verbal description. The student makes 1 or 2 minor errors in the graph, such as using a straight line when a curved line should be used or using a concave-up curve when a concave-down curve should be used. **0 points:** The student shows inconsistent or no understanding of how to sketch the graph of a function beased on a verbal description.

DCAS-Like Answer	Next-Generation Solution
24A: B (8.F.5)	**24B:** *Key:* d, b, c, a

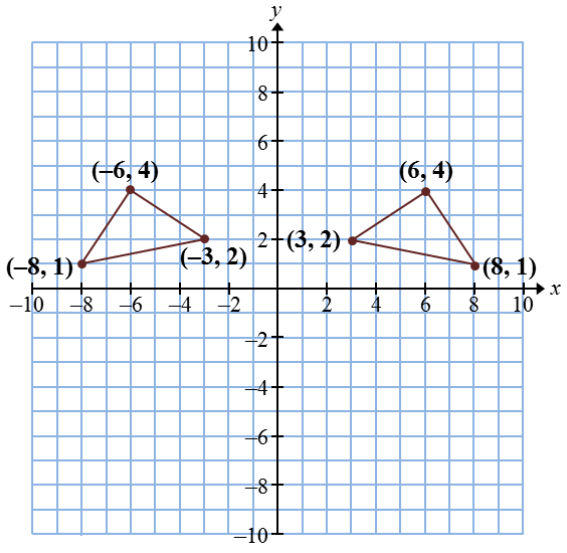
Geometry (G)

DCAS-Like Answer	Next-Generation Solution
25A: C (8.G.1)	**25B:** a.  b. Either of the following graphs is acceptable.  

DCAS-Like Answer	Next-Generation Solution
26A: D (8.G.2)	**26B:** *Sample Top-Score Response* 
27A: C (8.G.2)	**27B:** *Key and Distractor Analysis* a. $AB = z$: Students may work from left to right and think that $AB = y$. b. $AC = x$: Most students will probably answer this one correctly. c. $BC = y$: Students may work from left to right and think that $BC = z$.

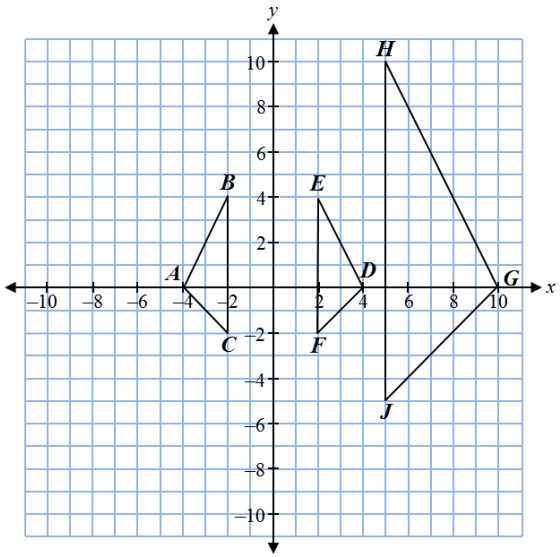
DCAS-Like Answer	Next-Generation Solution
28A: C (8.G.3)	**28B:** *Key and Distractor Analysis* a. Key b. Students may confuse dilation with reflection. c. Students may think that you can add the same amount from each coordinate when dilating. d. Students may think that you can subtract the same amount from each coordinate when dilating.
29A: B (8.G.3)	**29B:** *Part A* *D* (7, 4), *E* (4, 2), *F* (3, 8) *Part B* The conjecture is that the coordinates of the vertices of the image will have the opposite sign of the coordinates of the vertices of the original shape. When a point is rotated 180 degrees clockwise about the origin, if a line is drawn through the original point and the origin, the image of the point will also be on the line, and it will be the same distance from the origin that the original point was, but on the opposite side of the origin. When two points on the same line are the same distance from the origin and on opposite sides of the origin, the coordinates of the points have opposite signs, because the slope from each coordinate to the origin is the same, but to move from the origin to each point to get its coordinates, you must move in opposite directions. So if you move right from the origin to get to one point, you will move left to get to the other, and if you move up from the origin to get to one point, you will move down to get to the other. So the coordinates of the vertices of the image will have the opposite sign of the coordinates of the vertices of the original shape.

DCAS-Like Answer	Next-Generation Solution
	Scoring Rubric Responses to this item will receive 0-4 points based on the following: **4 points:** The student shows thorough understanding of how to rotate figures on the plane and make and justify conjectures regarding rotated figures. The student gives the correct coordinates of the triangles in Part A and provides a correct conjecture and justification in Part B. **3 points:** The student shows good but incomplete understanding of how to rotate figures on the plane and make and justify conjectures regarding rotated figures. The student gives the correct coordinates of the triangles in Part A and provides a correct conjecture in Part B, but the justification of the conjecture is incomplete (e.g., only specific examples are given) although it demonstrates progress. OR Part B is complete and correct, but the student makes a minor error when listing the coordinates of the triangles in Part A. **2 points:** The student shows partial understanding of how to rotate figures on the plane and make and justify conjectures regarding rotated figures. The student gives the correct coordinates of the triangles in Part A and provides a correct conjecture in Part B, but the justification of the conjecture is incorrect. OR The student makes 1 or 2 minor mistakes when listing the coordinates of the triangles in Part A, provides a correct conjecture in Part B, but the justification of the conjecture is incomplete (e.g., only specific examples are given) although it demonstrates progress. **1 point:** The student shows limited understanding of how to rotate figures on the plane and make and justify conjectures regarding rotated figures. The student gives the correct coordinates of the triangles in Part A, but Part B is incorrect. OR The student provides a correct conjecture in Part B but makes 1 or 2 minor mistakes when listing the coordinates of the triangles in Part A, and the justification of the conjecture in Part B is incorrect. **0 points:** The student shows inconsistent or no understanding of how to rotate figures on the plane and make and justify conjectures regarding rotated figures.

DCAS-Like Answer	Next-Generation Solution
30A: A (8.G.3)	**30B:** *Sample Top-Score Response* When a polygon is reflected over the y-axis, each vertex of the reflected polygon will end up on the opposite side of the y-axis but the same distance from the y-axis. So, the x-coordinates of the vertices will change from positive to negative or negative to positive, but the absolute value of the number will stay the same, so the x-coordinates of the corresponding vertices of the polygon and its image are opposites. Since the polygon is being reflected over the y-axis, the image is in a different place horizontally, but it does not move up or down, which means the y-coordinates of the vertices of the image will be the same as the y-coordinates of the corresponding vertices of the original polygon. As an example, look at the graph below and notice that the x-coordinates of the corresponding vertices of the polygon and its image are opposites, but the y-coordinates are the same. This means the conjecture is correct. 

DCAS-Like Answer	Next-Generation Solution
	Scoring Rubric Responses to this item will receive 0-3 points based on the following: **3 points:** The student shows a thorough understanding of how to construct a chain of reasoning to justify a statement regarding reflections. The student provides a chain of reasoning that demonstrates that it is always true that the x-coordinates of the corresponding vertices of the polygon and its image are opposites, but the y-coordinates are the same when a polygon is reflected over the y-axis. **2 points:** The student shows a partial understanding of how to construct a chain of reasoning to justify a statement regarding reflections. The student makes progress in providing a chain of reasoning that demonstrates that it is always true that the x-coordinates of the corresponding vertices of the polygon and its image are opposites, but the y-coordinates are the same when a polygon is reflected over the y-axis. However, there are gaps in the student's reasoning, such as not fully addressing the distance of the x-coordinates from the y-axis or the opposite signs of the x-coordinates on either side of the y-axis or the y-coordinates are the same. OR The student provides a thorough justification that shows that the conjecture is not true for reflections over the x-axis. **1 point:** The student shows a limited understanding of how to construct a chain of reasoning to justify a statement regarding reflections. The student only uses specific examples to show that the x-coordinates of the corresponding vertices of the polygon and its image are opposites, but the y-coordinates are always the same when a polygon is reflected over the y-axis. OR The student makes progress in providing a justification that shows that the conjecture is not true for reflections over the x-axis. OR The student provides a thorough justification that shows that the conjecture is not true for a transformation other than a reflection. **0 points:** The student shows inconsistent or no understanding of how to construct a chain of reasoning to justify a statement regarding reflections.

DCAS-Like Answer	Next-Generation Solution
31A: B (8.G.4)	**31B:** *Sample Top-Score Response* Triangle ABC is rotated 90 degrees clockwise about the origin and then dilated by a scale factor of 2 to make the triangle DEF. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows a thorough understanding of transformations. The student correctly describes the transformations that take triangle ABC to triangle DEF. **1 point:** The student shows a partial understanding of transformations. The student identifies either the rotation or dilation. **0 points:** The student shows inconsistent or no understanding of transformations.

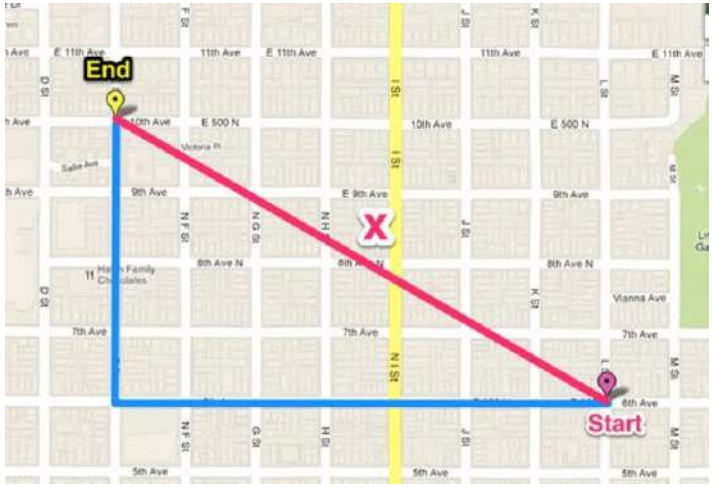
DCAS-Like Answer	Next-Generation Solution
32A: B (8.G.4)	**32B:** *Sample Top-Score Response* *Part A*  *Part B* A reflection over the y-axis. *Part C* A dilation with a scale factor of 2.5 about the origin. *Part D* ΔGHJ is similar to ΔABC. A dilation followed by a congruence, or a congruence followed by a dilation, is a similarity. So, ΔGHJ is similar to ΔABC.

DCAS-Like Answer	Next-Generation Solution
	Scoring Rubric Responses to this item will receive 0-3 points based on the following: **3 points:** The student shows a thorough understanding of how to apply the concepts of transformations, congruence, and similarity to solve problems. The student draws a correct triangle in Part A, states correct transformations in Parts B and C, and shows that triangles GHF and ABC are similar in Part D. **2 points:** The student shows a partial understanding of how to apply the concepts of transformations, congruence, and similarity to solve problems. The student draws a correct triangle n Part A and states correct transformations in Parts B and C but does not show that triangles GHJ and ABC are similar in Part D. OR The student shows that triangles GHJ and ABC are similar in Part D but does not draw a correct triangle in Part A, although the responses to Parts B and C indicate that that correct triangle was intended. **1 point:** The student shows a limited understanding of how to apply the concepts of transformations, congruence, and similarity to solve problems. The student shows that triangles GHJ and ABC are similar in Part D but does not draw a correct triangle in Part A, and only one of the transformations in Parts B and C is correct. **0 points:** The student shows inconsistent or no understanding of how to apply the concepts of transformations, congruence, and similarity to solve problems.
33A: C (8.G.5)	**33B:** *Key and Distractor Analysis* Students need to use the fact that the sum of the angles of a triangle is 180 degrees to find the correct values for x and y. Students may incorrectly assume that $x + 20$ must be equal to $y + 30$. Each part of the response will yield one point for a correct answer. $x = 40$ and $y = 40$.

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>34A: C
(8.G.6)</td><td>
34B:
Exemplary Responses
Part A:
<table>
<tr><td>Area 1 =</td><td>$\frac{ab}{2}$</td></tr>
<tr><td>Area 2 =</td><td>a^2</td></tr>
<tr><td>Area 3 =</td><td>b^2</td></tr>
<tr><td>Area 4 =</td><td>$\frac{ab}{2}$</td></tr>
<tr><td>Area 5 =</td><td>c^2</td></tr>
</table>
Part B:
<table>
<tr><th>Step</th><th>Statement</th><th>Justification</th></tr>
<tr><td>1</td><td>Each side of each square is divided into the same two parts, a and b.</td><td>Given</td></tr>
<tr><td>2</td><td>Squares X and Y are congruent.</td><td>Given</td></tr>
<tr><td>3</td><td>Area of Square X = Square Y</td><td>Squares X and Y are congruent.</td></tr>
<tr><td>4</td><td>Area of Square X =
$a^2 + b^2 + 4\left(\frac{ab}{2}\right) = a^2 + b^2 + 2ab$</td><td>Total area of an object equals the sum of all the partial areas within it.</td></tr>
<tr><td>5</td><td>Area of Square Y =
$c^2 + 4\left(\frac{ab}{2}\right) = c^2 + 2ab$</td><td>Total area of an object equals the sum of all the partial areas within it.</td></tr>
<tr><td>6</td><td>$a^2 + b^2 + 2ab = c^2 + 2ab$</td><td>Substitution</td></tr>
<tr><td>7</td><td>$a^2 + b^2 = c^2$</td><td>Subtracted same thing from both sides.</td></tr>
</table>
</td></tr>
</table>

DCAS-Like Answer	Next-Generation Solution
	Points Assigned ▪ 1 point for areas of shaded squares ▪ 1 point for areas of shaded triangles ▪ 0-2 points for the justifications (holistic)
35A: B (8.G.7)	**35B:** *Sample Top-Score Response* Picture the triangle with the side of length x on the bottom, the side of length y on the left, and the side of length z on the top. If $x^2 + y^2 = z^2$, the triangle is a right triangle. Since $x^2 + y^2 < z^2$, if the sides of length x and y were left so they made a right angle and the size of length z started at the other end of the side of length x, it would extend past the other end of the side of length y. So the end of the side of length y has to swing out to the left so the ends of all the segments can connect to form a triangle. When the side of length y swings out to the left, the measure of the angle between that side and the side of length x increases, so the triangle is an obtuse triangle. The conjecture is not true. *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows a thorough understanding of how to use the Pythagorean Theorem to construct a chain of reasoning to justify a statement about a triangle. The student justifies the conjecture and makes use of the Pythagorean Theorem while doing so. **1 point:** The student shows a partial understanding of how to use the Pythagorean Theorem to construct a chain of reasoning to justify a statement about a triangle. The student either demonstrates knowledge of the Pythagorean Theorem but does not provide a clear justification of the conjecture OR the student provides a justification of the conjecture without making use of the Pythagorean Theorem. **0 points:** The student shows inconsistent or no understanding of how to use the Pythagorean Theorem to construct a chain of reasoning to justify a statement about a triangle. Merely stating that the conjecture is true is not enough to earn any points.

DCAS-Like Answer	Next-Generation Solution
36A: B (8.G.7)	**36B:** *Sample Top-Score Response* *Part A* $7^2 + 11^2$ does not equal 14^2 because $49 + 121 = 170$, and not 196. Therefore, it is not a right triangle because the side lengths do not satisfy the Pythagorean Theorem. *Part B* 9, 12 *Scoring Rubric* The item will score 0-2 points based on the following: **2 points:** The student shows a thorough understanding of the Pythagorean Theorem and its converse. The student correct explains that the given triangle is not a right triangle and correctly provides legs that are whole numbers for a right triangle with a hypotenuse of length 15. **1 point:** The student shows a partial understanding of the Pythagorean Theorem and its converse. The student either correctly explains that the given triangle is not a right triangle or correctly provides legs that are whole numbers for a right triangle with a hypotenuse of length 15. **0 points:** The student shows inconsistent or no understanding of the Pythagorean Theorem and its converse.
37A: B (8.G.7)	**37B:** BC = 7, AC = 24, AB = 25 OR BC = 15, AC = 20, AB = 25 OR BC= 8, AC = 15, AB = 17 *Scoring Rubric* Responses to this item will receive 0-2 points based on the following: **2 points:** The student shows a thorough understanding of the Pythagorean Theorem. The student correctly chooses a set of 3 side lengths. **1 point:** The student shows a partial understanding of the Pythagorean Theorem. The student chooses the correct side lengths but does not enter them into the boxes correctly. **0 points:** The student shows inconsistent or no understanding of the Pythagorean Theorem.

DCAS-Like Answer	Next-Generation Solution
38A: D (8.G.8)	**38B:** a. Either prediction is acceptable as long as it is justified. Bert, being able to fly directly, will travel the shortest distance between the two points; however, his average speed is slower. Doug can travel faster, but as he must stay on the ground, will have a farther distance to travel. (It is important for students to realize that no matter the path Doug takes, as long as he only runs west and north, he will run 11 blocks: 7 blocks west and 4 blocks north.) b. One can infer that Bert will take the shortest path possible and draw a line segment between the start and finish to represent his path. You can draw any combination of due-west and due-north 11-block paths for Doug. (Drawing horizontally along 6th Ave and vertically along E St will be suggestive later for using the Pythagorean Theorem. Select a student to share high/her drawing that has chosen this path. c. You will have to compare the time it takes Doug to run his path at his speed and the time it takes Bert to fly his path at his speed. 

DCAS-Like Answer	Next-Generation Solution
	d. You need to know the distance that each travels. You already know Doug's distance, and you can use the Pythagorean Theorem to calculate Bert's distance. Once you know the distances, you can use $d = rt$ to find their times. Solving $d = rt$ for time gives $t = \frac{d}{r}$. So, you will divide each distance by the contestsnt's rate to find the time it took him to travel between the points. The contestant with the shorter time wins. Since the rates are given in miles per hour, the result I calculate will be expressed in hours. It may be helpful to convert the unit of time to minutes by multiplying the result by 60. e. Doug's distance = 11 blocks or $\frac{11}{16} = 0.6875$ miles. Bert's distance (let x represent the length of Bert's direct path): $$4^2 + 7^2 = x^2$$ $$\sqrt{65} = x$$ $$8.0623 \approx x$$ Bert's distance is approximately $\frac{8.0623}{16} = 0.5039$ miles. To find the time of travel, you can divide each distance by the corresponding rate. Doug's time = $\frac{0.6875 \text{ miles}}{30 \text{ (mi/hr)}} = 0.023$ hours or $(0.023)(60) = 1.38$ minutes Bert's time = $\frac{0.5039 \text{ miles}}{20 \text{ (mi/hr)}} = 0.025$ hours or $(0.025)(60) = 1.51$ minutes Since Doug's time is less than Bert's time, Doug wins the race.

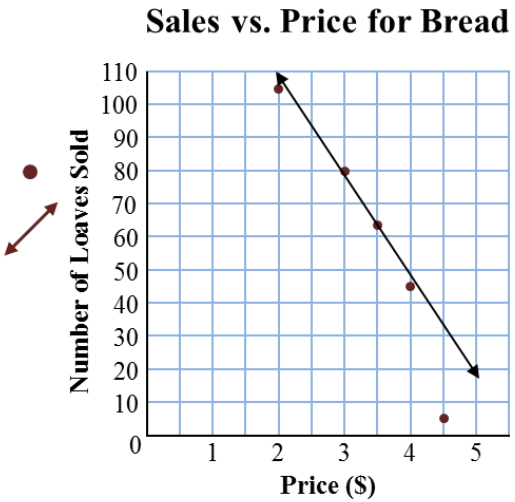
DCAS-Like Answer	Next-Generation Solution
39A: B (8.G.9)	**39B:** *Part A:* 36π cu. in. (or any number between 113, and 113.1) *Part B:* 36π cu. in. (or any number between 113, and 113.1) *Part C:* The following equation can be created if the volume of the sphere and cylinder are equal: $\frac{4}{3}\pi r^3 = \pi r^2$ Both sides of the equation can be divided by (πr^2) as shown below: $$\left(\frac{4}{3}\pi r^3\right) \div (\pi r^2) = (\pi r^2 h) \div (\pi r^2)$$ This justifies Lin's claim: $$\frac{4}{3}r = h$$ *Scoring Rubric* Responses to this items will receive 0-3 points based on the following: **3 points:** The student shows a thorough understanding of the volume of spheres and cylinders. The student correctly determines the volume of both the sphere (36π) and the cylinder (36π) and provides a clear justification in Part C. **2 points:** The student shows a partial understanding of the volume of spheres and cylinders. The student either gets both volumes correct but does not provide a clear justification for Part C OR the student gets only Part A or Part B correct AND provides a clear justification in Part C. **1 point:** The student shows a limited understanding of the volume of spheres and cylinders. The student answers only one part of the task correctly. **0 points:** The student shows inconsistent or no understanding of the volume of spheres and cylinders.

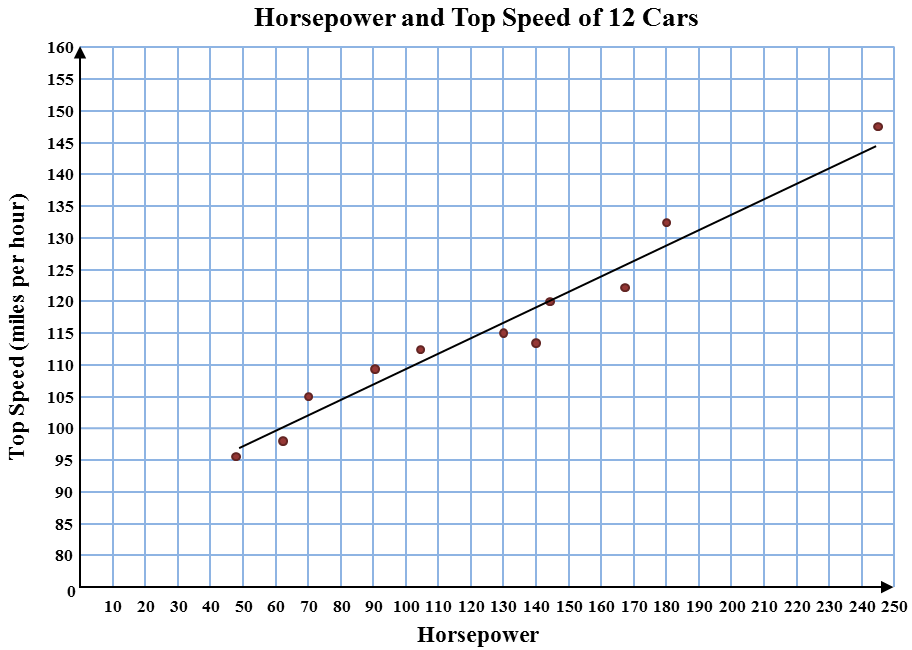
DCAS-Like Answer	Next-Generation Solution
40A: D (8.G.9)	**40B:** *Sample Top-Score Response* Tank #1: $r = 2$, $h = 9$ Tank #2: $r = 3$, $h = 4$ Tank #3: $r = 6$, $h = 1$ *Scoring Rubric* Responses to this item will receive 0-3 points based on the following: **3 points:** The student shows a thorough understanding of the volume of cylinders. The student provides 3 correct sets of dimensions. **2 points:** The student shows a partial understanding of the volume of cylinders. The student provides 2 correct sets of dimensions. **1 point:** The student shows a limited understanding of the volume of cylinders. The student provides 1 correct set of dimensions. **0 points:** The student shows inconsistent or no understanding of the volume of cylinders.

DCAS-Like Answer	Next-Generation Solution
41A: B (8.G.9)	**41B:** 1. Volume of the sphere $= \left(\frac{4}{3}\right)(\pi)(4^3) = 268$ cubic centimeters Volume of cone $= \frac{bh}{3} = \left(\frac{1}{3}\right)(\pi)(4^2)(16) = 268$ cubic centimeters, so yes, just barely OR Volume of the sphere $= \left(\frac{4}{3}\right)(\pi)(r^3) = \left(\frac{4}{3}\right)(\pi)(4^3) = \frac{4^4(\pi)}{3}$ Volume of the cone $= \frac{bh}{3} = \left(\frac{1}{3}\right)(\pi)(4^2)(16) = \frac{4^4(\pi)}{3}$ So, they are exactly the same. 2. 100 L = 100,000 cc 100,000 cc/268 cc/cone = 373 cones *Points Assigned* ▪ 1 point for finding the volume of the ice cream ▪ 1 point for finding the volume of the cone ▪ 1 point for finding how many cones can be made using 100 liters of ice cream
42A: C (8.G.9)	**42B:** *Key:* 12 centimeters

Statistics and Probability (SP)

DCAS-Like Answer	Next-Generation Solution
43A: C (8.SP.1)	**43B:** The scatter plot shows a moderate negative linear relationship between the number of texts a student sends and his or her GPA. There is one outlier that has a particularly low GPA and high number of texts sent, though it is in keeping with the overall pattern. It appears that students who send more text messages tend to have lower GPAs.

DCAS-Like Answer	Next-Generation Solution
44A: B (8.SP.2)	**44B:** *Part A*  *Part B* The trend line fits the data well between $4 and $4. Since it did not predict the actual sales at a price of $4.50, it would not be reliable at higher prices. It might be accurate for lower prices close to $2 but probably would not be accurate for very low prices. *Scoring Notes* Part A: Line does not have to be perfectly accurate but should not attempt to include the outlier. Part B: Discussion should make it clear why the trend line is not going to be accurate at high prices, at least. *Points Assigned* ▪ 1 point for plotting data correctly ▪ 1 point for drawing a trend line that does not include the outlier ▪ 1 point for an acceptable discussion of the data

DCAS-Like Answer	Next-Generation Solution
45A: C (8.SP.3)	**45B:** *Sample Top-Score Response* *Part A and Part B*  *Part C* 20 more horsepower. The slope of the line is about 10 miles per hour for 40 horsepower so it takes about 20 more horsepower for the top speed of the car to increase by 5 miles per hour.

DCAS-Like Answer	Next-Generation Solution
	Scoring Rubric This item will score 0-6 points based on up to 2 available in each part. *Part A* **2 points:** The student shows a thorough understanding of how to construct a scatter plot. The student plots each point very closely to where it should be located on the graph. **1 point:** The student shows a partial understanding of how to construct a scatter plot. The student makes minor errors when plotting individual points. **0 points:** The student shows inconsistent or no understanding of how to construct a scatter plot. The student makes major errors when plotting individual points, such as reversing *x*- and *y*-values. *Part B* **2 points:** The student shows a thorough understanding of how to construct a line of best fit. The line of best fit is within a preset range. **1 point:** The student shows a partial understanding of how to construct a line of best fit. The line is constructed so that parts of the line are outside of the preset range. **0 points:** The student shows inconsistent or no understanding of how to construct a line of best fit. *Part C* **2 points:** The student shows a thorough understanding of how to interpret the slope of a line of best fit. The answer of 20 and the explanation are both complete and correct. **1 point:** The student shows a partial understanding of how to interpret the slope of a line of best fit. Minor errors may be made in calculating the slope, or minor errors may be made in interpreting the slope. **0 points:** The student shows inconsistent or no understanding of how to interpret the slope of a line of best fit.

<table>
<tr><th>DCAS-Like Answer</th><th>Next-Generation Solution</th></tr>
<tr><td>46A: B
(8.SP.4)</td><td>
46B:
Sample Top-Score Response
Part A
<table>
<tr><th>At Least One Pet</th><th colspan="2">At Least One Child Under the Age of 18</th></tr>
<tr><th></th><th>Yes</th><th>No</th></tr>
<tr><td>Yes</td><td>9</td><td>6</td></tr>
<tr><td>No</td><td>2</td><td>8</td></tr>
</table>
Part B
Yes, there is evidence that the adults who have at least one child under the age of 18 also tend to have at least one pet. I found the relative frequencies for whether the adult had at least one pet or not given that the adult had at least one child and then given that the adult did not have any children, and 82% of the adults who had at least one child also had at least one pet. My work is shown below.
<table>
<tr><th>At Least One Pet</th><th colspan="2">At Least One Child Under the Age of 18</th><th>Totals</th></tr>
<tr><th></th><th>Yes</th><th>No</th><th></th></tr>
<tr><td>Yes</td><td>$\frac{9}{11} \approx 82\%$</td><td>$\frac{16}{14} \approx 43\%$</td><td>$\frac{15}{25} = 60\%$</td></tr>
<tr><td>No</td><td>$\frac{2}{11} \approx 18\%$</td><td>$\frac{8}{14} = 57\%$</td><td>$\frac{10}{25} = 40\%$</td></tr>
</table>
</td></tr>
</table>

DCAS-Like Answer	Next-Generation Solution
	Scoring Rubric Responses to this item will receive 0-4 points based on the following: *Part A* **2 points:** The student thoroughly understands how to construct two-way tables. The student's response in Part A matches the sample top-score response. **1 point:** The student shows a partial understanding of how to construct two-way tables. The student makes one or two minor mathematical errors when constructing the table. **0 points:** The student shows inconsistent or no understanding of how to construct two-way tables. The student makes several mathematical errors when constructing the table or one or more conceptual errors. *Part B* **2 points:** The student thoroughly understands how to interpret two-way tables. The student uses relative frequencies or a similar method in an explanation that corresponds with the table the student provided in Part A. **1 point:** The student shows a partial understanding of how to interpret two-way tables. The student uses the numbers in the table without using relative frequencies or a similar method in an explanation that corresponds with the table the student provided in Part A. **0 points:** The student shows inconsistent or no understanding of how to interpret two-way tables. The student does not use the table to help construct the explanation OR the student writes an explanation that does not correspond with the table the student provided in Part A.

SECTION 3: PERFORMANCE TASKS

GRADE 8 PERFORMANCE TASKS

The following are links to grade 8 Performance Tasks released by Smarter Balanced Assessment Consortium. All of the Performance Tasks are Claim 4, Modeling and Data Analysis.

MAT.08.PT.4.APARK.A.270* – *Designing a Park

- Primary Content Domain: Geometry
- Secondary Content Domains: Statistics and Probability, Ratios, and Proportions

MAT.08.PT.4.WTANK.A.271* – *Water Tower Options

- Primary Content Domain: Geometry
- Secondary Content Domains: Ratios and Proportional Relationships, Statistics and Probability

MAT.08.PT.4.MYPET.A.415* – *Cost of a Pet

- Primary Content Domain: Statistics and Probability
- Secondary Content Domains: Functions