

Interim Assessment 1

Mathematics

Grade 8

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 22 questions, including 4 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

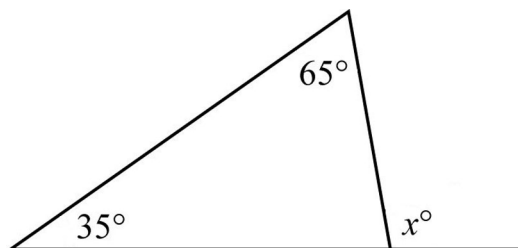
You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. What is the value of x in the figure shown below?



Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

2. The table and equation below show the proportional relationship between time, in seconds, x , and distance traveled, in feet, y , for two remote-control cars.

Car 1

x	y
15	75
17	85
21	105

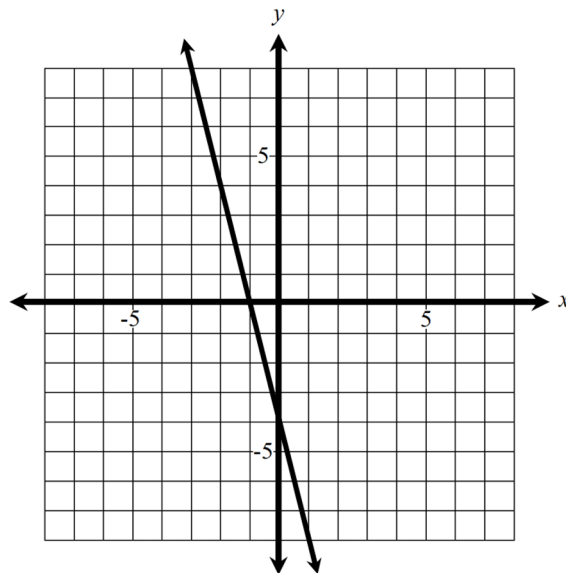
Car 2

$$y = 10x$$

Which statement is true about the speeds of the two cars?

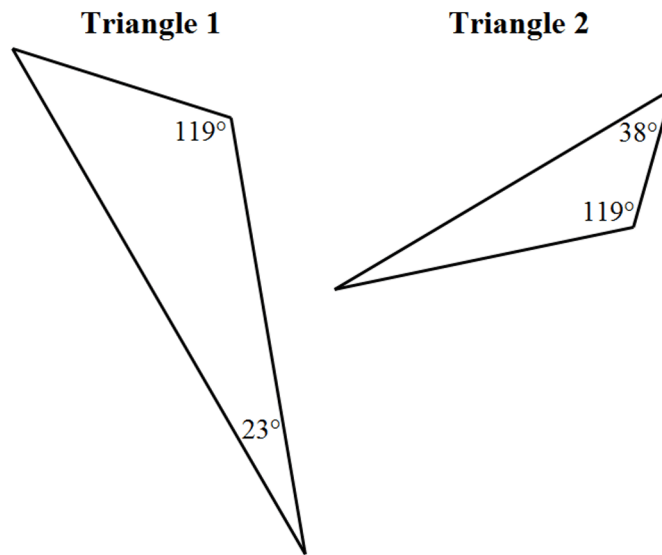
- A. Car 1 is traveling faster than Car 2.
- B. Car 2 is traveling faster than Car 1.
- C. The two cars are traveling at the same speed.
- D. The speeds cannot be compared because there is not enough information about Car 2.

3. What is the equation of the line shown below?



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

4. Triangle 1 and triangle 2 are shown below.



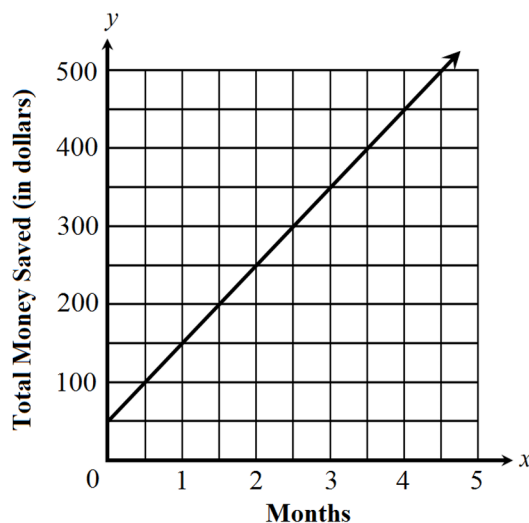
Which statement **best** describes triangle 1 and triangle 2?

- A. Triangle 1 and triangle 2 are similar because they have one pair of equal corresponding angles.
- B. Triangle 1 and triangle 2 are not similar because they have only one pair of equal corresponding angles.
- C. Triangle 1 and triangle 2 are similar because they have two pairs of equal corresponding angles.
- D. There is not enough information given to determine whether triangle 1 and triangle 2 are similar or not.

5. The table and graph below show the relationship between the number of months, x , and the total amount of money saved in dollars, y , for two students.

Student A

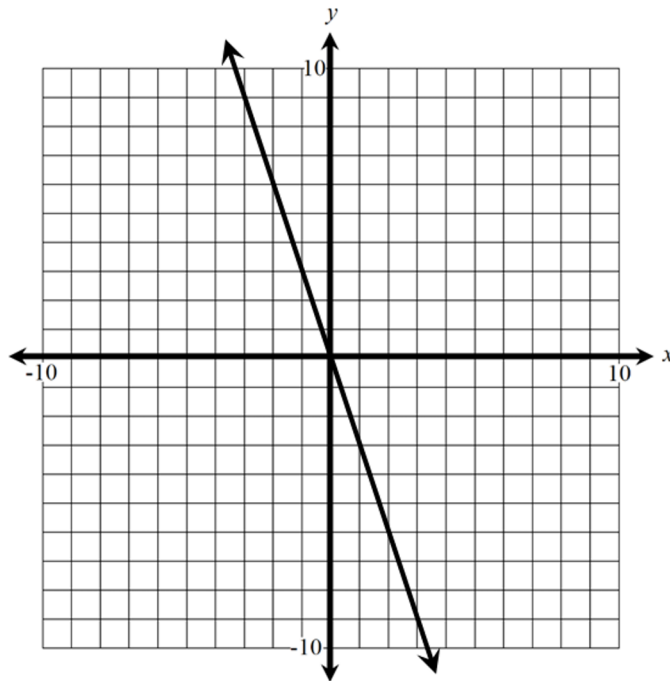
x	0	1	2	3
y	0	100	200	300

Student B

- Provide the equation for Student A's table and the equation for Student B's graph.
- If the equations are the same, explain why. If the equations are different, explain why.

Respond in the space provided.

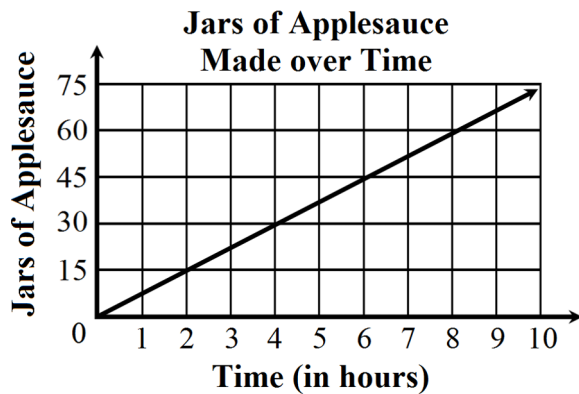
6. Use the graph below to answer the question.



Which equation represents the line shown in the graph above?

- A. $y = 3x$
- B. $y = -3x$
- C. $y = -\frac{1}{3}x$
- D. $y = x - 3$

7. The graph below shows the relationship between the number of hours, x , and the number of jars of applesauce, y , Gary makes for his applesauce business.



Which statement describes the slope of the line in the graph in terms of the context of the situation?

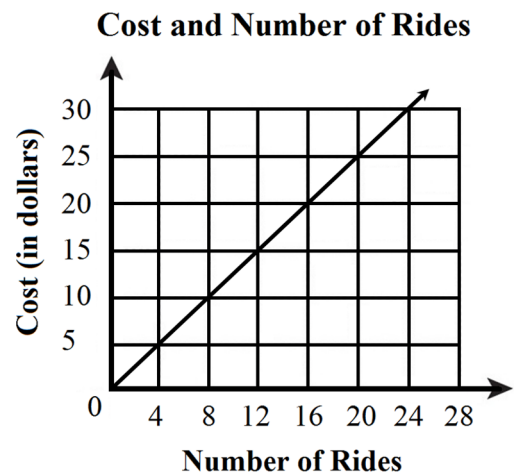
- A. Gary makes 7.5 jars of applesauce per hour.
- B. Gary makes 15 jars of applesauce per hour.
- C. Gary makes applesauce for a maximum of 7.5 hours at a time.
- D. Gary makes applesauce for a maximum of 10 hours at a time.

8. Two carnivals are coming to a town.

Carnival P charges y dollars to go on x rides. The cost for going on rides at Carnival P is represented as an equation.

$$y = 2.5x$$

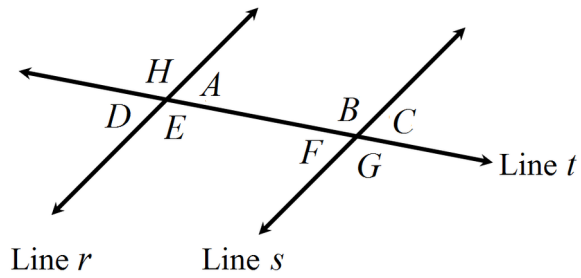
The cost for going on rides at Carnival Q is represented as a graph.



Which statement is true?

- A. The cost of 1 ride at Carnival P is twice the cost of 1 ride at Carnival Q.
- B. The cost of 4 rides at Carnival P is half the cost of 4 rides at Carnival Q.
- C. The cost of 1 ride at Carnival P is \$1.70 more than the cost of 1 ride at Carnival Q.
- D. The cost of 4 rides at Carnival P is \$3.40 less than the cost of 4 rides at Carnival Q.

9. Parallel lines r and s are cut by transversal line t .

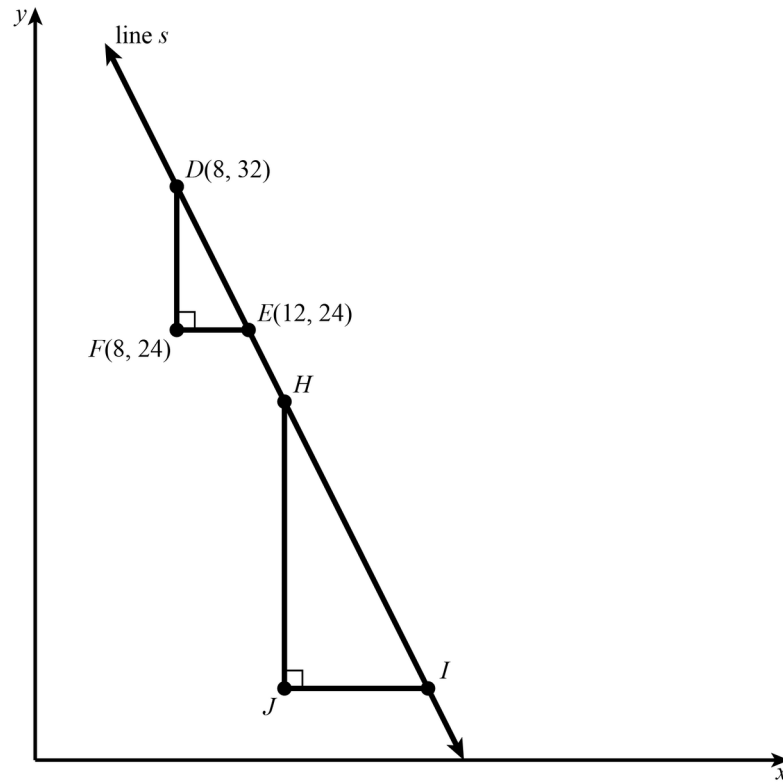


Which angles have a measure that is congruent to the measure of $\angle H$?

Select **all** that apply.

- A. $\angle A$
- B. $\angle B$
- C. $\angle C$
- D. $\angle D$
- E. $\angle E$
- F. $\angle F$
- G. $\angle G$

10. In the coordinate plane below, triangle DEF is similar to triangle HIJ .



Part A

What is the slope of \overline{HI} ? Justify your answer.

Respond in the space provided.

Part B

Write an equation that represents line s . Show or explain how you determined the equation.

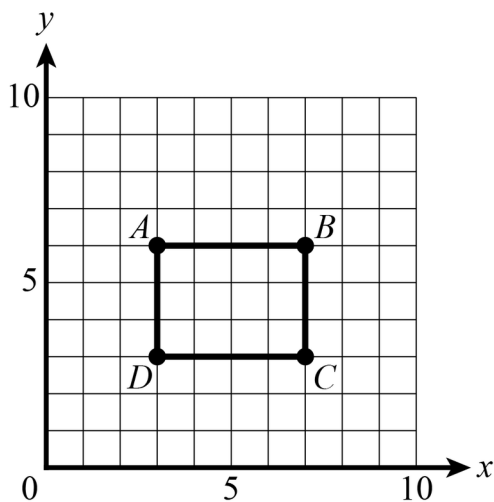
Respond in the space provided.

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



11. Rectangle $ABCD$ is shown below.

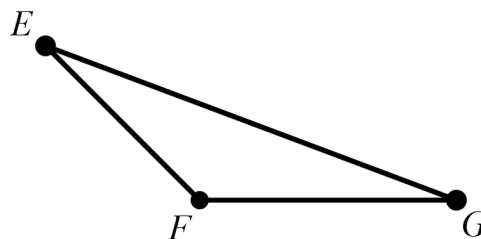


Rectangle $ABCD$ is dilated from the origin by a scale factor of 3 to create rectangle $A'B'C'D'$.

What are the coordinates of point A' ?

- A. (1, 2)
- B. (6, 9)
- C. (9, 6)
- D. (9, 18)

12. Angle EFG has a measure of 133° . Triangle EFG is rotated 180° counterclockwise about point F to create triangle $E'F'G'$.



What is the measure of angle $E'F'G'$?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

13. Rectangle S is dilated from the origin by a scale factor of 13 to create rectangle S' .

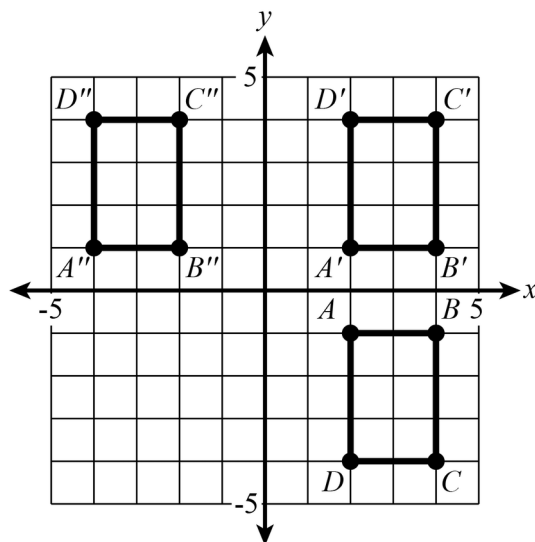
Which statements are true?

Select **all** that apply.

- A. Rectangle S is similar to rectangle S' .
- B. Rectangle S is congruent to rectangle S' .
- C. The side lengths of rectangle S are equal to the corresponding side lengths of rectangle S' .
- D. The side lengths of rectangle S are not equal to the corresponding side lengths of rectangle S' .
- E. The angle measurements of rectangle S are equal to the corresponding angle measurements of rectangle S' .
- F. The angle measurements of rectangle S are not equal to the corresponding angle measurements of rectangle S' .

14. Rectangle $ABCD$, rectangle $A'B'C'D'$, and rectangle $A''B''C''D''$, shown below, are congruent.

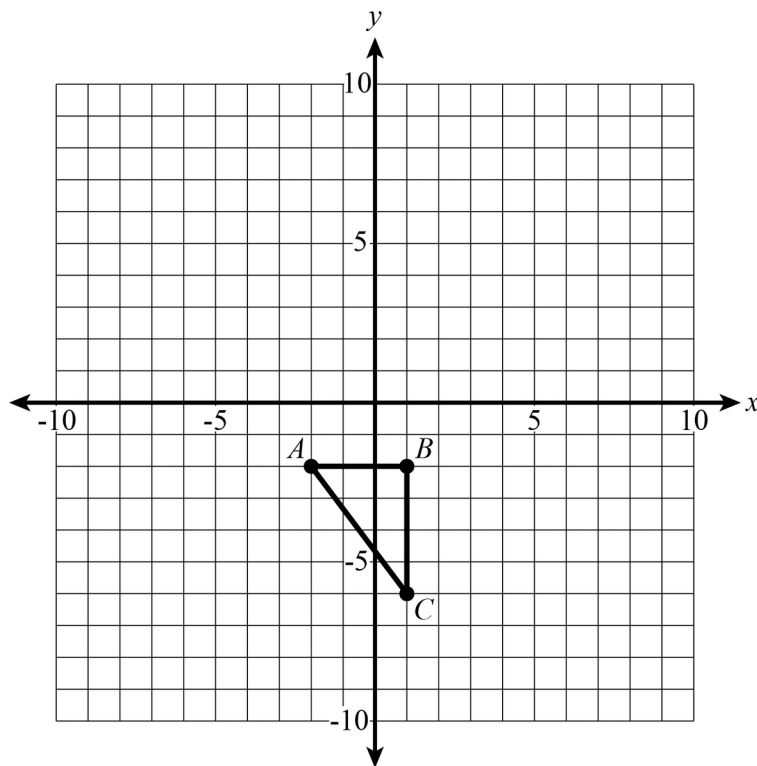
Rectangle $ABCD$ was transformed to create rectangle $A'B'C'D'$. Rectangle $A'B'C'D'$ was then transformed to create rectangle $A''B''C''D''$.



Which statement correctly describes the transformation of rectangle $ABCD$ to rectangle $A''B''C''D''$?

- A. Translate 2 units up and translate 6 units left.
- B. Translate 2 units up and reflect over the y -axis.
- C. Reflect over the x -axis and translate 6 units left.
- D. Reflect over the x -axis and reflect over the y -axis.

15. Triangle ABC is shown on the coordinate plane below.

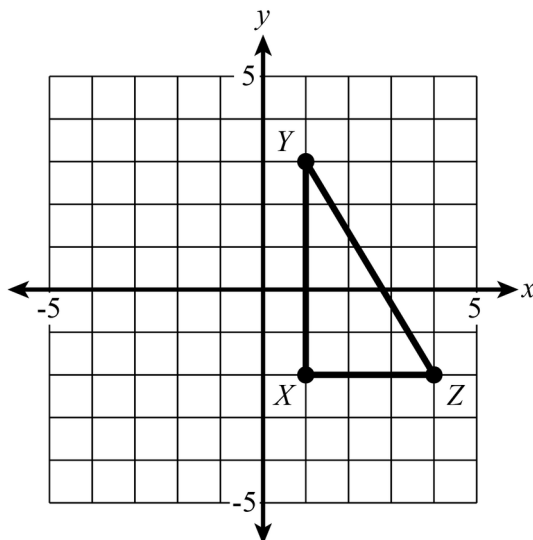


Triangle ABC is rotated 90° counterclockwise about point A to create triangle $A'B'C'$.

What are the coordinates of point B' ?

- A. $(-5, -2)$
- B. $(-2, -5)$
- C. $(-2, 1)$
- D. $(1, -2)$

16. Triangle XYZ is shown in the coordinate grid below.



\overline{XY} and \overline{XZ} are perpendicular. Triangle XYZ undergoes a transformation to create triangle $X'Y'Z'$.

Which statements are true?

Select **all** that apply.

- A. $\overline{X'Y'}$ and $\overline{X'Z'}$ will be perpendicular after a reflection over the y -axis.
- B. $\overline{X'Y'}$ and $\overline{X'Z'}$ will **not** be perpendicular after a reflection over the y -axis.
- C. $\overline{X'Y'}$ and $\overline{X'Z'}$ will be perpendicular after a translation down by 2 units.
- D. $\overline{X'Y'}$ and $\overline{X'Z'}$ will **not** be perpendicular after a translation down by 2 units.
- E. $\overline{X'Y'}$ and $\overline{X'Z'}$ will be perpendicular after a 90° rotation counterclockwise about the origin.
- F. $\overline{X'Y'}$ and $\overline{X'Z'}$ will **not** be perpendicular after a 90° rotation counterclockwise about the origin.

17. Part A

Rectangle $ABCD$ is translated and then reflected to create rectangle $A'B'C'D'$. Do rectangle $ABCD$ and rectangle $A'B'C'D'$ have the same area? Justify your answer.

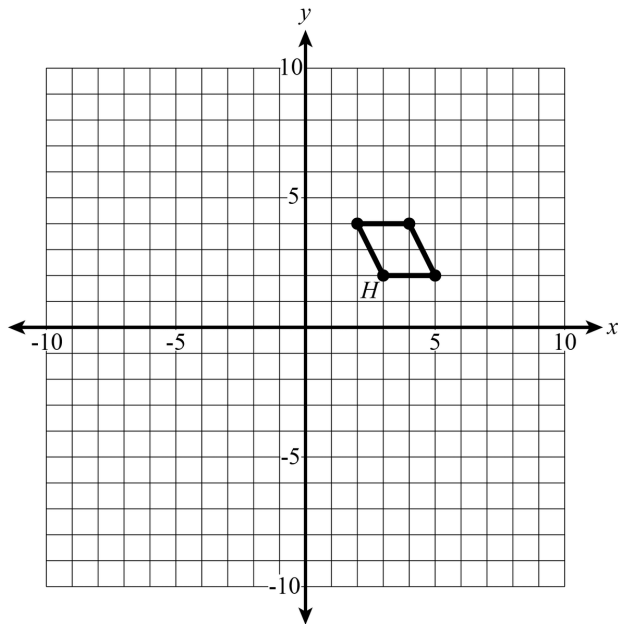
Respond in the space provided.

Part B

Triangle EFG is rotated and dilated by a scale factor other than 1 to create triangle $E'F'G'$. Do triangle EFG and triangle $E'F'G'$ have the same area? Justify your answer.

Respond in the space provided.

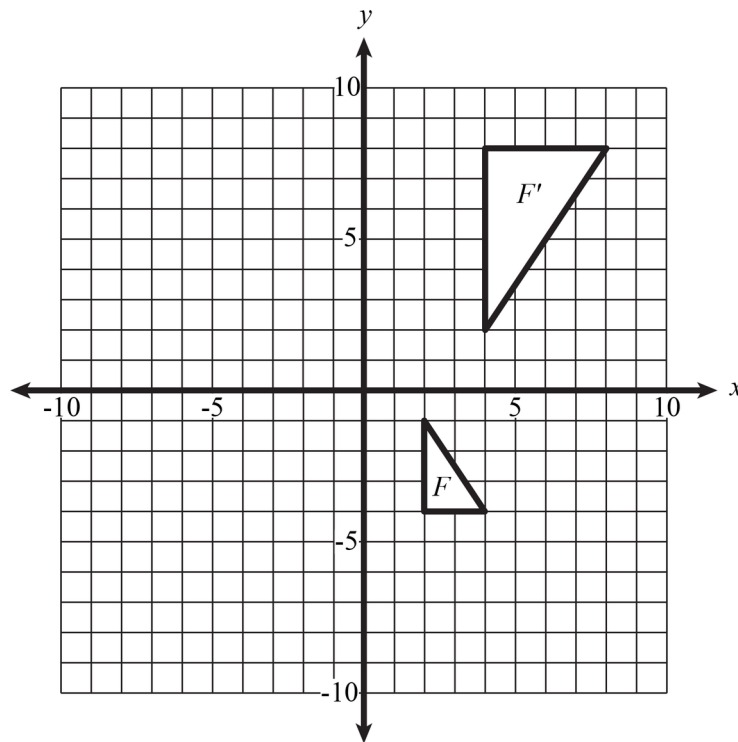
18. The parallelogram shown in the figure below is reflected over the y -axis and translated 6 units down.



What will be the new coordinates of point H after the reflection and translation?

- A. $(-3, -4)$
- B. $(-3, 2)$
- C. $(3, -8)$
- D. $(3, -4)$

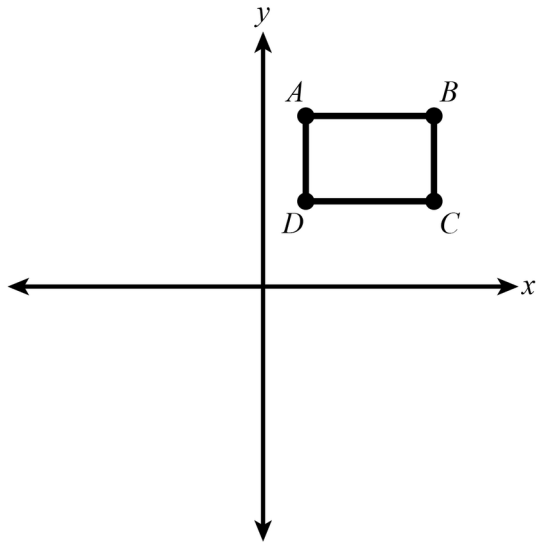
19. Shape F and shape F' are similar figures.



Which statement describes the transformation of shape F to shape F' ?

- A. Shape F is reflected over the y -axis and dilated from the origin by a factor of 2.
- B. Shape F is reflected over the x -axis and dilated from the origin by a factor of 2.
- C. Shape F is reflected over the y -axis and dilated from the origin by a factor of $\frac{1}{2}$.
- D. Shape F is reflected over the x -axis and dilated from the origin by a factor of $\frac{1}{2}$.

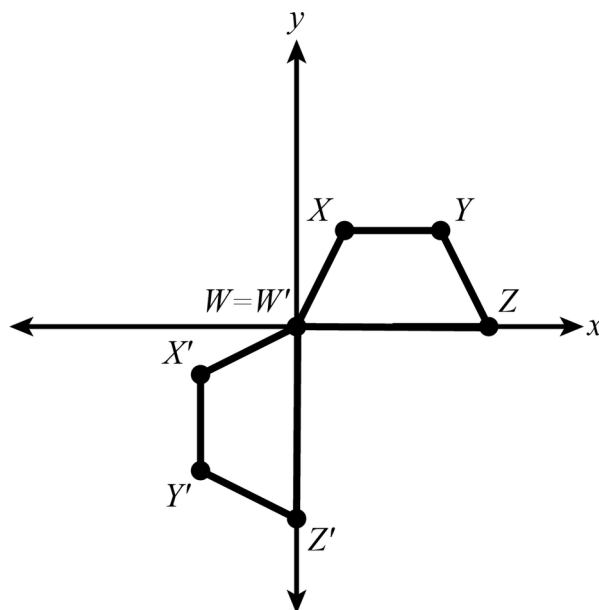
20. Quadrilateral $ABCD$, shown below, is translated 3 units to the left to create quadrilateral $A'B'C'D'$.



Which statement is true?

- A. The length of \overline{AB} is equal to the length of $\overline{A'B'}$.
- B. The length of \overline{AB} is less than the length of $\overline{A'B'}$.
- C. The length of \overline{AB} is greater than the length of $\overline{A'B'}$.
- D. There is not enough information given to compare the lengths of \overline{AB} and $\overline{A'B'}$.

21. Trapezoid $WXYZ$ and trapezoid $W'X'Y'Z'$, shown below, are congruent.

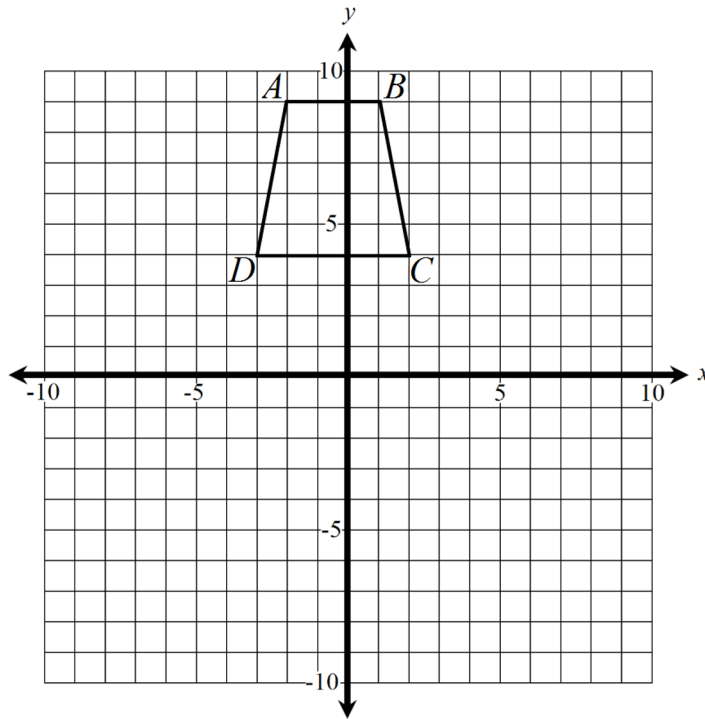


Which of the sequences of transformations of trapezoid $WXYZ$ results in trapezoid $W'X'Y'Z'$?

Select **all** that apply.

- A. Reflect trapezoid $WXYZ$ over the x -axis, and then rotate it 90° clockwise about the origin.
- B. Reflect trapezoid $WXYZ$ over the y -axis, and then rotate it 90° clockwise about the origin.
- C. Reflect trapezoid $WXYZ$ over the y -axis, and then rotate it 90° counterclockwise about the origin.
- D. Rotate trapezoid $WXYZ$ 90° clockwise about the origin, and then reflect it over the x -axis.
- E. Rotate trapezoid $WXYZ$ 90° clockwise about the origin, and then reflect it over the y -axis.
- F. Rotate trapezoid $WXYZ$ 90° counterclockwise about the origin, and then rotate it 180° about the origin.

22. Trapezoid $ABCD$ is transformed to make trapezoid $A'B'C'D'$ so that A' is located at $(-2, -4)$ and D' is located at $(-3, 1)$.



- Give coordinates for B' and C' that would make $ABCD$ congruent to $A'B'C'D'$.
- Describe the transformation, or sequence of transformations, that takes $ABCD$ to $A'B'C'D'$. Include all the information needed to complete the transformations.

Respond in the space provided.

Assessment Analysis Guide

Interim Assessment 1

Mathematics

Grade 8

1

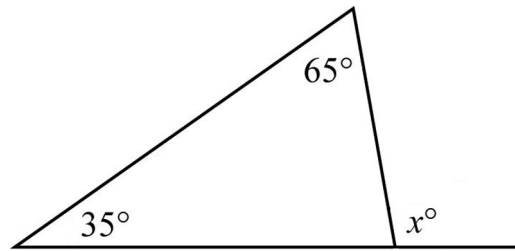
Item Id: i112772**Item Type: Math Short Answer**

Standards Description:

8.G.A.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.

Primary Standard: cc:8.G.A.5

Points Possible: 1

What is the value of x in the figure shown below?

Respond in the space provided.

*If your test is on paper, write your answer on the answer sheet.***Correct Answer:**

100°

Item Id: i112638**Item Type: Selected Response**

Standards Description:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.
Compare two different proportional relationships represented in different ways.

Primary Standard: cc:8.EE.B.5

Points Possible: 1

The table and equation below show the proportional relationship between time, in seconds, x , and distance traveled, in feet, y , for two remote-control cars.

Car 1

x	y
15	75
17	85
21	105

Car 2

$$y = 10x$$

Which statement is true about the speeds of the two cars?

A. Car 1 is traveling faster than Car 2.

Student compared the first x -value in the table (15) for Car 1 to the coefficient of x for Car 2 instead of calculating the slope for Car 1, OR student used the difference between the last two y -values in the table as the slope, but did not divide by the difference in the last two x -values.

B. Car 2 is traveling faster than Car 1.

Correct.

C. The two cars are traveling at the same speed.

Student used the difference between the first two y -values in the table as the slope, but did not divide by the difference in the first two x -values.

D. The speeds cannot be compared because there is not enough information about Car 2. Student did not recognize that the slope (speed) is represented by m (coefficient of x) from the equation.

3

Item Id: i112024

Item Type: Selected Response

Standards Description:

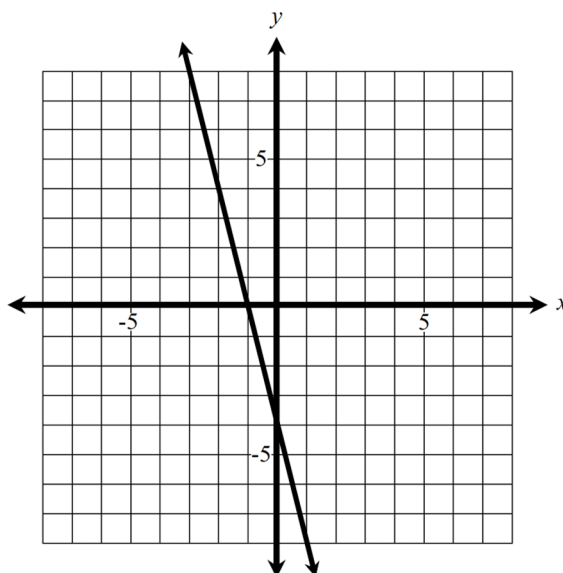
8.EE.B.6

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 .

Primary Standard: cc:8.EE.B.6

Points Possible: 1

What is the equation of the line shown below?



A. $y = 4x - 4$

Student represented the slope as positive instead of negative.

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

Student represented the slope as positive instead of negative and represented the slope as the change in x over the change in y.

C. $y = -4x - 4$

Correct.

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

Student represented the slope as the change in x over the change in y.

Item Id: i111906**Item Type: Selected Response**

Standards Description:

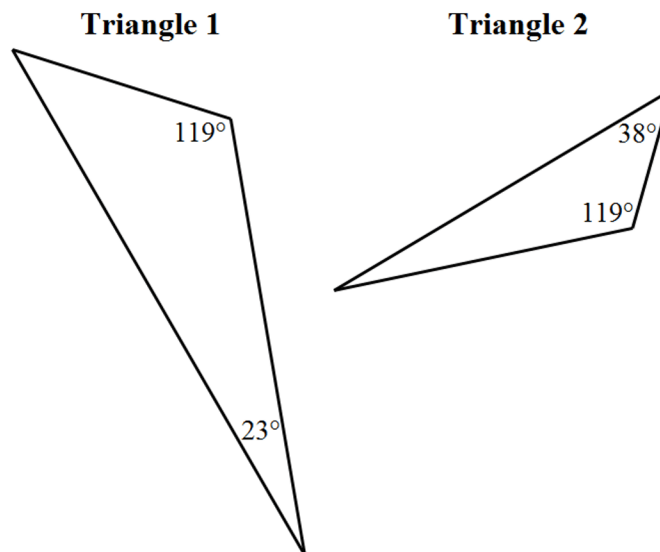
8.G.A.5

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.

Primary Standard: cc:8.G.A.5

Points Possible: 1

Triangle 1 and triangle 2 are shown below.

Which statement **best** describes triangle 1 and triangle 2?

A. Triangle 1 and triangle 2 are similar because they have one pair of equal corresponding angles.

Student recognized the one given pair of equal corresponding angles and thought that having only one pair was enough to prove triangle similarity.

- B. Triangle 1 and triangle 2 are not similar because they have only one pair of equal corresponding angles. Student understood that having only one pair of equal corresponding angles is not enough to prove triangle similarity, but did not recognize that there is more than one pair.
- C. Triangle 1 and triangle 2 are similar because they have two pairs of equal corresponding angles.** Correct.
- D. There is not enough information given to determine whether triangle 1 and triangle 2 are similar or not. Student thought that all angle measurements and/or side lengths needed to be given in order to determine triangle similarity, OR student thought that the missing angle measurement in either triangle could not be determined based on the given information.

Item Id: i113170**Item Type: Constructed Response**

Standards Description:

8.EE.B Understand the connections between proportional relationships, lines, and linear equations.

Standard(s) for Mathematical Practice:

MP4 Model with mathematics.

Students must identify important quantities in the table and graph to model each situation with an equation.

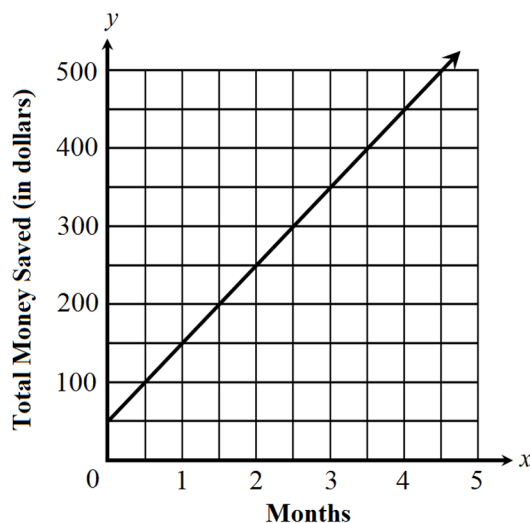
Primary Standard: cc:8.EE.B

Points Possible: 2

The table and graph below show the relationship between the number of months, x , and the total amount of money saved in dollars, y , for two students.

Student A

x	0	1	2	3
y	0	100	200	300

Student B

- Provide the equation for Student A's table and the equation for Student B's graph.
- If the equations are the same, explain why. If the equations are different, explain why.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Student A's equation is $y = 100x$

Student B's equation is $y = 100x + 50$

Although Student A and Student B are saving money at the same rate of \$100 per month and both equations have the same slope of 100, the equations differ because they have different y -intercepts. The y -intercept for Student A's equation is 0, and the y -intercept for Student B's equation is 50.

Evidence Statement(s):

1. Student derived the equation $y = mx$ for a line through the origin.
2. Student derived the equation $y = mx + b$ for a line intercepting the vertical axis at b .
3. Student understood that the equations representing the table and the graph differ only because they have different y -intercepts.

Common Misconception(s):

- Student did not understand the impact of the y -intercept when comparing Student A and Student B, and only considered the slope.
- Student did not understand how equations differ for lines that go through the origin and lines that do not.
- Student incorrectly calculated the slope for Student B and thought that the two equations should have different slopes.
- Student calculated the slope as the change in y , instead of the change in y divided by the change in x .
- Student calculated the slope as the change in x divided by the change in y , instead of the change in y divided by the change in x .
- Student confused the position of the slope and y -intercept in the equation $y = mx + b$.

6

Item Id: i112077**Item Type: Selected Response**

Standards Description:

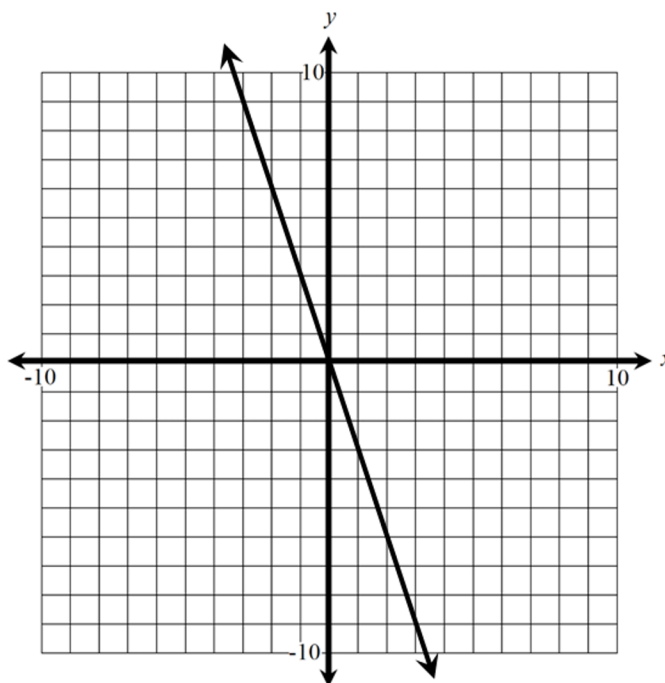
8.EE.B.6

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 .

Primary Standard: cc:8.EE.B.6

Points Possible: 1

Use the graph below to answer the question.



Which equation represents the line shown in the graph above?

A. $y = 3x$

Student confused a line with a negative slope with a line with a positive slope.

B. $y = -3x$

Correct.

C. $y = -\frac{1}{3}x$

Student found the slope by calculating the change in x over the change in y.

D. $y = x - 3$

Student may have confused the slope and the y-intercept, and assumed that lines passing through the origin had a slope of 1, OR student identified the slope as -3 but did not recognize that the slope should be the coefficient of x.

Item Id: i112546

Item Type: Selected Response

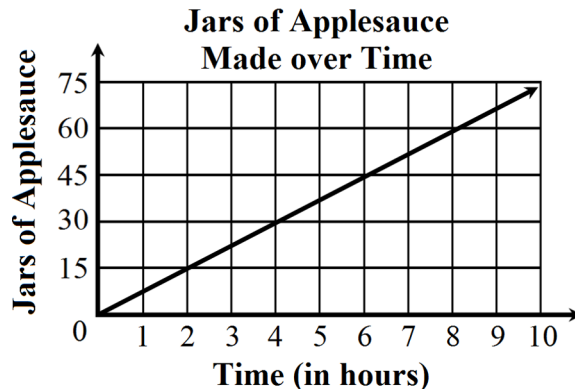
Standards Description:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.
Compare two different proportional relationships represented in different ways.

Primary Standard: cc:8.EE.B.5

Points Possible: 1

The graph below shows the relationship between the number of hours, x , and the number of jars of applesauce, y , Gary makes for his applesauce business.



Which statement describes the slope of the line in the graph in terms of the context of the situation?

- A. Gary makes 7.5 jars of applesauce per hour.** Correct.
- B. Gary makes 15 jars of applesauce per hour. Student interpreted the interval on the y-axis as the slope.
- C. Gary makes applesauce for a maximum of 7.5 hours at a time. Student calculated the slope correctly, but did not interpret it as the unit rate.
- D. Gary makes applesauce for a maximum of 10 hours at a time. Student interpreted the maximum x-value shown on the x-axis as the slope.

Item Id: i112994

Item Type: Selected Response

Standards Description:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.
Compare two different proportional relationships represented in different ways.

Primary Standard: cc:8.EE.B.5

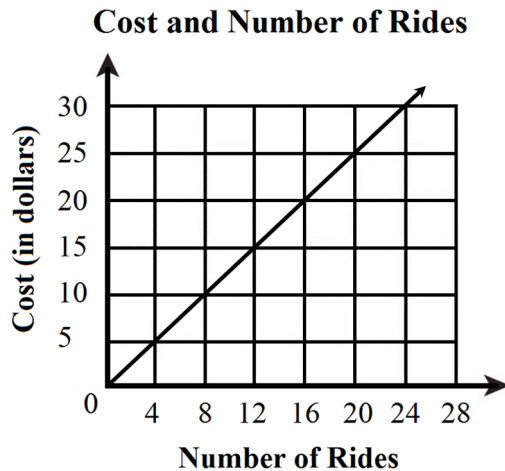
Points Possible: 1

Two carnivals are coming to a town.

Carnival P charges y dollars to go on x rides. The cost for going on rides at Carnival P is represented as an equation.

$$y = 2.5x$$

The cost for going on rides at Carnival Q is represented as a graph.



Which statement is true?

A. The cost of 1 ride at Carnival P is twice the cost of 1 ride at Carnival Q. Correct.

B. The cost of 4 rides at Carnival P is half the cost of 4 rides at Carnival Q.

Student switched the relative sizes of the costs, OR student compared the first y-value on the graph for Carnival Q with the coefficient in the equation for Carnival P.

C. The cost of 1 ride at Carnival P is \$1.70 more than the cost of 1 ride at Carnival Q.

Student calculated the unit rate as x/y from the graph.

D. The cost of 4 rides at Carnival P is \$3.40 less than the cost of 4 rides at Carnival Q.

Student identified that the cost of 4 rides at Carnival Q is \$5.00, but incorrectly substituted 4 in for y instead of x in the equation for Carnival P to get 1.6, and subtracted $5.0 - 1.6 = 3.4$.

Item Id: i112030

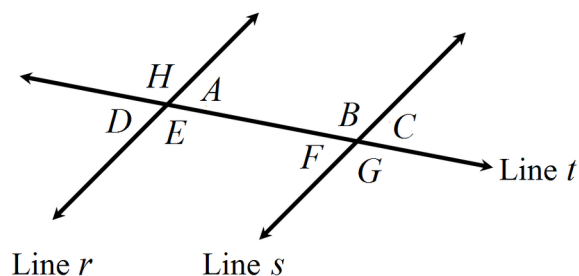
Item Type: Multiple Select

Standards Description:

8.G.A.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.

Primary Standard: cc:8.G.A.5

Points Possible: 1

Parallel lines r and s are cut by transversal line t .Which angles have a measure that is congruent to the measure of $\angle H$?Select **all** that apply.A. $\angle A$

Student thought that adjacent angles are congruent.

B. $\angle B$

Correct.

C. $\angle C$

Student thought that the angles are congruent; perhaps thought that there is an exterior corresponding angles relationship.

D. $\angle D$

Student thought that adjacent angles are congruent.

E. $\angle E$

Correct.

F. $\angle F$

Student thought that the angles are congruent;
perhaps thought these angles have an alternate interior
or alternate exterior angles relationship.

G. $\angle G$

Correct.

10

Item Id: i138612**Item Type: Constructed Response**

Standards Description:

8.EE.B.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 .

Standard(s) for Mathematical Practice:

MP5 Use appropriate tools strategically.

In Part B, students must recognize the need to use the equation $y = mx + b$ to derive the equation for line s .

MP7 Look for and make use of structure.

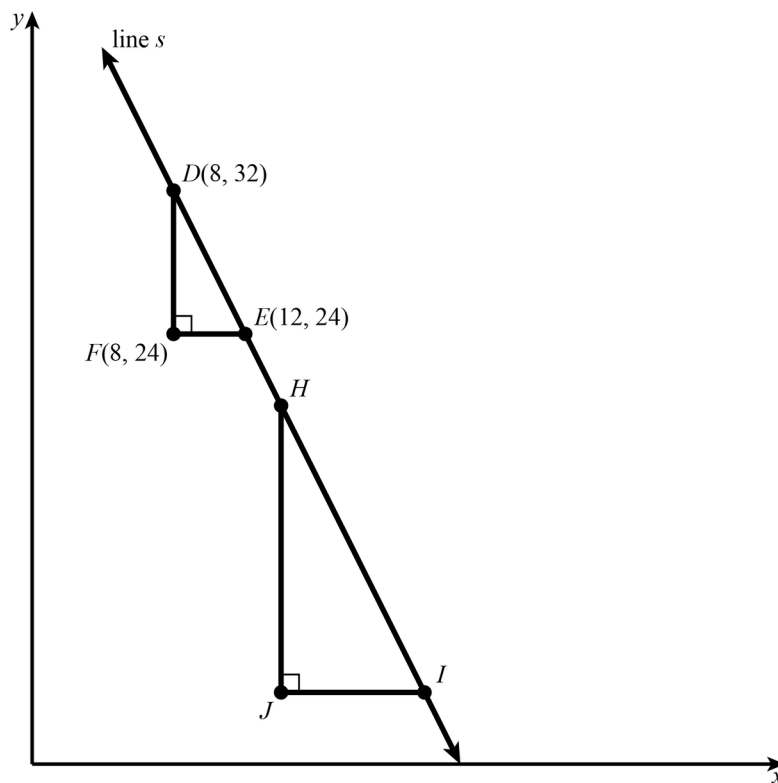
In Part A, students must understand and look for the connections in the structures of triangles DEF and HIJ . They then must use the given details for the structure of triangle DEF to answer a question about triangle HIJ .

10A

Primary Standard: cc:8.EE.B.6

Points Possible: 2

In the coordinate plane below, triangle DEF is similar to triangle HIJ .

**Part A**

What is the slope of \overline{HI} ? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Because \overline{DE} and \overline{HI} are on the same line, they have the same slope. Therefore, the ratio of the rise over the run for \overline{HI} is equivalent to the ratio of the rise over the run for \overline{DE} .

$$\text{The slope of } \overline{HI} = \frac{JH}{JI} = \frac{FD}{FE} = -\frac{8}{4} = -2$$

Evidence Statement(s):

1. Student understood that the slope is the same between any two distinct points on a non-vertical line in the coordinate plane.
2. Student derived the slope of \overline{HI} using the ratio of the rise over the run for \overline{DE} , demonstrating an understanding that line segments with the same slope have equivalent ratios for the change in y and the change in x .

Common Misconception(s):

- Student thought there was not enough information given to derive the slope of \overline{HI} ; did not understand that \overline{HI} and \overline{DE} have the same slope.
- Student thought the slopes of \overline{HI} and \overline{DE} had to be different because the lengths of \overline{HI} and \overline{DE} are different.
- Student thought the slopes of \overline{HI} and \overline{DE} are positive because the line segments are in a quadrant with positive x -values and y -values.
- Student derived the slope as the ratio of the change in x over the change in y .

10B

Primary Standard: cc:8.EE.B.6

Points Possible: 2

Part BWrite an equation that represents line s . Show or explain how you determined the equation.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$y = mx + b$$

The slope of line s is the same as the slope for \overline{DE} and \overline{HI} .

$$m = -2$$

$$y = -2x + b$$

$$24 = -2(12) + b$$

$$24 = -24 + b$$

$$b = 48$$

The equation for line s is:

$$y = -2x + 48$$

Evidence Statement(s):

1. Student understood that the slope of line s is the same as the slope derived for \overline{DE} and \overline{HI} .
2. Student derived the equation $y = mx + b$ for a line intercepting the vertical axis at b .

Common Misconception(s):

- Student thought the equation for line s could not be derived; perhaps did not understand that the slope for line s is the same as the slope for \overline{DE} and \overline{HI} .
- Student substituted the slope found in Part A for b in $y = mx + b$ and solved for m .
- Student substituted the coordinates of one of the three points given (point D , E , or F) into the wrong parts of $y = mx + b$.
- Student correctly substituted the slope found in Part A and the coordinates of either point D or E into $y = mx + b$, but incorrectly solved for b .

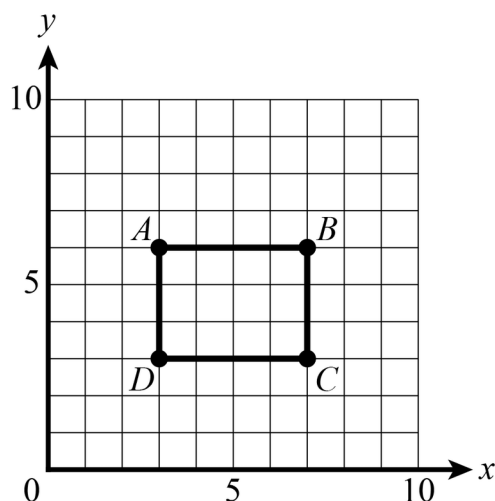
Item Id: i138885**Item Type: Selected Response**

Standards Description:

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

Primary Standard: cc:8.G.A.3

Points Possible: 1

Rectangle $ABCD$ is shown below.Rectangle $ABCD$ is dilated from the origin by a scale factor of 3 to create rectangle $A'B'C'D'$.What are the coordinates of point A' ?

A. (1, 2)

Student confused a scale factor that makes the coordinates larger with one that makes the coordinates smaller, and divided each coordinate by 3 instead of multiplying each by 3.

B. (6, 9)

Student added 3 to the value of each coordinate instead of multiplying each coordinate by 3.

C. (9, 6)

Student only multiplied the x-coordinate by 3; left the y-coordinate as is.

D. (9, 18)

Correct.

12

Item Id: i138326**Item Type: Math Short Answer**

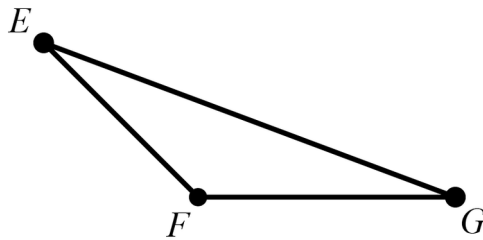
Standards Description:

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

Primary Standard: cc:8.G.A.1

Points Possible: 1

Angle EFG has a measure of 133° . Triangle EFG is rotated 180° counterclockwise about point F to create triangle $E'F'G'$.



What is the measure of angle $E'F'G'$?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

Correct Answer:

133°

Item Id: i129595**Item Type: Multiple Select**

Standards Description:

8.G.A.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.

Primary Standard: cc:8.G.A.4

Points Possible: 2

Rectangle S is dilated from the origin by a scale factor of 13 to create rectangle S' .

Which statements are true?

Select **all** that apply.

- A. Rectangle S is similar to rectangle S' .** Correct.
- B. Rectangle S is congruent to rectangle S' .** Student thought that a dilation preserves both the angle measurements and the side lengths, OR student confused the meaning of congruent with the meaning of similar.
- C. The side lengths of rectangle S are equal to the corresponding side lengths of rectangle S' .** Student thought that a dilation preserves the side lengths.
- D. The side lengths of rectangle S are not equal to the corresponding side lengths of rectangle S' .** Correct.
- E. The angle measurements of rectangle S are equal to the corresponding angle measurements of rectangle S' .** Correct.

F. The angle measurements of rectangle S are not equal to the corresponding angle measurements of rectangle S' . Student thought that a dilation does not preserve the angle measurements.

Item Id: i138327

Item Type: Selected Response

Standards Description:

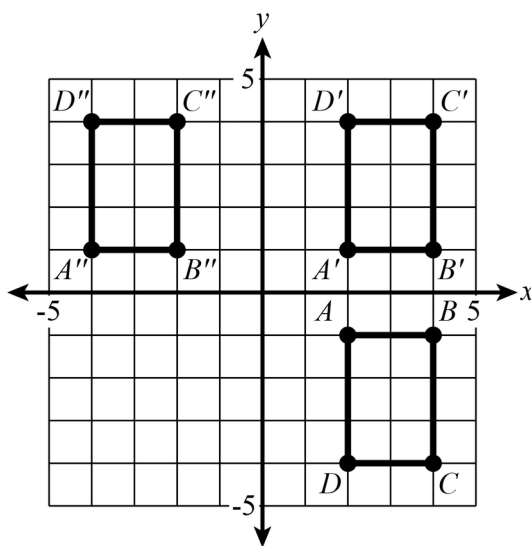
8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

Primary Standard: cc:8.G.A.2

Points Possible: 1

Rectangle $ABCD$, rectangle $A'B'C'D'$, and rectangle $A''B''C''D''$, shown below, are congruent.

Rectangle $ABCD$ was transformed to create rectangle $A'B'C'D'$. Rectangle $A'B'C'D'$ was then transformed to create rectangle $A''B''C''D''$.



Which statement correctly describes the transformation of rectangle $ABCD$ to rectangle $A''B''C''D''$?

A. Translate 2 units up and translate 6 units left.

Student translated A to A' and B to B', and then A' to A'' and B' to B'', and did not recognize that the other vertices did not match.

B. Translate 2 units up and reflect over the y -axis.

Student translated A to A' and B to B', not recognizing that the other vertices did not match, and then reflected A'B'C'D' over the y -axis, not realizing that none of the vertices matched at this step.

C. Reflect over the x -axis and translate 6 units left. Correct.

D. Reflect over the x -axis and reflect over the y -axis.

Student confused a translation with a reflection in the second transformation, not realizing that the vertices did not match at the second step.

15

Item Id: i138857**Item Type: Selected Response**

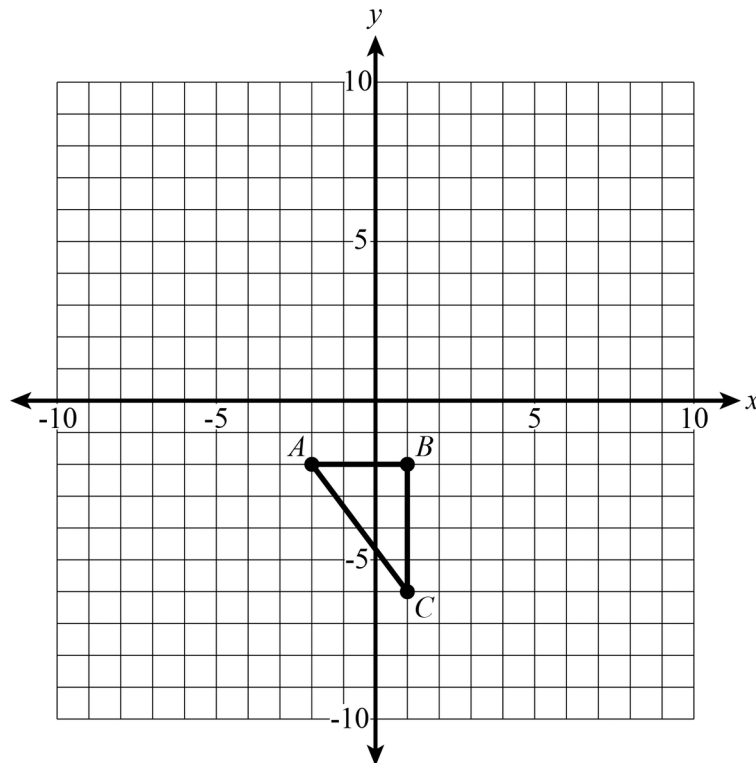
Standards Description:

8.G.A.3

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

Primary Standard: cc:8.G.A.3

Points Possible: 1

Triangle ABC is shown on the coordinate plane below.Triangle ABC is rotated 90° counterclockwise about point A to create triangle $A'B'C'$.What are the coordinates of point B' ?

A. $(-5, -2)$

Student rotated 180° instead of just 90° , OR student reflected the triangle over the line $x = -2$ because the point A is on that line.

B. $(-2, -5)$

Student rotated the triangle clockwise instead of counterclockwise, OR student rotated the triangle 270° counterclockwise instead of just 90° .

C. $(-2, 1)$

Correct.

D. $(1, -2)$

Student switched the x-coordinate and y-coordinate of point B'.

Item Id: i138321

Item Type: Multiple Select

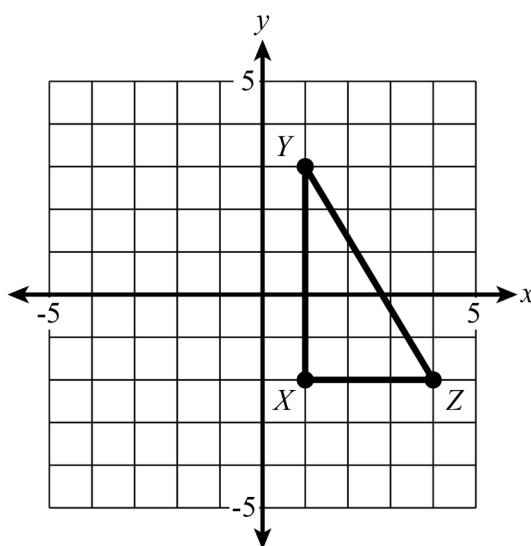
Standards Description:

8.G.A.1

Verify experimentally the properties of rotations, reflections, and translations:

Primary Standard: cc:8.G.A.1

Points Possible: 1

Triangle XYZ is shown in the coordinate grid below.

\overline{XY} and \overline{XZ} are perpendicular. Triangle XYZ undergoes a transformation to create triangle $X'Y'Z'$.

Which statements are true?

Select **all** that apply.

A. $\overline{X'Y'}$ and $\overline{X'Z'}$ will be perpendicular after a reflection over the y -axis.

Correct.

B. $\overline{X'Y'}$ and $\overline{X'Z'}$ will **not** be perpendicular after a reflection over the y -axis.

Student thought a reflection would change the outline of the shape and that would mean the line segments would no longer be perpendicular.

C. $\overline{X'Y'}$ and $\overline{X'Z'}$ will be perpendicular after a translation down by 2 units.

Correct.

D. $\overline{X'Y'}$ and $\overline{X'Z'}$ will **not** be perpendicular after a translation down by 2 units.

Student thought a translation would mean that the line segments are no longer perpendicular because the location of the shape is different.

E. $\overline{X'Y'}$ and $\overline{X'Z'}$ will be perpendicular after a 90° rotation counterclockwise about the origin.

Correct.

F. $\overline{X'Y'}$ and $\overline{X'Z'}$ will **not** be perpendicular after a 90° rotation counterclockwise about the origin.

Student thought a rotation would change the outline of the shape, OR student thought that, because the line segments would have a different orientation, they would not be perpendicular.

17

Item Id: i138301**Item Type: Constructed Response**

Standards Description:

8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.

Standard(s) for Mathematical Practice:

MP6 Attend to precision.

Throughout the item, students have to use clear, accurate definitions and geometric facts in their justifications of their answers.

17A

Primary Standard: cc:8.G.A

Points Possible: 2

Part A

Rectangle $ABCD$ is translated and then reflected to create rectangle $A'B'C'D'$. Do rectangle $ABCD$ and rectangle $A'B'C'D'$ have the same area? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

When a shape is translated and/or reflected, the new shape will have the same angle measures and side lengths as the original shape. Therefore, rectangle $ABCD$ and rectangle $A'B'C'D'$ are congruent and have the same area.

Evidence Statement(s):

1. Student understood that rectangle $A'B'C'D'$ is congruent to rectangle $ABCD$ because a translation and/or reflection does not change the angle measures and side lengths.
2. Student understood that two congruent figures have the same area.

Common Misconception(s):

- Student thought that a translation and/or reflection changed the size or shape of a figure; perhaps thought the angle measures or side lengths changed.
- Student understood the two figures are congruent but did not understand that two congruent figures have the same area.

17B

Primary Standard: cc:8.G.A

Points Possible: 2

Part B

Triangle EFG is rotated and dilated by a scale factor other than 1 to create triangle $E'F'G'$. Do triangle EFG and triangle $E'F'G'$ have the same area? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

While a rotation does not change the angle measures nor side lengths, a dilation by a scale factor other than 1 changes the side lengths. Therefore, triangle EFG and triangle $E'F'G'$ are similar, not congruent, and do not have the same area.

Evidence Statement(s):

1. Student understood that triangle $E'F'G'$ is similar, not congruent, to triangle EFG because a dilation by a scale factor other than 1 changes the side lengths.
2. Student understood that the two similar figures do not have the same area.

Common Misconception(s):

- Student thought that a transformation of any kind, including a dilation, does not change the size or shape of a figure.
- Student understood the two figures are similar, not congruent, but did not understand that the two similar figures do not have the same area.

Item Id: i138883

Item Type: Selected Response

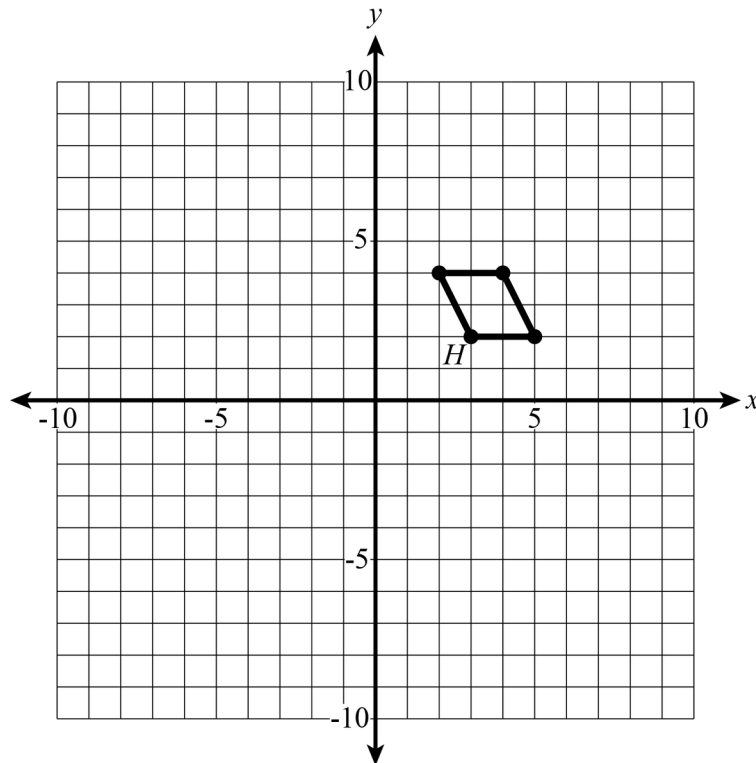
Standards Description:

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

Primary Standard: cc:8.G.A.3

Points Possible: 1

The parallelogram shown in the figure below is reflected over the y -axis and translated 6 units down.



What will be the new coordinates of point H after the reflection and translation?

A. $(-3, -4)$

Correct.

B. $(-3, 2)$

Student reflected the parallelogram, but did not translate it.

C. $(3, -8)$

Student reflected the parallelogram over the x-axis, instead of the y-axis, and then translated it.

D. $(3, -4)$

Student translated the parallelogram, but did not reflect it.

Item Id: i129596

Item Type: Selected Response

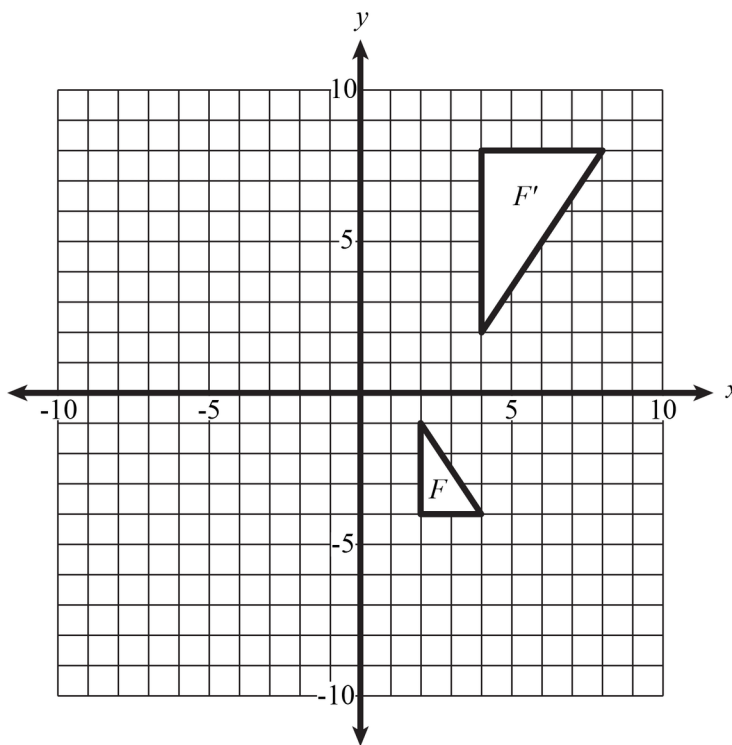
Standards Description:

8.G.A.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.

Primary Standard: cc:8.G.A.4

Points Possible: 1

Shape F and shape F' are similar figures.



Which statement describes the transformation of shape F to shape F' ?

- A. Shape F is reflected over the y -axis and dilated from the origin by a factor of 2. Student misinterpreted the transformation as a reflection over the y -axis instead of the x -axis.

B. Shape F is reflected over the x -axis and dilated from the origin by a factor of 2. Correct.

C. Shape F is reflected over the y -axis and dilated from the origin by a factor of $\frac{1}{2}$. Student misinterpreted the transformation as a reflection over the y -axis instead of the x -axis and calculated the dilation factor as if shape F' was transformed to shape F .

D. Shape F is reflected over the x -axis and dilated from the origin by a factor of $\frac{1}{2}$. Student calculated the dilation factor as if shape F' was transformed to shape F .

20

Item Id: i138325

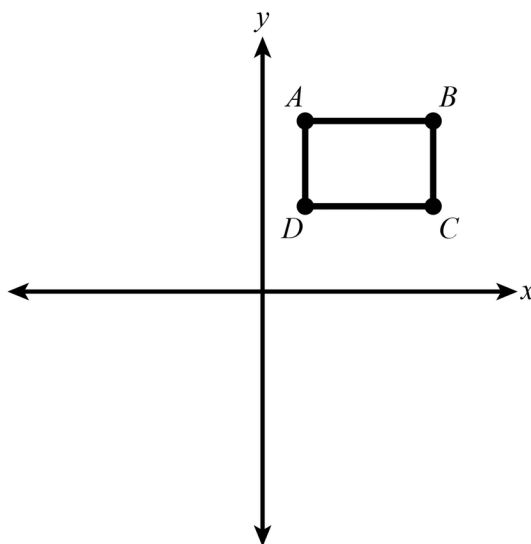
Item Type: Selected Response

Standards Description:

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

Primary Standard: cc:8.G.A.1

Points Possible: 1

Quadrilateral $ABCD$, shown below, is translated 3 units to the left to create quadrilateral $A'B'C'D'$.

Which statement is true?

A. The length of \overline{AB} is equal to the length of $\overline{A'B'}$. Correct.

B. The length of \overline{AB} is less than the length of $\overline{A'B'}$.

Student thought that a translation of quadrilateral $ABCD$ to the left made line segments AB and CD longer; perhaps thought that only points A and D would be translated 3 units left.

C. The length of \overline{AB} is greater than the length of $\overline{A'B'}$.

Student thought that a translation of quadrilateral ABCD to the left made line segments AB and CD shorter; perhaps thought that only points B and C would be translated 3 units left, making them closer to points A and D.

D. There is not enough information given to compare the lengths of \overline{AB} and $\overline{A'B'}$.

Student thought that the length of line segment AB must be given in order to compare; did not recognize that a translation would create congruent line segments.

Item Id: i156000

Item Type: Multiple Select

Standards Description:

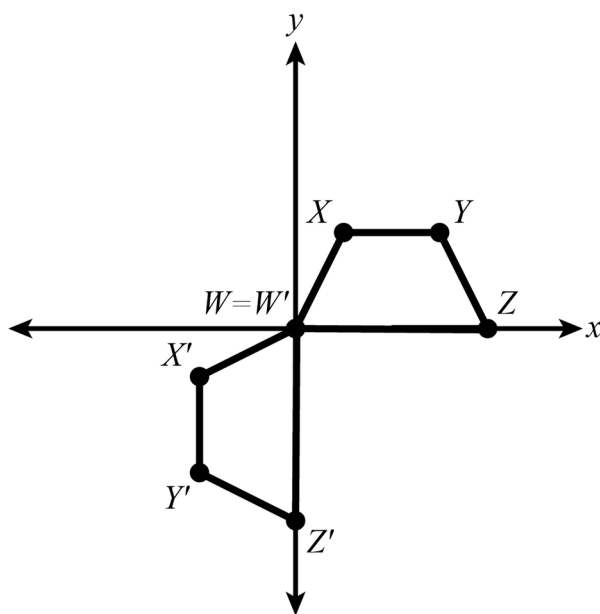
8.G.A.2

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.

Primary Standard: cc:8.G.A.2

Points Possible: 2

Trapezoid $WXYZ$ and trapezoid $W'X'Y'Z'$, shown below, are congruent.



Which of the sequences of transformations of trapezoid $WXYZ$ results in trapezoid $W'X'Y'Z'$?

Select **all** that apply.

A. Reflect trapezoid $WXYZ$ over the x -axis, and then rotate it 90° clockwise about the origin.

Correct.

B. Reflect trapezoid $WXYZ$ over the y -axis, and then rotate it 90° clockwise about the origin.

Student confused a reflection over the y -axis with a reflection over the x -axis.

C. Reflect trapezoid $WXYZ$ over the y -axis, and then rotate it 90° counterclockwise about the origin.

Correct.

D. Rotate trapezoid $WXYZ$ 90° clockwise about the origin, and then reflect it over the x -axis.

Student confused a clockwise rotation with a counterclockwise rotation.

E. Rotate trapezoid $WXYZ$ 90° clockwise about the origin, and then reflect it over the y -axis.

Correct.

F. Rotate trapezoid $WXYZ$ 90° counterclockwise about the origin, and then rotate it 180° about the origin.

Student chose a sequence that would only have line segment WZ coincide with line segment $W'Z'$; did not recognize that the three other sides would not coincide without a reflection.

Item Id: i112363**Item Type: Constructed Response**

Standards Description:

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

Standard(s) for Mathematical Practice:

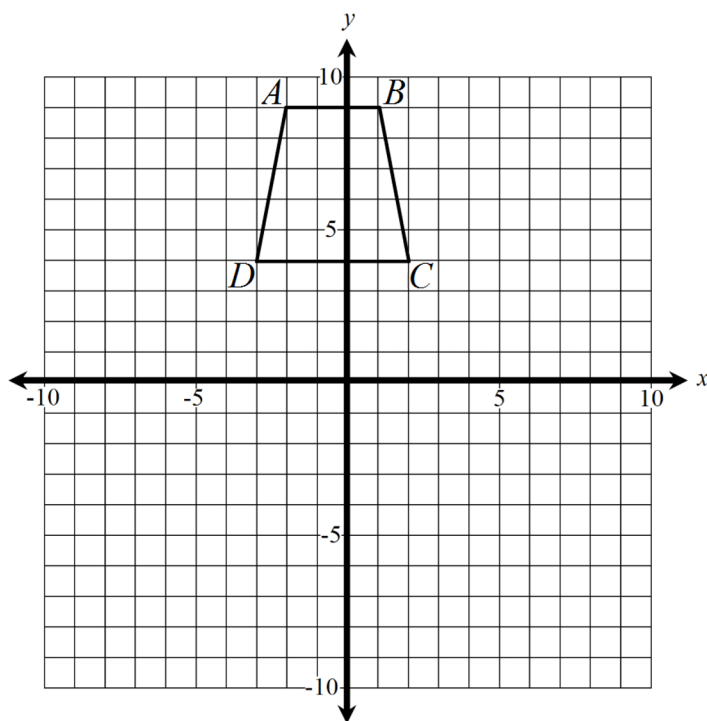
MP8 Look for and express regularity in repeated reasoning.

Students who recognize the repeated reasoning in a sequence of geometric transformations will notice that the sequence that takes AD to $A'D'$ is the same sequence that takes $ABCD$ to $A'B'C'D'$ and results in a congruent image.

Primary Standard: cc:8.G.A.3

Points Possible: 2

Trapezoid $ABCD$ is transformed to make trapezoid $A'B'C'D'$ so that A' is located at $(-2, -4)$ and D' is located at $(-3, 1)$.



- Give coordinates for B' and C' that would make $ABCD$ congruent to $A'B'C'D'$.
- Describe the transformation, or sequence of transformations, that takes $ABCD$ to $A'B'C'D'$. Include all the information needed to complete the transformations.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

B' is located at $(1, -4)$. C' is located at $(2, 1)$.

Reflect $ABCD$ over the line $y = 4$. Translate it down 3 units.

Other transformations are also accepted.

Evidence Statement(s):

1. Student provided coordinates for B' and C' that make $ABCD$ congruent to $A'B'C'D'$.
2. Student accurately described a sequence of transformations that takes $ABCD$ to $A'B'C'D'$, understanding that the sequence that takes AD to $A'D'$ is the same sequence that takes $ABCD$ to $A'B'C'D'$.

Common Misconception(s):

- Student did not recognize that the orientation of the trapezoid changed, and did not include a reflection in their description.
- Student thought $ABCD$ translated down 13 units to create $A'B'C'D'$ because of the change in the y -coordinates for A and A' .

Interim Assessment 2

Mathematics

Grade 8

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 33 questions, including 4 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

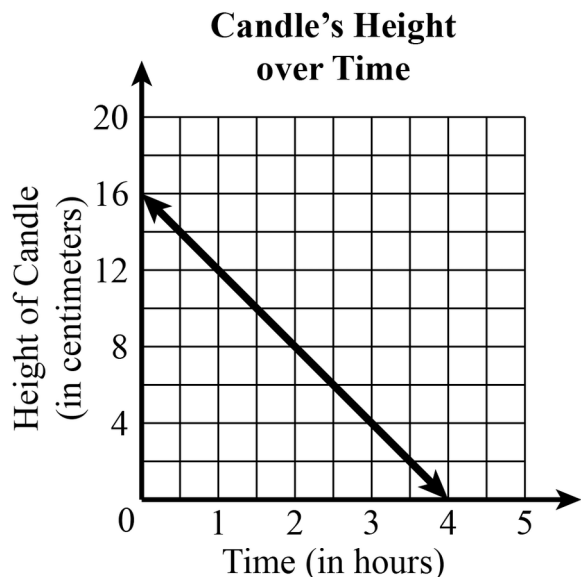
You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. A candle burns at a constant rate, as shown in the graph below.



Which statement best describes the rate of change for the height of the candle?

- A. The height of the candle was 0 centimeters after 4 hours.
- B. The height of the candle decreased 4 centimeters each hour.
- C. The height of the candle decreased 12 centimeters each hour.
- D. The height of the candle was 16 centimeters when it started to burn.

2. The sum of Joy's age and her brother's age is 24. Her brother's age is 3 years older than twice Joy's age.

What is the difference, in years, between Joy's age and her brother's age?

- A. 4
- B. 6
- C. 10
- D. 18

3. Christine fills a ball in the shape of a sphere with air. The diameter of the ball when it is filled is 18 inches.

How much air, in cubic inches, is in the ball when it is filled?

- A. 108π
- B. 324π
- C. 972π
- D. $1,728\pi$

4. Emily and Lily are reading the same copy of the same book for a summer reading assignment.

- Emily has already read 16 pages. Emily reads 22 pages per day until the book is finished.
- Lily has already read 24 pages. Lily reads 18 pages per day until the book is finished.

One day, the two girls notice that they are on the same page. What page number are they on when they have read the same amount of the book?

- A. 42
- B. 60
- C. 102
- D. 236

5. Luciana is adding water to a pool at a constant rate. Before she added any water, the pool had 12,000 gallons of water. Luciana is adding 9 gallons of water each minute.

Which equation represents the total number of gallons of water in the pool, w , after Luciana adds water for m number of minutes?

- A. $m = 9w + 12,000$
- B. $w = 9m + 12,000$
- C. $w = 12,000m + 9$
- D. $w = 12,000 - 9m$

6. A right cylinder has a height of 8 inches and a volume of 400 cubic inches.

Which measurement is **closest** to the radius, in inches, of the cylinder?

- A. 4
- B. 8
- C. 16
- D. 50

7. Two water tanks are being drained at constant rates.

- Water tank A has 220 gallons of water and is being drained at a constant rate of 5 gallons per minute.
- Water tank B has 180 gallons of water and is being drained at a constant rate of 3 gallons per minute.

Part A

How much time, in minutes, do water tank A and water tank B have to be drained in order for them to have the same amount of water? Show all the steps you took to find your answer.

Respond in the space provided.

Part B

Which water tank, A or B, will be completely drained first? How much less time, in minutes, will it take this water tank to completely drain than the other water tank? Show or explain how you determined your answer.

Respond in the space provided.

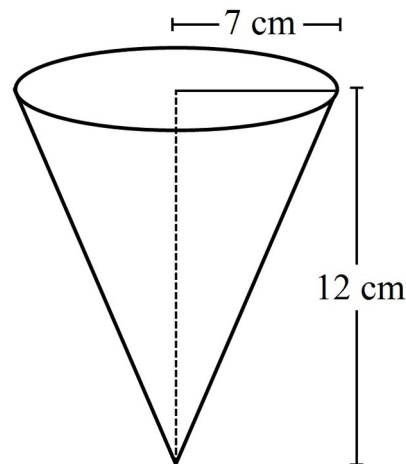
8. A container of water is heated at a constant rate. The table below shows the temperature, in degrees Celsius, of the water, y , after it has been heated for a number of minutes, x .

Minutes of heating (x)	Temperature in degrees Celsius (y)
2	54
5	99

What was the initial temperature, in degrees Celsius, of the water before it was heated?

- A. 0
- B. 24
- C. 39
- D. 45

9. The dimensions of a right cone are shown in the diagram.



The figure is not drawn to scale.

What is the volume, in cubic centimeters, of the cone?

- A. 56π
- B. 196π
- C. 336π
- D. 588π

10. Use the graph below to answer the question.

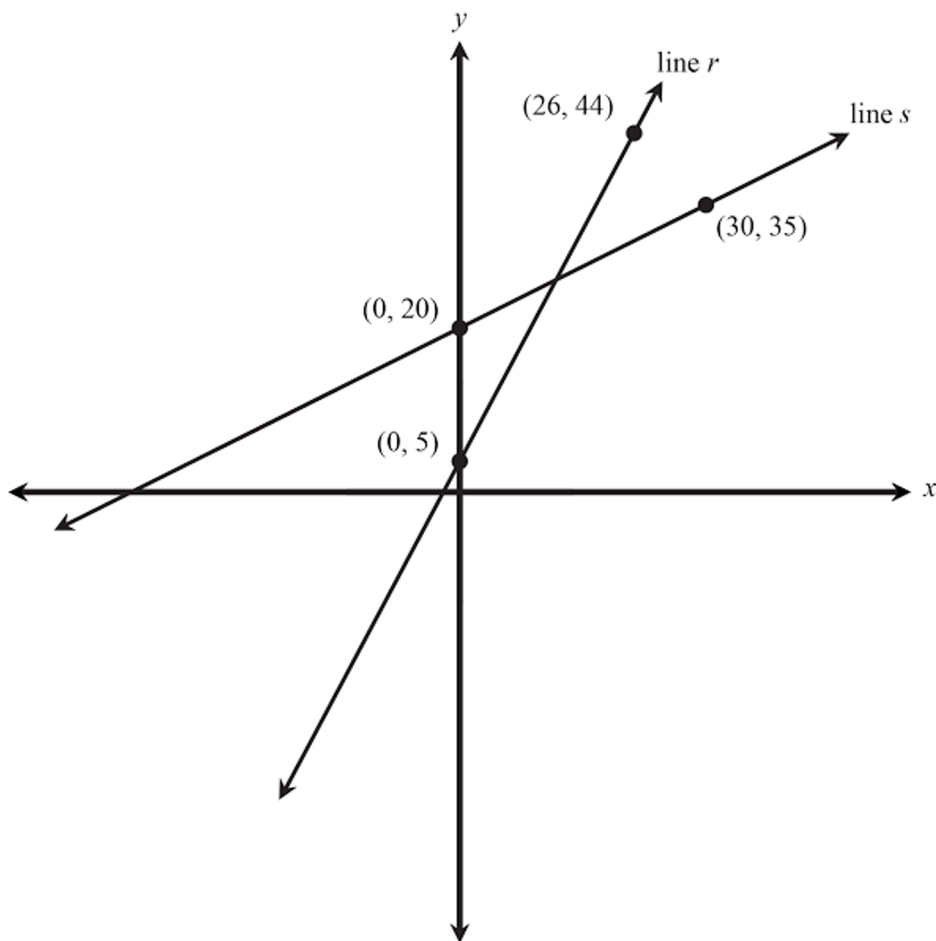
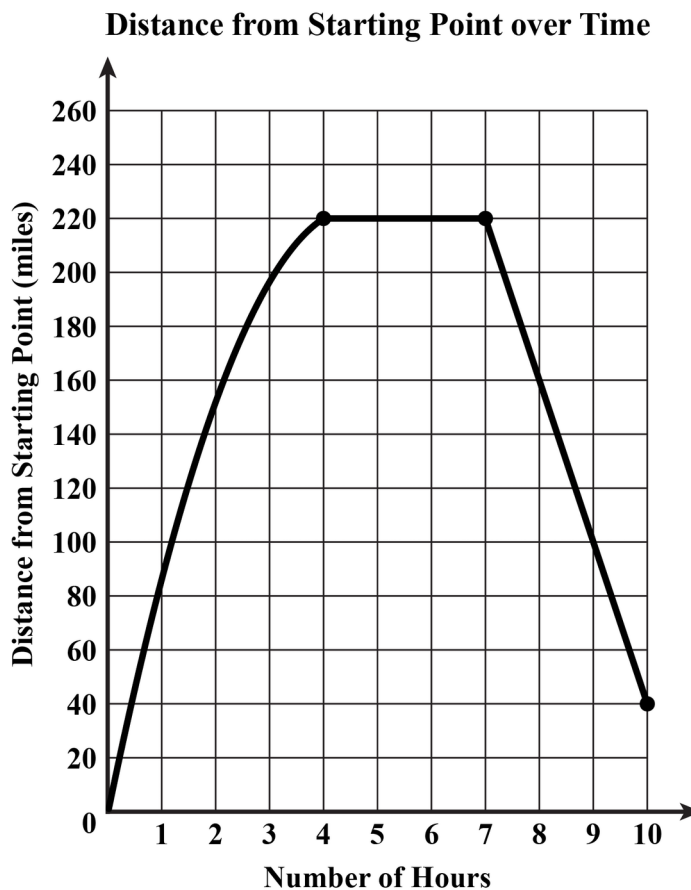


Figure is not drawn to scale.

Which ordered pair represents the point at which line r and line s intersect?

- A. $(1.5, 0.5)$
- B. $(9.375, 38.75)$
- C. $(12.5, 23.75)$
- D. $(15, 27.5)$

11. Marissa went on a trip and drove her car throughout the day. The graph below shows Marissa's distance from the starting point of her trip for different segments of time.



Part A

Describe each of the three segments of the graph in terms of the rate of change in Marissa's distance from the starting point throughout her trip.

Respond in the space provided.

Part B

Describe Marissa's distance from the starting point at the end of her trip in relation to her distance from the starting point at the beginning of her trip. Use evidence from the graph above to justify your answer.

Respond in the space provided.

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



12. Function G is a linear function and is represented by the table shown below.

Function G:

x	y
2	10
4	18

Function H is a linear function and is represented by the equation shown below.

Function H: $y = 2x + 4$

Which statement about the functions is true?

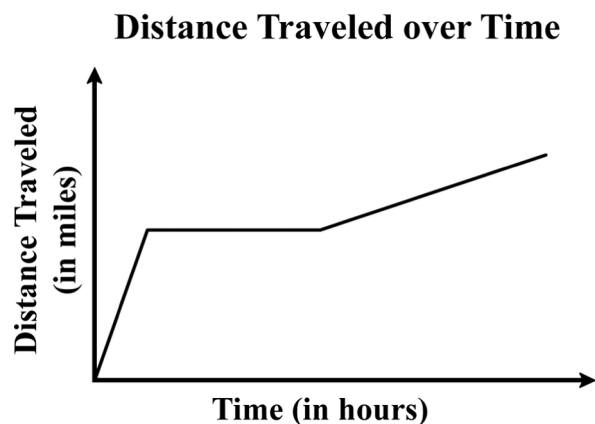
- A. Function G has a rate of change of $\frac{1}{4}$, and function H has a rate of change of 2.
- B. Function G has a rate of change of 4, and function H has a rate of change of 2.
- C. Function G has a rate of change of 4, and function H has a rate of change of 4.
- D. Function G has a rate of change of 8, and function H has a rate of change of 2.

13. Which equations have no solution?

Select **all** that apply.

- A. $x + 6 = \frac{1}{2}x + 6$
- B. $3(x + 4) - 3x = 12$
- C. $12x - 6 + 8x = 20x - 9$
- D. $12x - 5 - 6x = -5 + 6x$
- E. $10x - 2x + 12 = 2(3x + 5) + 2x$

14. A group of friends went on a drive. The graph below shows the distance the friends traveled, in miles, over time, in hours.



Based on the graph, which statement **best** describes the friends' drive?

- A. The friends traveled at a slow pace, sped up, and then traveled at a quick pace.
- B. The friends traveled at a slow pace, stopped, and then traveled at a quick pace.
- C. The friends traveled at a quick pace, stopped, and then traveled at a slow pace.
- D. The friends traveled at a quick pace, slowed down, and then traveled at a quicker pace.

15. Which equation represents a linear function?

- A. $w = t^3$
- B. $e = 12u^2$
- C. $d = \left(\frac{g}{2}\right)^2$
- D. $m = 5.45p$

16. Solve for p .

$$p - 12 = 8 - 5(p - 2)$$

- A. $p = -3$
- B. $p = -1\frac{1}{2}$
- C. $p = 3$
- D. $p = 5$

17. Yesenia wrote a system of equations that has an infinite number of solutions. One of the equations she wrote is listed below.

$$y = -5x + 2$$

Which of the following could be the other equation she wrote?

Select **all** that apply.

- A. $y + 5x = 2$
 B. $y = 5x + 2$
 C. $y = -5x - 2$
 D. $2y - 10x = 4$
 E. $3y = -15x + 6$

18. Select **all** tables that represent a function.

A.

x	y
-5	-2
-3	-2
-1	-2
1	-2

B.

x	y
0	9
2	7
2	5
4	3

C.

x	y
-5	-5
-5	0
-3	2
-3	-3

D.

x	y
6	-8
6	-4
6	0
6	4

E.

x	y
-4	4
0	0
-1	1
7	-7

- 19.** Mariana solved a linear equation and found that it had an infinite number of solutions.

Which could have been the final line of her work?

- A.** $x = -1$
- B.** $9 = 10$
- C.** $x = x$
- D.** $x = \frac{4}{x}$

- 20.** Function E is a linear function with an initial value of 2 and a rate of change of $\frac{1}{3}$.

Function F is a linear function. The graph of function F includes the points (2, 8) and (0, 2).

Which statement is true?

- A.** The two functions have the same initial value.
- B.** The two functions have the same rate of change.
- C.** The initial value in function F is greater than the initial value in function E.
- D.** The rate of change in function E is greater than the rate of change in function F.

21. The solution to a system of two linear equations is $(1, 7)$.

Which of the systems shown could represent the two linear equations?

Select **all** that apply.

- A. $y = 1$
 $x = 7$
- B. $y = 7x$
 $x = 1$
- C. $y = x + 1$
 $y = x + 7$
- D. $y = x + 6$
 $y = 3x + 3$
- E. $y = 2x + 5$
 $y = -x + 8$

22. Solve the equation below for x .

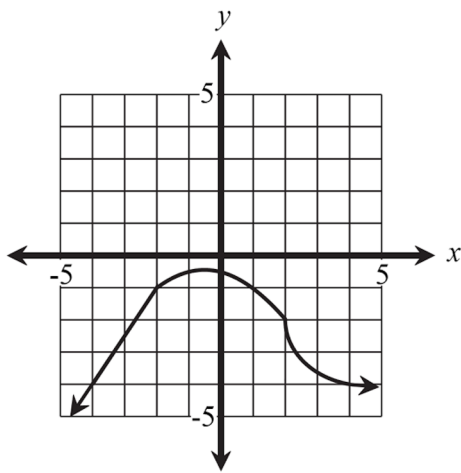
$$\frac{1}{3}(-x + 3) = -x - 4$$

- A. $x = -10\frac{1}{2}$
- B. $x = -7\frac{1}{2}$
- C. $x = 2\frac{1}{4}$
- D. $x = 7\frac{1}{2}$

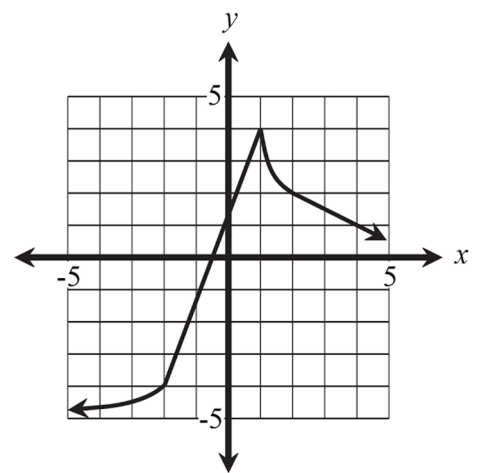
23. Which graph represents a function with the following criteria?

- The function is linear and increasing for $-4 < x < -2$.
- The function is nonlinear and decreasing for $2 < x < 4$.

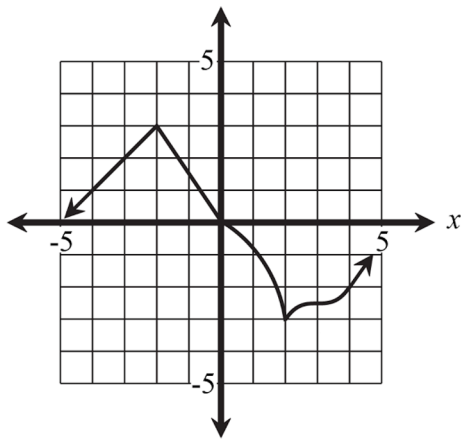
A.



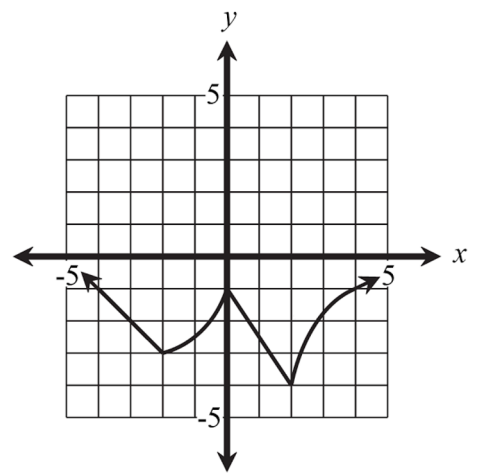
C.



B.



D.



24. The table below gives a credit score and credit description for seven different people.

Person	Credit Score	Credit Description
1	680	Good
2	730	Excellent
3	650	Average
4	500	Bad
5	590	Poor
6	560	Bad
7	650	Average

Part A

According to the data in the table, is the credit score a function of the credit description? Explain why or why not.

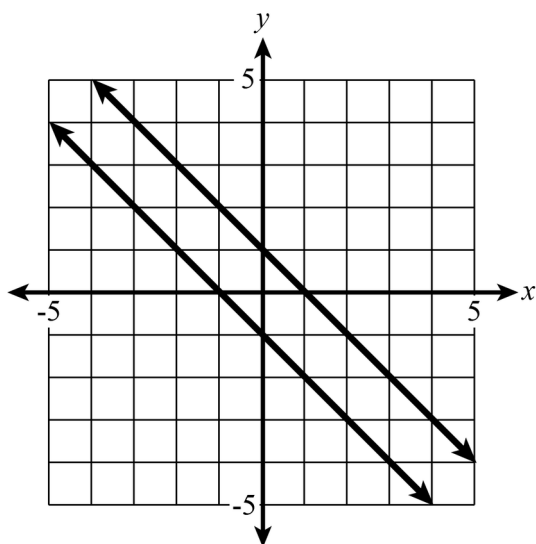
Respond in the space provided.

Part B

According to the data in the table, is the credit description a function of the credit score? Explain why or why not.

Respond in the space provided.

25. Which statement about the system of equations represented by the lines below is true?



- A. There is no solution because the lines are parallel.
- B. There are infinitely many solutions because the lines have the same slope.
- C. There is exactly one solution, and the solution is $(-1, 1)$.
- D. There is exactly one solution because the distance between the two lines is always 2 units.

26. Which table contains coordinate points that form a linear function?

A.

x	y
1	1
3	9
5	25

B.

x	y
3	-1
5	1
7	3

C.

x	y
3	3
4	0
8	-3

D.

x	y
-2	-4
0	4
2	-1

27. Solve the equation below for x .

$$0.5(x + 7) + 9 = 43$$

Respond in the space provided.

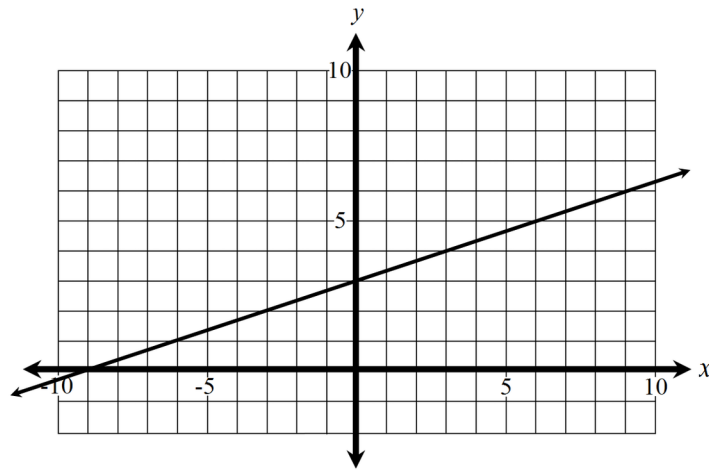
If your test is on paper, write your answer on the answer sheet.

28. Use the linear functions below to answer the question.

Function Q:

$$y = 3x - 2$$

Function R:



Which statements about the two functions are true?

Select **all** that apply.

- A. Function Q and function R have the same initial value.
- B. Function Q has a greater initial value than function R.
- C. Function R has a greater initial value than function Q.
- D. Function Q and function R have the same rate of change.
- E. Function Q has a greater rate of change than function R.
- F. Function R has a greater rate of change than function Q.

29. Use the system of equations to answer the question.

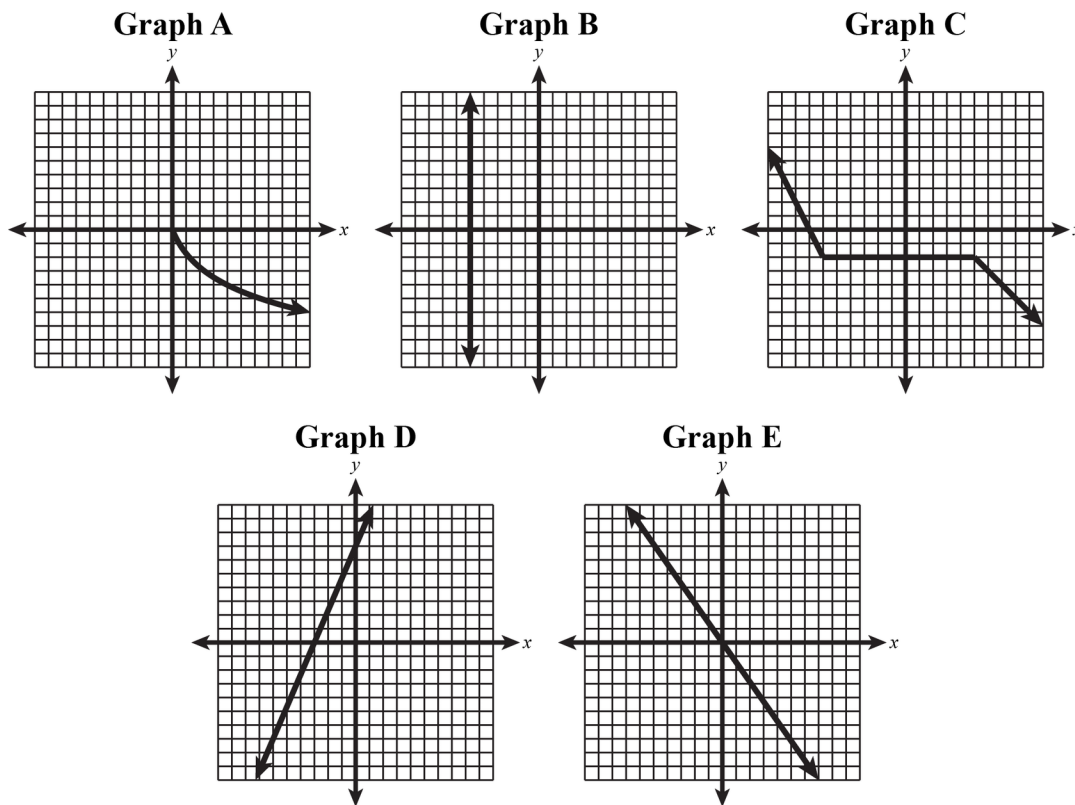
$$y = 4x + 2$$

$$-6x + 2y = 8$$

What is the value of $x + y$?

- A.** -13
- B.** 2
- C.** 12
- D.** 17

30. Use the graphs below to answer the question.

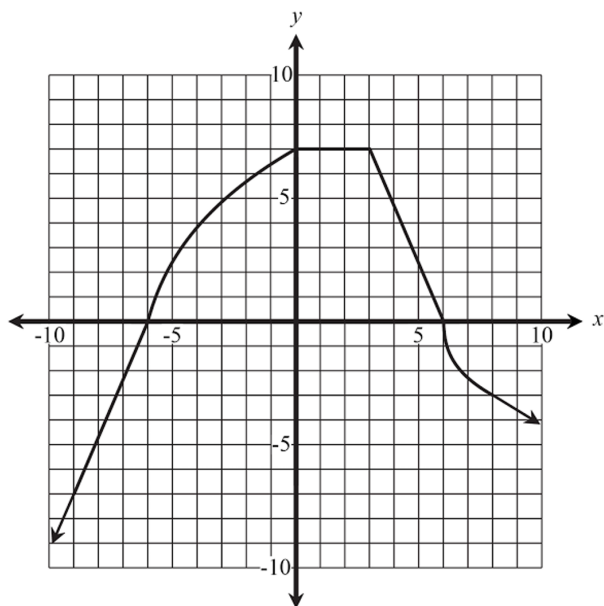


Which graphs represent a **nonlinear function**?

Select **all** that apply.

- A. Graph A
- B. Graph B
- C. Graph C
- D. Graph D
- E. Graph E

31. In the graph below, y is a function of x .

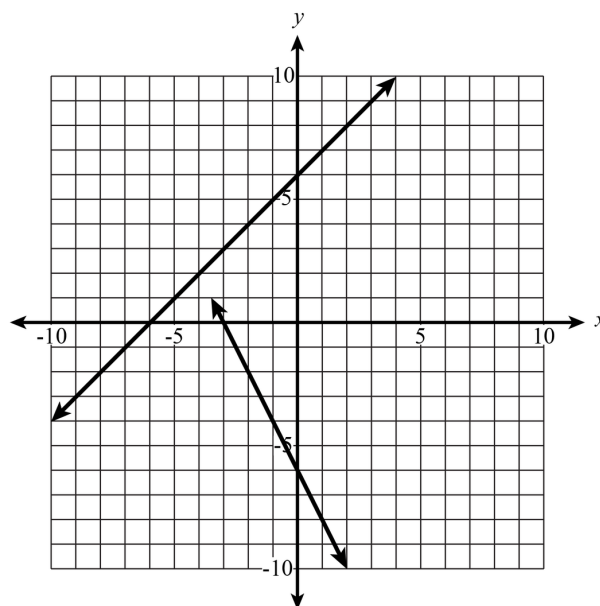


During which intervals is the function decreasing?

Select **all** that apply.

- A. $x < -6$
- B. $-6 < x < 0$
- C. $0 < x < 3$
- D. $3 < x < 6$
- E. $x > 6$

32. Which statement about the solution to the system of equations is true?



- A. There is no solution to the system of equations.
- B. The solution is $(-4, 2)$ because both lines pass through this point.
- C. The solution is $(-6, -3)$ because the point is made up of the x -intercepts from both lines.
- D. The solution is $(6, -6)$ because the point is made up of the y -intercepts from both lines.

33. Derick solves the equation below.

$$-3(4n + 2) = -4n + -2(4n - 6)$$

After solving, he says that the equation has no solution.

- If Derick is correct, show how you know.
- If Derick is incorrect, show how you know and describe the solution to the equation.

Respond in the space provided.

Assessment Analysis Guide

Interim Assessment 2

Mathematics

Grade 8

1

Item Id: i138636

Item Type: Selected Response

Standards Description:

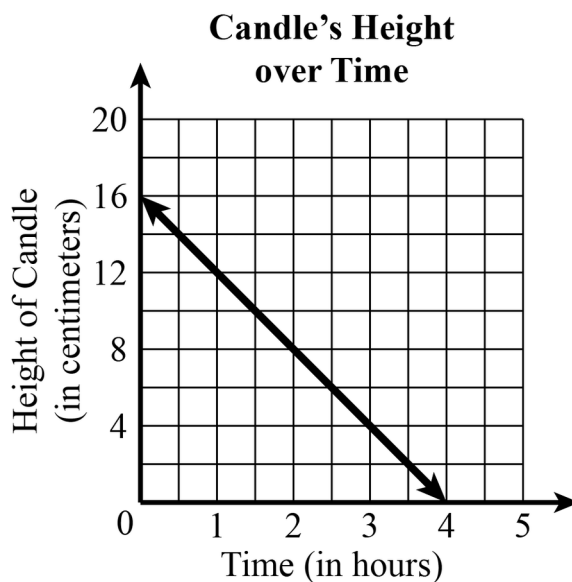
8.F.B.4

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.

Primary Standard: cc:8.F.B.4

Points Possible: 1

A candle burns at a constant rate, as shown in the graph below.



Which statement best describes the rate of change for the height of the candle?

A. The height of the candle was 0 centimeters after 4 hours.

Student identified the total amount of time it took to burn the candle down to 0 centimeters instead of the rate at which the candle's height decreased during the total 4-hour period.

B. The height of the candle decreased 4 centimeters each hour. Correct.

C. The height of the candle decreased 12 centimeters each hour.

Student identified the height of the candle after burning for one hour instead of the rate at which the candle's height decreased each hour.

D. The height of the candle was 16 centimeters when it started to burn.

Student identified the initial value as the rate of change.

2

Item Id: i112782**Item Type: Selected Response**

Standards Description:

8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Primary Standard: cc:8.EE.C.8.c

Points Possible: 1

The sum of Joy's age and her brother's age is 24. Her brother's age is 3 years older than twice Joy's age.

What is the difference, in years, between Joy's age and her brother's age?

- A. 4 Student set up the second equation as $0.5j + 3 = b$ instead of $2j + 3 = b$ and solved based on the incorrect equation.
- B. 6 Student set up the second equation as $2j - 3 = b$ instead of $2j + 3 = b$ and solved based on the incorrect equation.
- C. 10 Correct.
- D. 18 Student correctly set up the equations, but incorrectly canceled like terms without taking into account the relative positions of the variables to get $j = 21$, substituted j into the equation $j + b = 24$, got $b = 3$, and subtracted.

3

Item Id: i113157**Item Type: Selected Response**

Standards Description:

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

Primary Standard: cc:8.G.C.9

Points Possible: 1

Christine fills a ball in the shape of a sphere with air. The diameter of the ball when it is filled is 18 inches.

How much air, in cubic inches, is in the ball when it is filled?

A. 108π Student used r^2 in the formula instead of r^3 .B. 324π Student squared the radius, instead of cubing it, and multiplied by 4, instead of $\frac{4}{3}$ (calculated 4×9^2).C. 972π

Correct.

D. $1,728\pi$ Student found $\frac{4}{3}$ of the radius and then cubed the result, rather than cubing the radius first.

Item Id: i111645**Item Type: Selected Response**

Standards Description:

8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Primary Standard: cc:8.EE.C.8.c

Points Possible: 1

Emily and Lily are reading the same copy of the same book for a summer reading assignment.

- Emily has already read 16 pages. Emily reads 22 pages per day until the book is finished.
- Lily has already read 24 pages. Lily reads 18 pages per day until the book is finished.

One day, the two girls notice that they are on the same page. What page number are they on when they have read the same amount of the book?

- A. 42 Student set up the equations correctly as $16 + 22x = 24 + 18x$, but did not correctly apply inverse operations to solve for x ; they added terms instead of subtracting from both sides to get $40x = 40$, and substituted x into Lily's equation.
- B. 60 Correct.
- C. 102 Student switched the coefficients and constants for both equations to get $16x + 22 = 24x + 18$, subtracted $16x$ from both sides, incorrectly added 18 instead of subtracting to get $8x = 40$, and substituted x into Emily's incorrect equation.
- D. 236 Student set up the equations correctly as $16 + 22x = 24 + 18x$, subtracted $18x$ from both sides, incorrectly added 16 instead of subtracting to get $4x = 40$, and substituted x into Emily's equation.

Item Id: i138640**Item Type: Selected Response**

Standards Description:

8.F.B.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.

Primary Standard: cc:8.F.B.4

Points Possible: 1

Luciana is adding water to a pool at a constant rate. Before she added any water, the pool had 12,000 gallons of water. Luciana is adding 9 gallons of water each minute.

Which equation represents the total number of gallons of water in the pool, w , after Luciana adds water for m number of minutes?

A. $m = 9w + 12,000$

Student confused the variables.

B. $w = 9m + 12,000$

Correct.

C. $w = 12,000m + 9$

Student confused the initial value and the rate of change.

D. $w = 12,000 - 9m$

Student represented the rate of change as negative instead of positive.

6

Item Id: i111633**Item Type: Selected Response**

Standards Description:

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

Primary Standard: cc:8.G.C.9

Points Possible: 1

A right cylinder has a height of 8 inches and a volume of 400 cubic inches.

Which measurement is **closest** to the radius, in inches, of the cylinder?

- A. 4 Correct.
- B. 8 Student divided the value of r^2 by 2 instead of taking the square root.
- C. 16 Student found r^2 .
- D. 50 Student only divided the volume by the height.

7

Item Id: i138894**Item Type: Constructed Response**

Standards Description:

8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Standard(s) for Mathematical Practice:

MP1 Make sense of problems and persevere in solving them.

Students will need to plan a solution pathway while monitoring and evaluating their progress, changing course if necessary.

MP2 Reason abstractly and quantitatively.

Students must make sense of quantities and their relationships. Students will need to decontextualize the situation to represent it symbolically while also contextualizing to ensure they are attending to the meaning of the quantities.

MP4 Model with mathematics.

Students must demonstrate an understanding of how the quantities relate to one another by representing the verbal descriptions of a real-world context as linear equations.

7A

Primary Standard: cc:8.EE.C.8.c

Secondary Standard(s): cc:8.EE.C.7.b

Points Possible: 3

Two water tanks are being drained at constant rates.

- Water tank A has 220 gallons of water and is being drained at a constant rate of 5 gallons per minute.
- Water tank B has 180 gallons of water and is being drained at a constant rate of 3 gallons per minute.

Part A

How much time, in minutes, do water tank A and water tank B have to be drained in order for them to have the same amount of water? Show all the steps you took to find your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

y = amount of water, in gallons, in the water tank

x = amount of time, in minutes, the water tank is drained

Water tank A: $y = 220 - 5x$

Water tank B: $y = 180 - 3x$

$$220 - 5x = 180 - 3x$$

$$2x = 40$$

$$x = 20$$

Water tank A and water tank B have to be drained for 20 minutes in order for them to have the same amount of water.

Evidence Statement(s):

1. Student represented the water tank situation as a system of two linear equations in two variables.
2. Student identified how to relate the two linear equations in order to solve for the variable representing the amount of time, in minutes, the water tank is drained.
3. Student solved the system of two linear equations to determine the amount of time, in minutes, water tank A and water tank B have to be drained in order for them to have the same amount of water.

Common Misconception(s):

- Student did not understand the need for a negative slope in each linear equation and instead used positive slopes.
- Student set up a system of two linear equations correctly but incorrectly combined like terms to get $-8x = 400$, and then solved for x , while ignoring the signs.
- Student set up a system of two linear equations correctly but solved for y , the amount of water, in gallons, in the water tank, instead of x , the amount of time, in minutes, the water tank is drained.
- Student confused the roles of the slopes and the y -intercepts when developing the system of equations, and solved $5 - 220x = 3 - 180x$.
- Student did not utilize a system of two linear equations and instead only found the difference between the constant rates or the initial number of gallons.

7B

Primary Standard: cc:8.EE.C.8.c

Secondary Standard(s): cc:8.EE.C.7.b

Points Possible: 1

Part B

Which water tank, A or B, will be completely drained first? How much less time, in minutes, will it take this water tank to completely drain than the other water tank? Show or explain how you determined your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Water Tank A:

$$220 - 5x = 0$$

$$-5x = -220$$

$$x = 44$$

Water tank B:

$$180 - 3x = 0$$

$$-3x = -180$$

$$x = 60$$

Water tank A will be completely drained first. It will take 16 fewer minutes to drain water tank A when compared to water tank B.

Evidence Statement(s):

1. Student solved each linear equation to find out how long it will take to completely drain water tanks A and B, and determined how much less time it will take to drain water tank A.

Common Misconception(s):

- Student concluded that water tank A would completely drain first but based only on the fact that water tank A was draining at a faster rate.
- Student incorrectly concluded that water tank B would completely drain first because water tank B started with less water.
- Student correctly determined how long it would take water tanks A and B to completely drain, but concluded that water tank B would completely drain first because its value was greater.

Item Id: i138639**Item Type: Selected Response**

Standards Description:

8.F.B.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.

Primary Standard: cc:8.F.B.4

Points Possible: 1

A container of water is heated at a constant rate. The table below shows the temperature, in degrees Celsius, of the water, y , after it has been heated for a number of minutes, x .

Minutes of heating (x)	Temperature in degrees Celsius (y)
2	54
5	99

What was the initial temperature, in degrees Celsius, of the water before it was heated?

A. 0

Student divided 54 by 2 as if it were a proportion, got a rate of 27, subtracted 27 from 54 to get 27 for minute 1, and then subtracted 27 from 27 to get 0 for the initial temperature, OR student assumed the initial temperature had to start at zero.

B. 24

Correct.

C. 39

Student found the temperature of the water after it had been heated for 1 minute; did not understand that the initial temperature is the temperature after heating the water for 0 minutes.

D. 45

Student found the difference between the temperatures of the water after it had been heated for 2 minutes and 5 minutes.

Item Id: i112241**Item Type: Selected Response**

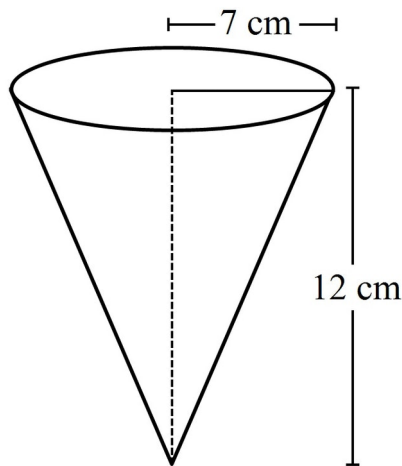
Standards Description:

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

Primary Standard: cc:8.G.C.9

Points Possible: 1

The dimensions of a right cone are shown in the diagram.



The figure is not drawn to scale.

What is the volume, in cubic centimeters, of the cone?

A. 56π Student calculated 7^2 as 7×2 and then calculated correctly; calculated $(7 \times 2 \times 12)/3 \times \pi$.B. 196π

Correct.

C. 336π Student squared the height instead of the radius and then calculated correctly; calculated $(7 \times 12^2)/3 \times \pi$.

D. 588π

Student forgot to divide the volume by 3; calculated $12 \times 7^2 \times \pi$.

10

Item Id: i116738**Item Type: Selected Response**

Standards Description:

8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Primary Standard: cc:8.EE.C.8.c

Points Possible: 1

Use the graph below to answer the question.

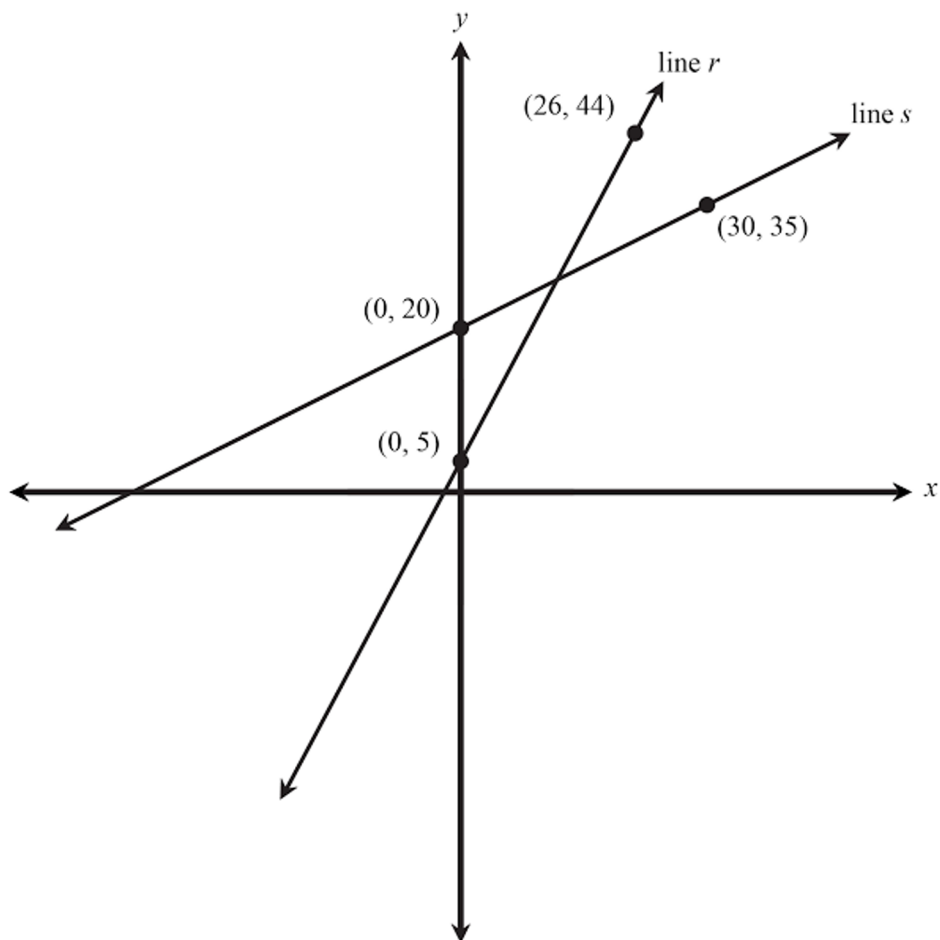


Figure is not drawn to scale.

Which ordered pair represents the point at which line r and line s intersect?

A. (1.5, 0.5)

Student found the correct slopes for line r and line s and thought that together they created the ordered pair that represents the point of intersection.

B. (9.375, 38.75)

Student used run over rise, instead of rise over run, when calculating the slopes for line r and line s to get $\frac{2}{3}x + 5 = 2x + 20$ and did not correctly apply inverse operations to solve for x; they added terms instead of subtracting from both sides to get $2\frac{2}{3}x = 25$, and substituted x into the equation for line s.

C. (12.5, 23.75)

Student set up the equations correctly as $1.5x + 5 = 0.5x + 20$, but did not correctly apply inverse operations to solve for x; they added terms instead of subtracting from both sides to get $2x = 25$, and substituted x into the equation for line r.

D. (15, 27.5)

Correct.

11

Item Id: i131353**Item Type: Constructed Response**

Standards Description:

8.F.B Use functions to model relationships between quantities.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

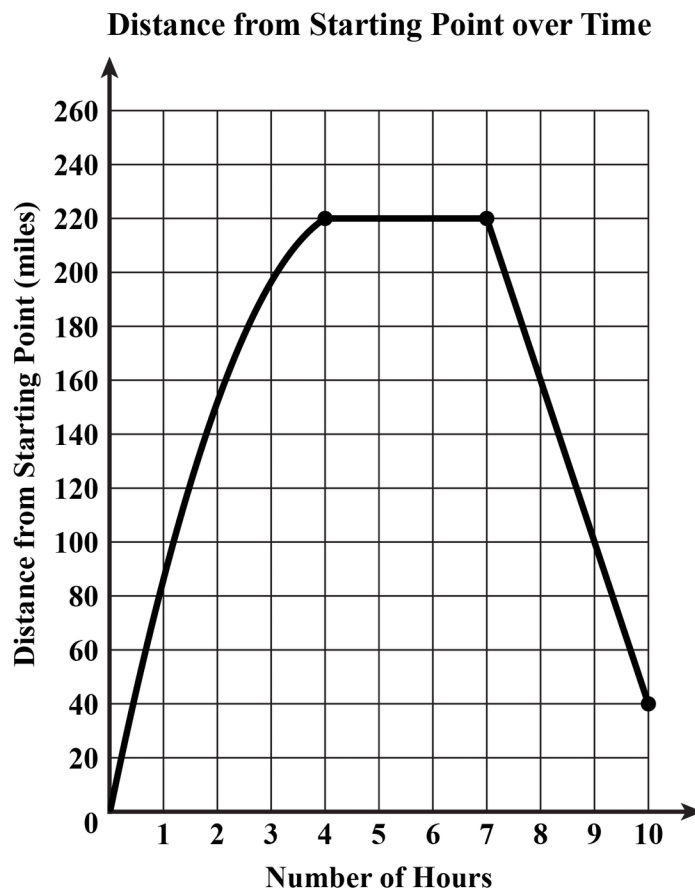
Students must contextualize the three segments of a graph representing a function as they describe each segment. Students must also contextualize the meaning of the initial value.

11A

Primary Standard: cc:8.F.B

Points Possible: 2

Marissa went on a trip and drove her car throughout the day. The graph below shows Marissa's distance from the starting point of her trip for different segments of time.

**Part A**

Describe each of the three segments of the graph in terms of the rate of change in Marissa's distance from the starting point throughout her trip.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

During the first 4 hours of Marissa's trip, her distance from the starting point increased at a rate that was not constant.

Between hours 4 and 7, Marissa's distance from the starting point changed at a rate of 0 because the distance remained the same.

Between hours 7 and 10, Marissa's distance from the starting point decreased at a constant rate.

Evidence Statement(s):

1. Student qualitatively described the rate of change of the functional relationship by analyzing the graph in terms of when it was increasing, decreasing, or neither.
2. Student qualitatively described the rate of change of the functional relationship by analyzing the graph in terms of when it was linear (i.e., constant) or nonlinear (i.e., not constant).

Common Misconception(s):

- Student interpreted the part of the graph with a rate of change of 0 as indicating something other than a period of time when Marissa's distance from the starting point did not change.
- Student thought that the parts of the graph that are linear represent a rate of change that is not constant.
- Student thought that the parts of the graph that are nonlinear represent a rate of change that is constant.
- Student thought that the parts of the graph with a positive rate of change represent a decrease.
- Student thought that the parts of the graph with a negative rate of change represent an increase.
- Student interpreted the graph in terms of the rate of change in Marissa's driving speed, instead of her distance from the starting point.

11B

Primary Standard: cc:8.F.B

Points Possible: 2

Part B

Describe Marissa's distance from the starting point at the end of her trip in relation to her distance from the starting point at the beginning of her trip. Use evidence from the graph above to justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Marissa's distance from the starting point at the end of her trip is 40 miles from the starting point. The graph shows this because the point located at (0, 0) means that when Marissa drove for 0 hours, her distance from the starting point is 0 miles or that her initial distance from the starting point is 0 miles. The point located at (10, 40) means that after going on a trip for 10 hours, Marissa's distance from the starting point is 40 miles or that her distance from the starting point at the end of her 10-hour trip is 40 miles.

Evidence Statement(s):

1. Student interpreted and related the initial value and the value that indicates the end of the function using the graph that represents a functional relationship.
2. Student described the meaning of the points located at $(0, 0)$ and $(10, 40)$ in terms of the situation being modeled by the graph, and used this information to justify their answer.

Common Misconception(s):

- Student did not understand that Marissa's initial distance from the starting point is her distance when the input, or the number of hours, is 0.
- Student did not understand that Marissa's distance from the starting point at the end of her trip is her distance when the input, or the number of hours, is 10.
- Student thought that Marissa's initial distance from the starting point was the same as her distance from the starting point at the end of her trip.

12

Item Id: i112750**Item Type: Selected Response**

Standards Description:

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Primary Standard: cc:8.F.A.2

Points Possible: 1

Function G is a linear function and is represented by the table shown below.

Function G:

x	y
2	10
4	18

Function H is a linear function and is represented by the equation shown below.

Function H: $y = 2x + 4$

Which statement about the functions is true?

- A. Function G has a rate of change of $\frac{1}{4}$, and function H has a rate of change of 2. Student calculated the rate of change for function G as the change in x over the change in y instead of the change in y over the change in x.
- B. Function G has a rate of change of 4, and function H has a rate of change of 2.** Correct.
- C. Function G has a rate of change of 4, and function H has a rate of change of 4. Student identified the initial value as the rate of change for function H.
- D. Function G has a rate of change of 8, and function H has a rate of change of 2. Student calculated the rate of change for function G as the change in y and not as the change in y over the change in x.

Item Id: i130387**Item Type: Multiple Select**

Standards Description:

8.EE.C.7.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).

Primary Standard: cc:8.EE.C.7.a

Points Possible: 1

Which equations have no solution?

Select **all** that apply.

A. $x + 6 = \frac{1}{2}x + 6$

Student mistook an equation that simplifies to $x = 0$ for an equation that has no solution.

B. $3(x + 4) - 3x = 12$

Student mistook an equation with an infinite number of solutions for one with no solutions; perhaps misunderstood the elimination of the variable through simplification to indicate no solution.

C. $12x - 6 + 8x = 20x - 9$

Correct.

D. $12x - 5 - 6x = -5 + 6x$

Student mistook an equation with an infinite number of solutions for one with no solutions; perhaps misunderstood the simplified equation of $-5 = -5$ to indicate no solution.

E. $10x - 2x + 12 = 2(3x + 5) + 2x$

Correct.

Item Id: i112064

Item Type: Selected Response

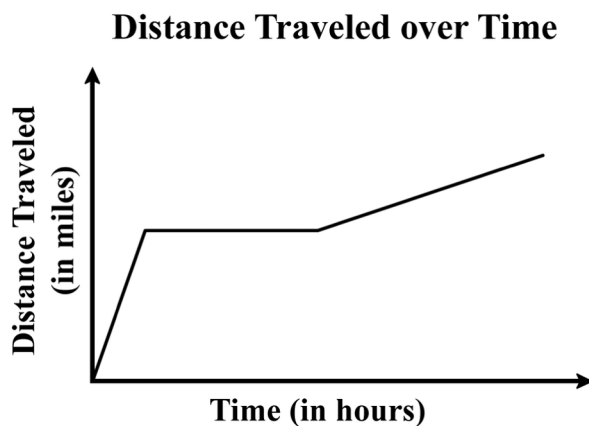
Standards Description:

8.F.B.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.

Primary Standard: cc:8.F.B.5

Points Possible: 1

A group of friends went on a drive. The graph below shows the distance the friends traveled, in miles, over time, in hours.



Based on the graph, which statement **best** describes the friends' drive?

A. The friends traveled at a slow pace, sped up, and then traveled at a quick pace.

Student did not use the labels on the horizontal and vertical axes to interpret the graph, but rather related the lengths of the line segments to speed; thought a shorter line segment meant slower speed and a longer line segment meant faster speed.

B. The friends traveled at a slow pace, stopped, and then traveled at a quick pace.

Student recognized that a flat line means the friends stopped, but used the lengths of the line segments instead of the slopes to indicate the friends' speed.

C. The friends traveled at a quick pace, stopped, and then traveled at a slow pace.

Correct.

D. The friends traveled at a quick pace, slowed down, and then traveled at a quicker pace.

Student did not recognize that a flat line segment means the friends did not cover any distance and misinterpreted the slope of the last interval of time.

15

Item Id: i129605**Item Type: Selected Response**

Standards Description:

8.F.A.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.

Primary Standard: cc:8.F.A.3

Points Possible: 1

Which equation represents a linear function?

A. $w = t^3$

Student did not recognize that cubing a variable results in a function that is not linear.

B. $e = 12u^2$

Student did not recognize that squaring a variable results in a function that is not linear.

C. $d = \left(\frac{g}{2}\right)^2$

Student did not recognize that squaring a variable results in a function that is not linear; perhaps thought squaring and dividing by 2 were inverses.

D. $m = 5.45p$

Correct.

16

Item Id: i138072**Item Type: Selected Response**

Standards Description:

8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Primary Standard: cc:8.EE.C.7.b

Points Possible: 1

Solve for p .

$$p - 12 = 8 - 5(p - 2)$$

A. $p = -3$

Student simplified $8 - 5$ before distributing and then solved for p .

B. $p = -1\frac{1}{2}$

Student correctly simplified to $p - 12 = 18 - 5p$, but then incorrectly combined like terms to get $-4p = 6$ before solving for p .

C. $p = 3$

Student only distributed -5 to p and then solved for p .

D. $p = 5$

Correct.

Item Id: i138655**Item Type: Multiple Select**

Standards Description:

8.EE.C.8.b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

Primary Standard: cc:8.EE.C.8.b

Points Possible: 1

Yesenia wrote a system of equations that has an infinite number of solutions. One of the equations she wrote is listed below.

$$y = -5x + 2$$

Which of the following could be the other equation she wrote?

Select **all** that apply.

A. $y + 5x = 2$

Correct.

B. $y = 5x + 2$

Student identified an equation that would create a system of equations with exactly one solution; may have thought that equations with a solution of 0 have infinite solutions.

C. $y = -5x - 2$

Student confused an equation that would create a system with no solution as one that would create a system with infinite solutions.

D. $2y - 10x = 4$

Student divided all terms by 2 to get $y - 5x = 2$ and identified that the coefficients and the constant match those in the given equation, but did not transform the equation into slope-intercept form.

E. $3y = -15x + 6$

Correct.

Item Id: i112037**Item Type: Multiple Select**

Standards Description:

8.F.A.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.

Primary Standard: cc:8.F.A.1

Points Possible: 1

Select **all** tables that represent a function.

A.

x	y
-5	-2
-3	-2
-1	-2
1	-2

Correct.

B.

x	y
0	9
2	7
2	5
4	3

Student thought that a function is defined by each output having exactly one input; perhaps confused because the y -values decrease at a consistent rate of 2.

C.

x	y
-5	-5
-5	0
-3	2
-3	-3

Student thought that a function is defined by each output having exactly one input.

D.

x	y
6	-8
6	-4
6	0
6	4

Student thought that a vertical line is a function.

E.

x	y
-4	4
0	0
-1	1
7	-7

Correct.

Item Id: i130386**Item Type: Selected Response**

Standards Description:

8.EE.C.7.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).

Primary Standard: cc:8.EE.C.7.a

Points Possible: 1

Mariana solved a linear equation and found that it had an infinite number of solutions.

Which could have been the final line of her work?

A. $x = -1$

Student confused an equation indicating exactly one solution with one indicating an infinite number of solutions.

B. $9 = 10$

Student confused an equation indicating no solution with one indicating an infinite number of solutions.

C. $x = x$

Correct.

D. $x = \frac{4}{x}$

Student confused an equation indicating two solutions, 2 and -2, for one indicating an infinite number of solutions.

20

Item Id: i113111**Item Type: Selected Response**

Standards Description:

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Primary Standard: cc:8.F.A.2

Points Possible: 1

Function E is a linear function with an initial value of 2 and a rate of change of $\frac{1}{3}$.

Function F is a linear function. The graph of function F includes the points (2, 8) and (0, 2).

Which statement is true?

- A. The two functions have the same initial value.** Correct.
- B. The two functions have the same rate of change. Student may have calculated the rate of change as the change in x over the change in y in function F.
- C. The initial value in function F is greater than the initial value in function E. Student may have compared the rate of change in function F with the initial value in function E.
- D. The rate of change in function E is greater than the rate of change in function F. Student may have calculated the rate of change in function F as negative and thought that a negative rate of change is always less than a positive rate of change.

Item Id: i130629**Item Type: Multiple Select**

Standards Description:

8.EE.C.8.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.

Primary Standard: cc:8.EE.C.8.a

Points Possible: 1

The solution to a system of two linear equations is $(1, 7)$.

Which of the systems shown could represent the two linear equations?

Select **all** that apply.

A. $y = 1$
 $x = 7$

Student confused the variables in the solution and swapped the values of x and y .

B. $y = 7x$
 $x = 1$

Correct.

C. $y = x + 1$
 $y = x + 7$

Student thought the y -intercepts of the two equations gave the solution to the system; student did not check to see if the point satisfied either of the equations.

D. $y = x + 6$
 $y = 3x + 3$

Student selected a system where the solution point satisfied only the first equation but not both.

E. $y = 2x + 5$
 $y = -x + 8$

Correct.

Item Id: i138069**Item Type: Selected Response**

Standards Description:

8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Primary Standard: cc:8.EE.C.7.b

Points Possible: 1

Solve the equation below for x .

$$\frac{1}{3}(-x + 3) = -x - 4$$

A. $x = -10\frac{1}{2}$

Student did not distribute the $\frac{1}{3}$ to the 3 when solving.

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

Correct.

C. $x = 2\frac{1}{4}$

Student correctly distributed the $\frac{1}{3}$ but did not perform inverse operations when collecting like terms from opposite sides of the equal sign; simplified the equation to $(-4/3)x = -3$, then solved for x .

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

Student simplified to $(2/3)x = -5$, but omitted the negative sign when simplifying.

Item Id: i112875**Item Type: Selected Response**

Standards Description:

8.F.B.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.

Primary Standard: cc:8.F.B.5

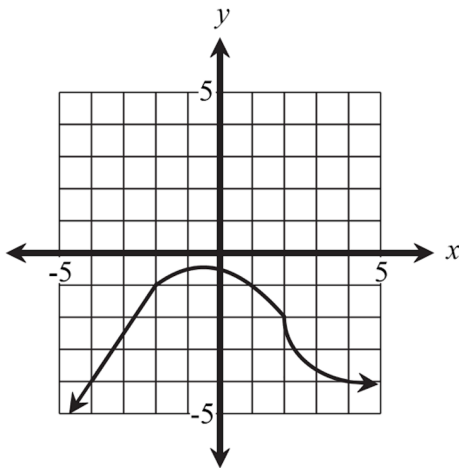
Points Possible: 1

Which graph represents a function with the following criteria?

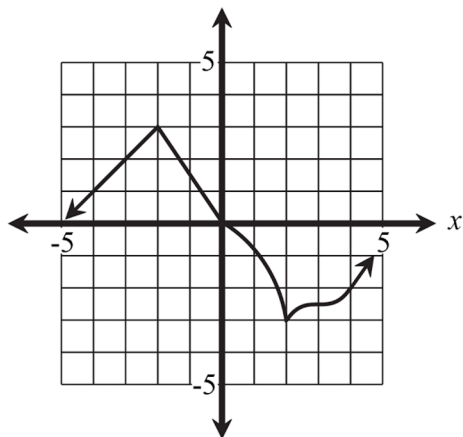
- The function is linear and increasing for $-4 < x < -2$.
- The function is nonlinear and decreasing for $2 < x < 4$.

A.

Correct.

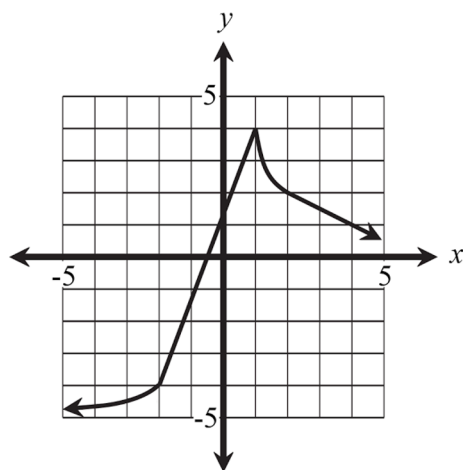


B.



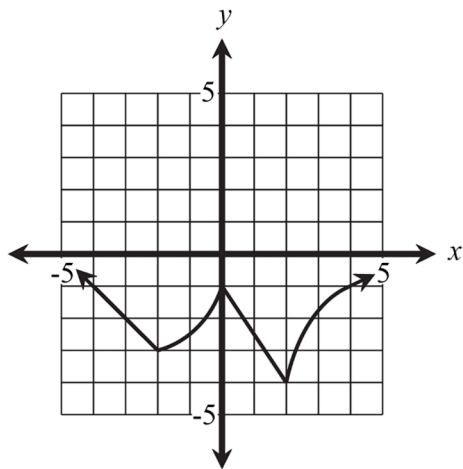
Student chose a function that correctly represents the first interval but not the second interval; perhaps confused "increasing" with having positive y-coordinates and "decreasing" with having negative y-coordinates.

C.



Student chose a function that is increasing and linear for $-4 < y < -2$ and decreasing and nonlinear for $2 < y < 4$, OR student confused the meanings of linear and nonlinear.

D.



Student chose a function that is linear but decreasing for $-4 < x < -2$ and nonlinear but increasing for $2 < x < 4$.

24

Item Id: i112601**Item Type: Constructed Response**

Standards Description:

8.F.A.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.

Standard(s) for Mathematical Practice:

MP6 Attend to precision.

Students must apply a clear and accurate rule for a functional relationship. They must pay close attention to what the input is and what the output is in each prompt.

24A

Primary Standard: cc:8.F.A.1

Points Possible: 1

The table below gives a credit score and credit description for seven different people.

Person	Credit Score	Credit Description
1	680	Good
2	730	Excellent
3	650	Average
4	500	Bad
5	590	Poor
6	560	Bad
7	650	Average

Part A

According to the data in the table, is the credit score a function of the credit description? Explain why or why not.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to

rounding or estimation.

The credit score is not a function of the credit description because some descriptions have more than one score.

Evidence Statement(s):

1. Student understood that when each input does not have exactly one output, the output is not a function of the input.

Common Misconception(s):

- Student thought that the credit score is a function of the credit description, perhaps because they thought that some inputs could have more than one unique output.
- Student thought that the credit score is a function of the credit description, perhaps because they did not recognize that a credit description of “Bad” has more than one unique output.
- Student thought that a function could only exist if both categories are numerical.

24B

Primary Standard: cc:8.F.A.1

Points Possible: 1

Part B

According to the data in the table, is the credit description a function of the credit score? Explain why or why not.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

The credit description is a function of the credit score because each score has exactly one description.

Evidence Statement(s):

1. Student understood that when each input has exactly one output, the output is a function of the input.

Common Misconception(s):

- Student thought that the credit description is not a function of the credit score because the input of 650 repeats.
- Student thought that a function could only exist if both categories are numerical.

25

Item Id: i138653

Item Type: Selected Response

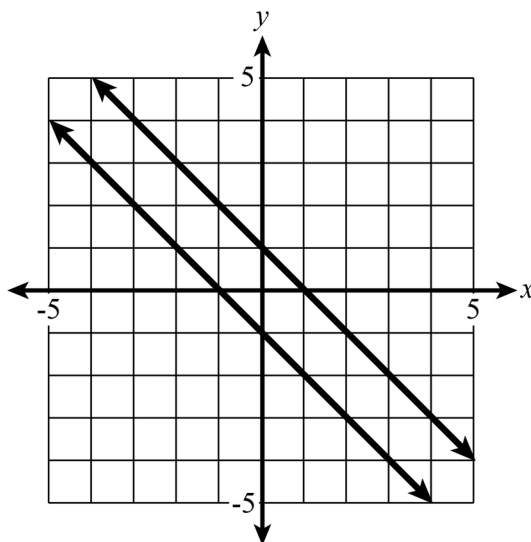
Standards Description:

8.EE.C.8.b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

Primary Standard: cc:8.EE.C.8.b

Points Possible: 1

Which statement about the system of equations represented by the lines below is true?



A. There is no solution because the lines are parallel.

Correct.

B. There are infinitely many solutions because the lines have the same slope.

Student identified that the lines have the same slope, but confused infinitely many solutions with no solution.

C. There is exactly one solution, and the solution is $(-1, 1)$.

Student confused exactly one solution with no solution and identified the solution as a combination of the x-intercepts and y-intercepts of the two lines.

D. There is exactly one solution because the distance between the two lines is always 2 units.

Student identified that the two lines have a consistent distance between them (used the distance between the two y-intercepts), but confused exactly one solution with no solution.

Item Id: i129603**Item Type: Selected Response**

Standards Description:

8.F.A.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.

Primary Standard: cc:8.F.A.3

Points Possible: 1

Which table contains coordinate points that form a linear function?

A.

Student thought that having y-values that were the squares of the corresponding x-values meant that the values in the table represent a linear function.

x	y
1	1
3	9
5	25

B.

Correct.

x	y
3	-1
5	1
7	3

C.

x	y
3	3
4	0
8	-3

Student thought that the constant rate of change for y -values, but not x -values, meant that the values in the table represent a linear function.

D.

x	y
-2	-4
0	4
2	-1

Student thought that the constant rate of change for x -values, but not y -values, meant that the values in the table represent a linear function.

Item Id: i138077**Item Type: Math Short Answer**

Standards Description:

8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Primary Standard: cc:8.EE.C.7.b

Points Possible: 1

Solve the equation below for x .

$$0.5(x + 7) + 9 = 43$$

Respond in the space provided.

*If your test is on paper, write your answer on the answer sheet.***Correct Answer:**

$$x = 61$$

Item Id: i112118**Item Type: Multiple Select**

Standards Description:

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

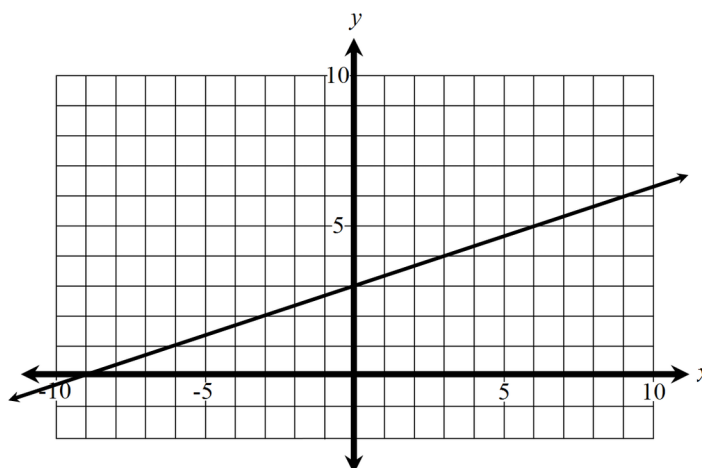
Primary Standard: cc:8.F.A.2

Points Possible: 1

Use the linear functions below to answer the question.

Function Q:

$$y = 3x - 2$$

Function R:

Which statements about the two functions are true?

Select **all** that apply.

A. Function Q and function R have the same initial value.

Student interpreted the initial value in function R correctly, but identified the rate of change as the initial value in function Q.

B. Function Q has a greater initial value than function R.

Student confused the rates of change and the initial values in both functions.

C. Function R has a greater initial value than function Q.

Correct.

D. Function Q and function R have the same rate of change.

Student interpreted the rate of change in function Q correctly, but identified the initial value as the rate of change in function R, OR student identified the rate of change in function R as the change in x over the change in y instead of the change in y over the change in x.

E. Function Q has a greater rate of change than function R.

Correct.

F. Function R has a greater rate of change than function Q.

Student interpreted the initial values as the rates of change in function Q and function R.

Item Id: i138656**Item Type: Selected Response**

Standards Description:

8.EE.C.8.b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

Primary Standard: cc:8.EE.C.8.b

Points Possible: 1

Use the system of equations to answer the question.

$$y = 4x + 2$$
$$-6x + 2y = 8$$

What is the value of $x + y$?

A. -13

Student substituted $4x + 2$ for $2y$ instead of y , substituted -3 for x in the first equation, and then added x and y .

B. 2

Student correctly solved for x as 2, but then substituted 2 for y in the first equation, instead of x , and solved for y as 0, OR student correctly solved for x as 2 and did not proceed further in the process.

C. 12

Correct.

D. 17

Student correctly substituted $4x + 2$ for y to get $-6x + 2(4x + 2) = 8$, but only distributed 2 to $4x$, and then substituted 3 for x in the first equation before adding x and y .

Item Id: i129617

Item Type: Multiple Select

Standards Description:

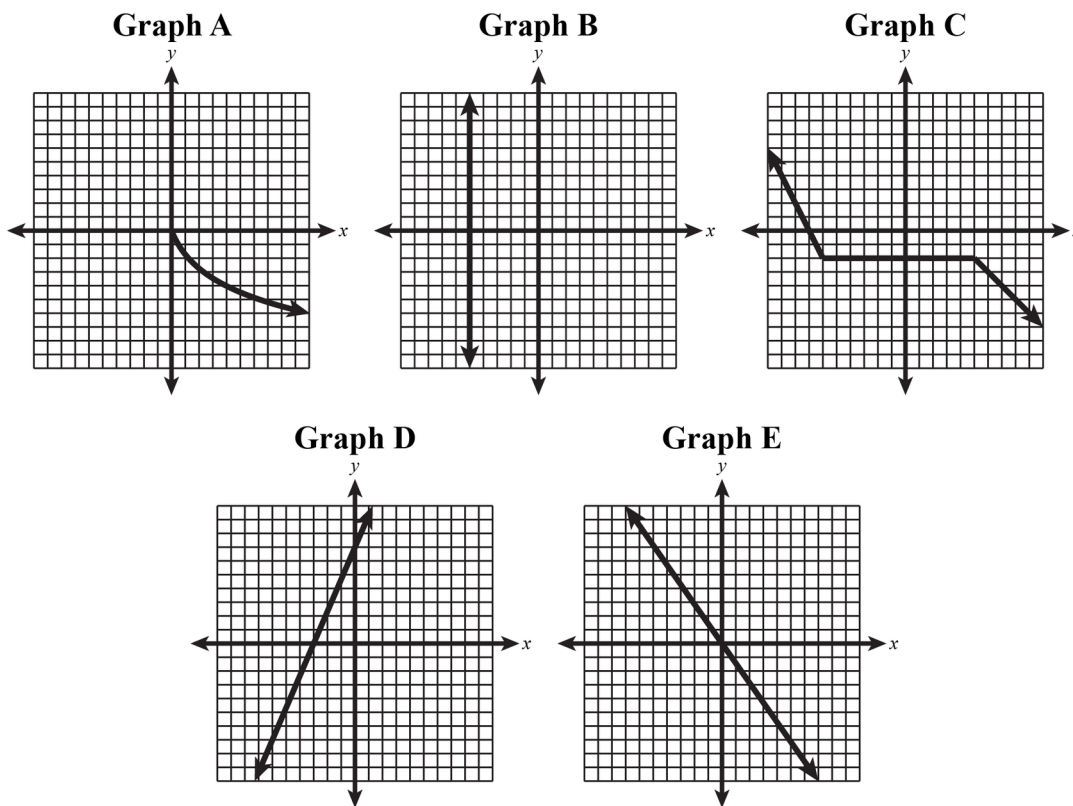
8.F.A.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Primary Standard: cc:8.F.A.3

Secondary Standard(s): cc:8.F.A.1

Points Possible: 1

Use the graphs below to answer the question.



Which graphs represent a **nonlinear function**?

Select **all** that apply.

A. Graph A

Correct.

B. Graph B

Student chose a graph that does not represent a function.

C. Graph C

Correct.

D. Graph D

Student chose a graph that represents a linear function; perhaps thought that all linear functions must pass through the origin.

E. Graph E

Student chose a graph that represents a linear function; perhaps thought that a linear function could not have a negative rate of change.

Item Id: i112346**Item Type: Multiple Select**

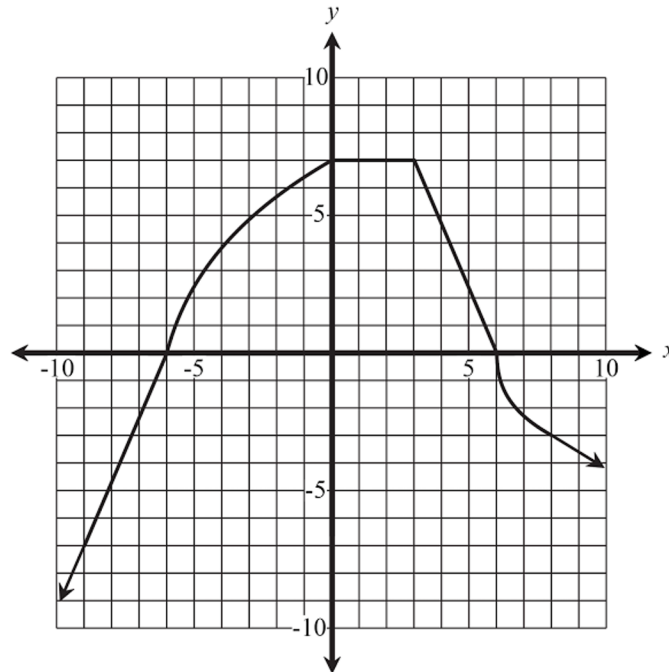
Standards Description:

8.F.B.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.

Primary Standard: cc:8.F.B.5

Points Possible: 1

In the graph below, y is a function of x .

During which intervals is the function decreasing?

Select **all** that apply.

A. $x < -6$

Student confused an interval in which the function is increasing linearly with an interval where the function is decreasing, OR student thought that an interval in which all y-values are negative is an interval where the function is decreasing.

B. $-6 < x < 0$

Student confused an interval in which the function is increasing nonlinearly with an interval where the function is decreasing.

C. $0 < x < 3$

Student confused an interval in which the function is constant with an interval where the function is decreasing.

D. $3 < x < 6$

Correct.

E. $x > 6$

Correct.

Item Id: i130628

Item Type: Selected Response

Standards Description:

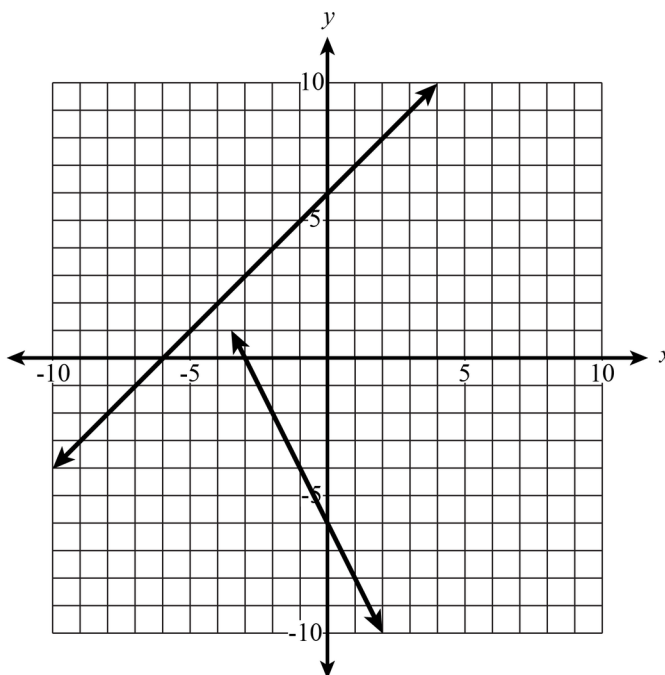
8.EE.C.8.a

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.

Primary Standard: cc:8.EE.C.8.a

Points Possible: 1

Which statement about the solution to the system of equations is true?



A. There is no solution to the system of equations.

Student confused lines that do not visually intersect with lines that never intersect.

B. The solution is $(-4, 2)$ because both lines pass through this point.

Correct.

C. The solution is $(-6, -3)$ because the point is made up of the x -intercepts from both lines.

Student equated the x -intercepts of the two lines with the solution to a system.

D. The solution is $(6, -6)$ because the point is made up of the y -intercepts from both lines.

Student equated the y -intercepts of the two lines with the solution to a system.

Item Id: i138113**Item Type: Constructed Response**

Standards Description:

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

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

Students must manipulate the equation to arrive at a point where it is clear that there are no solutions. They must flexibly use different properties of operations to attempt to transform the given equation into simpler forms.

MP3 Construct viable arguments and critique the reasoning of others.

Students must evaluate and respond to Derick's solution, justifying mathematically that his reasoning is correct.

MP7 Look for and make use of structure.

Students must successfully transform the given equation into simpler forms to determine the equation's solution(s).

Primary Standard: cc:8.EE.C.7

Points Possible: 2

Derick solves the equation below.

$$-3(4n + 2) = -4n + -2(4n - 6)$$

After solving, he says that the equation has no solution.

- If Derick is correct, show how you know.
- If Derick is incorrect, show how you know and describe the solution to the equation.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Yes, Derick is correct.

$$-3(4n + 2) = -4n + -2(4n - 6)$$

$$-12n - 6 = -4n - 8n + 12$$

$$-12n - 6 = -12n + 12$$

$$-6 = 12$$

Since $-6 = 12$ is a false statement, there are no solutions to the equation.

Evidence Statement(s):

1. Student identified that the equation has no solution.
2. Student showed there is no solution to the equation by transforming it into an equivalent equation of the form $a = b$.

Common Misconception(s):

- Student incorrectly transformed the equation by only distributing to the first term in each set of parentheses.
- Student incorrectly combined like terms or combined terms that are not like.
- Student made a calculation error when substituting 1 or any other value for x to test for solutions to the equation.
- Student successfully transformed the equation to a simpler form but confused an equation with no solution with an equation with infinitely many solutions.

Interim Assessment 3

Mathematics

Grade 8

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 34 questions, including 4 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



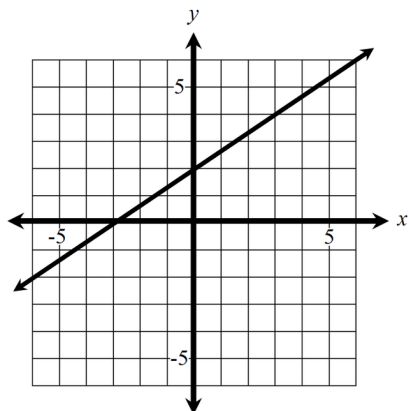
1. What is the distance, to the nearest tenth of a unit, between point $M(-8, -1)$ and point $N(3, 5)$?
 - A. 4.1
 - B. 9.2
 - C. 12.5
 - D. 17.0

2. Function J and function K, shown below, are linear functions.

Function J:

x	y
0	-3
3	-1
6	1

Function K:



Which statement about the functions is true?

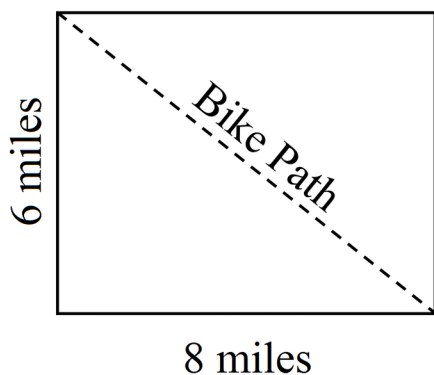
- A. Function J and function K both have a rate of change of $\frac{3}{2}$.
- B. Function J and function K both have a rate of change of $\frac{2}{3}$.
- C. The rate of change in function J is $\frac{3}{2}$, and the rate of change in function K is $\frac{2}{3}$.
- D. The rate of change in function J is -3 , and the rate of change in function K is 2.

3. Amelia competed in a race in which she ran at a constant speed. A graph of a line that represents the relationship between the number of seconds Amelia ran, x , and the total distance she ran in meters, y , shows that in 15 seconds she ran 67.5 meters.

Which point could be on the graph of Amelia's line?

- A. (0, 4.5)
- B. (3, 13.5)
- C. (4.5, 1)
- D. (67.5, 15)

4. Greenfield Park is in the shape of a rectangle. A straight bike path cuts across the park from corner to corner, as shown below.

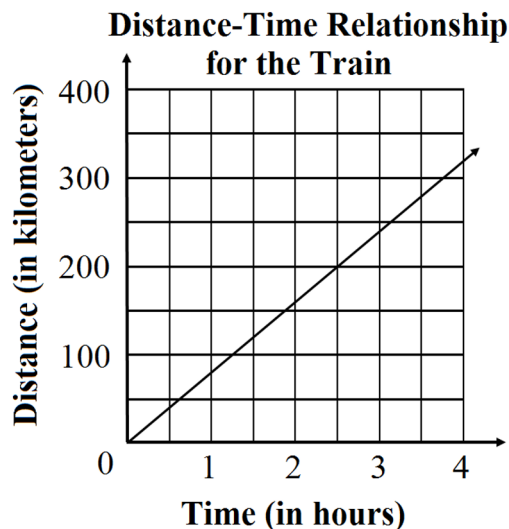


What is the distance, in miles, of the bike path?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

5. A train is moving at a constant speed. The graph below shows the distance-time relationship for the train, where x represents the time, in hours, and y represents the distance traveled, in kilometers.



Which function represents the distance-time relationship shown on the graph?

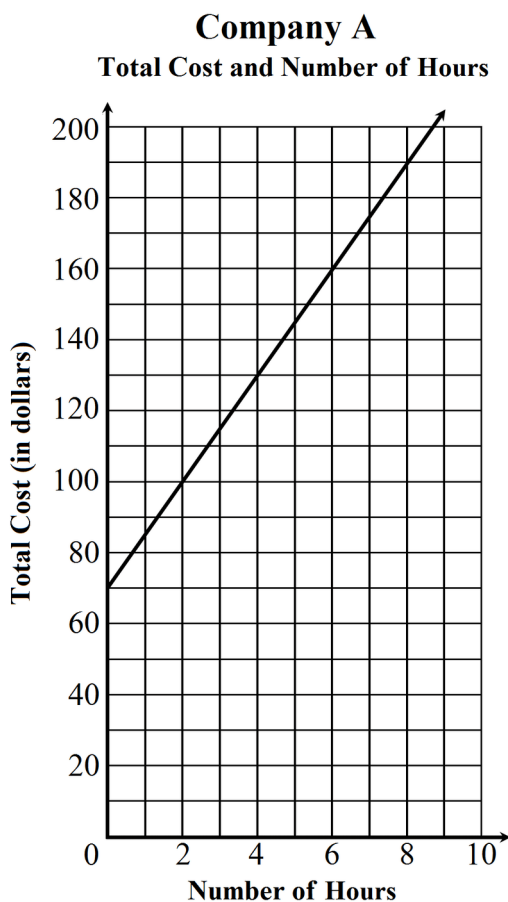
- A. $y = 80x$
- B. $y = 200x$
- C. $y = x + 80$
- D. $y = 2.5x + 200$

6. Tiffany starts with \$16,000 in her savings account and deposits an additional \$25 every week. Michelle starts with \$9,000 in her savings account and deposits an additional \$75 every week. There will be a week in the future when Tiffany and Michelle have the same amount of money in their savings accounts.

How much money will be in each savings account when Tiffany and Michelle have the same amount of money?

- A. \$14,250
- B. \$19,500
- C. \$25,000
- D. \$27,750

7. Marshall is comparing different companies that rent sound systems. The total cost, y , for each company includes a fixed rental fee plus an additional fee based on the number of hours, x , the sound system is rented. Information about the cost for each company is shown below.



Company B

x	y
0	50
2	90
4	130
6	170

Company C

$$y = 10x + 90$$

Part A

Which company has the lowest additional fee per hour for renting a sound system? Show or explain how you found your answer.

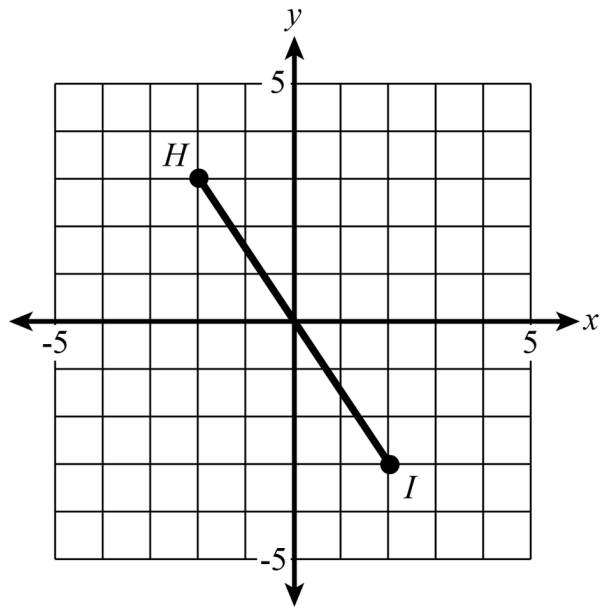
Respond in the space provided.

Part B

Marshall claims that the company that has the lowest fixed rental fee is always the company that will represent the lowest total cost for renting a sound system. Is Marshall's claim correct? Justify your answer with an example from the situation.

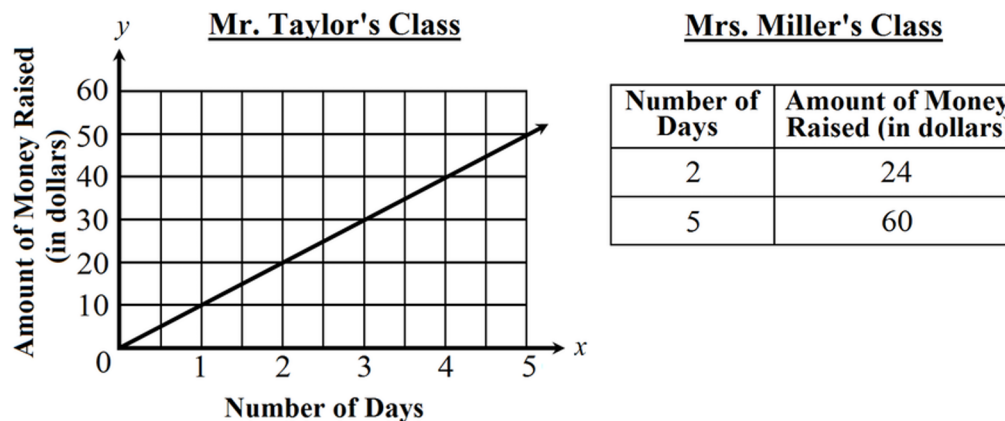
Respond in the space provided.

8. Find the length of \overline{HI} to the nearest hundredth of a unit.



- A. 3.16
- B. 4.47
- C. 4.90
- D. 7.21

9. Mr. Taylor's class and Mrs. Miller's class are raising money for charity. The results are recorded in the graph and the table below, where y represents the total amount of money raised, in dollars, and x represents the number of days that have passed. In both classes, the amount of money raised is proportional to the number of days.



How much greater is the daily increase in money in Mrs. Miller's class than in Mr. Taylor's class?

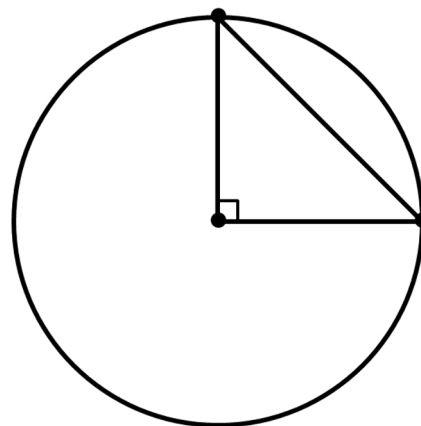
- A. \$2
- B. \$4
- C. \$14
- D. \$26

10. A snowboarder starts at the top of a mountain that is 2,500 feet above sea level. The snowboarder then descends at a constant rate of 650 feet per minute.

Which equation represents this situation, where y represents the current altitude of the snowboarder, in feet, and x represents the number of minutes that have passed?

- A. $y = 2,500x - 650$
- B. $y = 650x + 2,500$
- C. $y = -650x - 2,500$
- D. $y = -650x + 2,500$

11. A right triangle is drawn in a circle, as shown in the picture below. The legs of the right triangle are radii, and each has a length of 6.8 centimeters.



What is the length, in centimeters, of the hypotenuse, to the nearest tenth?

- A. 5.2
- B. 9.6
- C. 13.6
- D. 92.5

12. Function T is a linear function and is represented by the equation below.

Function T : $y = 2x - 4$

Function U is a linear function and is represented by the table below.

Function U :

x	y
-4	0
-2	2
0	4
2	6

Which statement about the functions is true?

- A. The initial value in function T is the same as the initial value in function U .
- B. The initial value in function T is the opposite of the initial value in function U .
- C. The initial value in function T is half the initial value in function U .
- D. The initial value in function T is greater than the initial value in function U .

13. A school put on a play. Adult tickets were sold for \$5.50, and student tickets were sold for \$3.50. There was a total of 230 tickets sold and a total of \$995 collected from ticket sales.

How many **more** student tickets than adult tickets were sold for the play?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

- 14.** Triangle LMN has side lengths of 32 inches, 16 inches, and 40 inches. Is triangle LMN a right triangle? Justify your answer.

Respond in the space provided.

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



15. A scientist is examining two skin cells. Skin Cell A has a length of 5×10^{-3} cm, and Skin Cell B has a length of 1×10^{-4} cm.

Which statement about the lengths of the skin cells is true?

- A. Skin Cell A is $\frac{1}{50}$ as long as Skin Cell B.
- B. Skin Cell A is 5 times as long as Skin Cell B.
- C. Skin Cell A is 10 times as long as Skin Cell B.
- D. Skin Cell A is 50 times as long as Skin Cell B.

16. What is $3.8\overline{3}$ written as a fraction?

- A. $3\frac{3}{8}$
- B. $3\frac{83}{100}$
- C. $3\frac{5}{6}$
- D. $3\frac{83}{99}$

17. Which expression is equivalent to the one below?

$$(2^6 \times 9^6) \div 18^{14}$$

- A. $\frac{1}{18^{-2}}$
- B. $\frac{1}{18^8}$
- C. 18^8
- D. 18^{20}

18. Which statement correctly describes the equation below?

$$-2(x + 3) + 4x = 2x - 6$$

- A. There is no solution.
- B. There are infinitely many solutions.
- C. There is exactly one solution, and the solution is 0.
- D. There is exactly one solution, and the solution is 2.

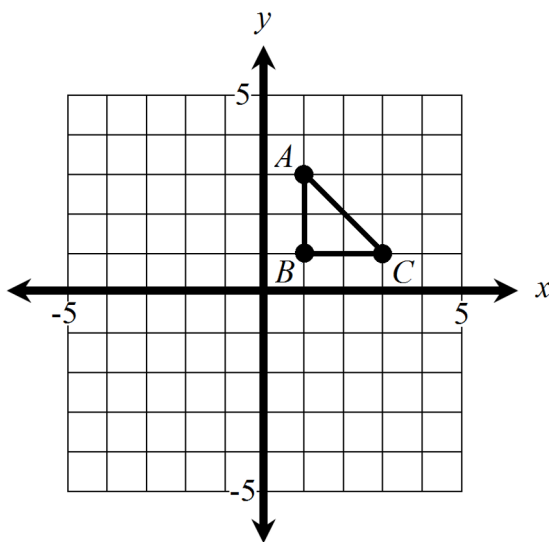
19. Evaluate.

$$\sqrt[3]{8}$$

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

20. Triangle ABC is shown below. Triangle ABC undergoes a transformation to create triangle $A'B'C'$.



Which statements about the location of point B' are true?

Select **all** that apply.

- A. When triangle ABC is reflected over the y -axis to create triangle $A'B'C'$, the coordinates for B' are $(1, -1)$.
- B. When triangle ABC is rotated 90° clockwise about point A to create triangle $A'B'C'$, the coordinates for B' are $(3, 3)$.
- C. When triangle ABC is dilated from the origin by a scale factor of $\frac{1}{4}$ to create triangle $A'B'C'$, the coordinates for B' are $(4, 4)$.
- D. When triangle ABC is translated 2 units to the left and 1 unit down to create triangle $A'B'C'$, the coordinates for B' are $(-1, 0)$.
- E. When triangle ABC is dilated from the origin by a scale factor of 5 to create triangle $A'B'C'$, the coordinates for B' are $(5, 5)$.

21. The mass of Earth is about 6×10^{24} kilograms. The mass of the moon is about 7×10^{22} kilograms. The mass of Jupiter is about 2×10^{27} kilograms.

- About how many times as large is Earth's mass compared to the moon's mass? Justify your answer.
- About how many times as large is Jupiter's mass compared to Earth's mass? Justify your answer.

Respond in the space provided.

22. Solve for x .

$$27 = -0.5(8x - 6)$$

- A. -27
- B. -8.25
- C. -7.5
- D. -6

23. $\sqrt{20}$ and $\sqrt{27}$ are plotted on the number line below.



What could be the value of point M ?

- A. 4
- B. 5
- C. 6
- D. 7

24. Which expression is equivalent to the one below?

$$\frac{4}{(4^2)^5}$$

- A. 4^{-10}
- B. 4^{-9}
- C. 4^{-7}
- D. 4^{11}

25. Light travels at a speed of 1.9×10^5 miles per second.

How far, in miles, does light travel in 30 seconds?

- A. 5.7×10^1
- B. 5.7×10^4
- C. 5.7×10^6
- D. 5.7×10^7

26. Which numbers are irrational?

Select **all** that apply.

- A. $-\frac{29}{3}$
- B. $-2.\overline{19}$
- C. 3.728459...
- D. $\sqrt{27}$
- E. $\sqrt{81}$

27. What is the solution to the system of equations below?

$$y = 2x + 4$$
$$y = -3x - 6$$

- A. $(-2, -3)$
- B. $(-2, 0)$
- C. $(2, 0)$
- D. $(2, 8)$

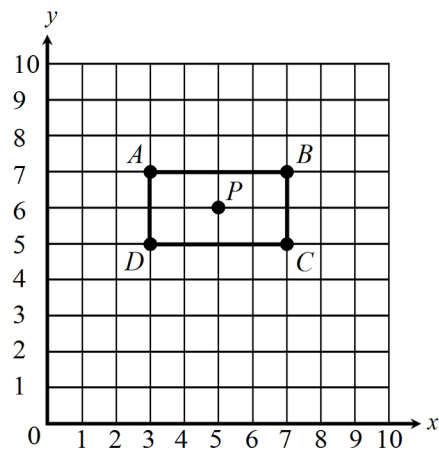
28. Which values are solutions to the equation below?

$$b^2 = 12$$

Select **all** that apply.

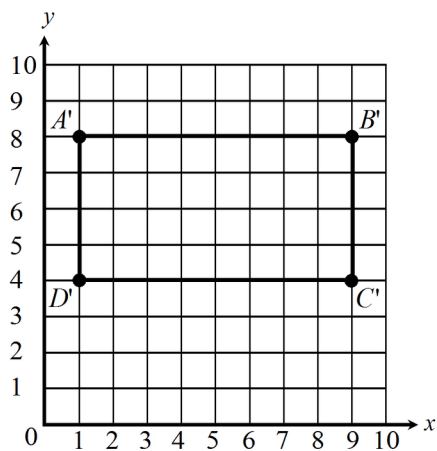
- A. -6
- B. 6
- C. $-\sqrt{12}$
- D. $\sqrt{12}$
- E. -144
- F. 144

29. Rectangle $ABCD$ is shown on the coordinate plane below.

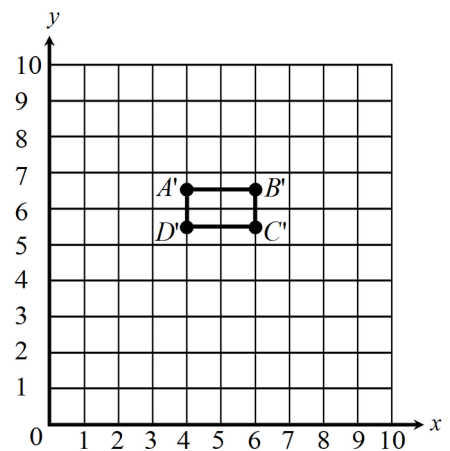


The center of rectangle $ABCD$ is at the point P . Which rectangle represents a dilation from point P by a scale factor of 2?

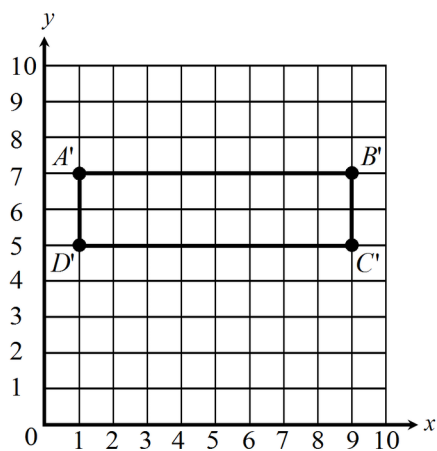
A.



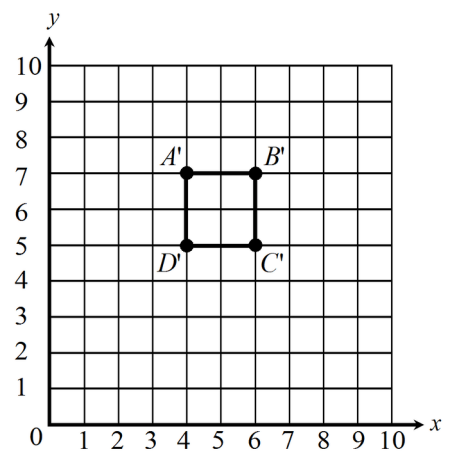
C.



B.



D.



30. Last year, there were 221,458,249 tons of trash collected in the United States.

What is the **best estimate** for the number of tons of trash collected in the United States last year?

- A. 2×10^{-9}
- B. 2×10^{-8}
- C. 2×10^8
- D. 2×10^9

31. Solve the equation below for m .

$$3(0.3m + 6) + m = 75$$

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

32. On a real number line, $\sqrt{71}$ is between which two integers?

- A. 6 and 7
- B. 7 and 8
- C. 8 and 9
- D. 9 and 10

33. Simplify.

$$\frac{6.0 \times 10^8}{1.2 \times 10^5}$$

- A. 4.8×10^3
- B. 5.0×10^3
- C. 5.0×10^{13}
- D. 7.2×10^{13}

34. Part A

Miles says that, when a is any integer greater than 0, the value of a^{-3} is always less than $-a^3$ because the exponent in a^{-3} is less than the exponent in $-a^3$. Is Miles's reasoning correct? Justify your answer.

Respond in the space provided.

Part B

Is b^0 equivalent to 0^b , when b is any integer greater than 0? Justify your answer.

Respond in the space provided.

Assessment Analysis Guide
Interim Assessment 3
Mathematics
Grade 8

1

Item Id: i138645**Item Type: Selected Response**

Standards Description:

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

Primary Standard: cc:8.G.B.8

Points Possible: 1

What is the distance, to the nearest tenth of a unit, between point $M(-8, -1)$ and point $N(3, 5)$?

- A. 4.1 Student found the square root of $(a + b)$; solved the square root of $(11 + 6)$.
- B. 9.2 Student found the square root of $a^2 - b^2$; solved the square root of $(11^2 - 6^2)$.
- C. 12.5 Correct.
- D. 17.0 Student found the sum of the lengths of a and b ; solved $(11 + 6)$.

Item Id: i113038

Item Type: Selected Response

Standards Description:

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Primary Standard: cc:8.F.A.2

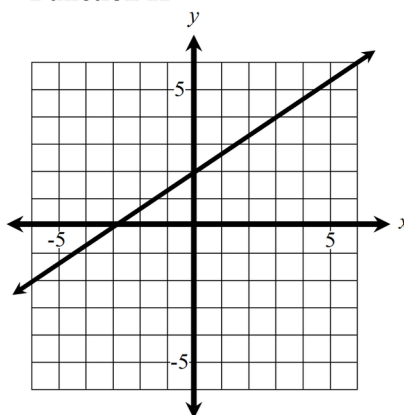
Points Possible: 1

Function J and function K, shown below, are linear functions.

Function J:

x	y
0	-3
3	-1
6	1

Function K:



Which statement about the functions is true?

- A. Function J and function K both have a rate of change of $\frac{3}{2}$. Student calculated the rate of change in function J and function K as the change in x divided by the change in y.
- B. Function J and function K both have a rate of change of $\frac{2}{3}$. Correct.
- C. The rate of change in function J is $\frac{3}{2}$, and the rate of change in function K is $\frac{2}{3}$. Student calculated the rate of change in function K correctly, but calculated the rate of change in function J as the change in x divided by the change in y.

D. The rate of change in function J is -3 , and the rate of change in function K is 2.

Student interpreted the initial values as the rates of change in both function J and function K.

3

Item Id: i112302**Item Type: Selected Response**

Standards Description:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.
Compare two different proportional relationships represented in different ways.

Primary Standard: cc:8.EE.B.5

Points Possible: 1

Amelia competed in a race in which she ran at a constant speed. A graph of a line that represents the relationship between the number of seconds Amelia ran, x , and the total distance she ran in meters, y , shows that in 15 seconds she ran 67.5 meters.

Which point could be on the graph of Amelia's line?

A. (0, 4.5)

Student represented the unit rate (slope) as the y-intercept.

B. (3, 13.5)

Correct.

C. (4.5, 1)

Student determined the unit rate but reversed the x- and y-coordinates.

D. (67.5, 15)

Student chose a point that included the given values but confused which value represents the x-coordinate and which value represents the y-coordinate.

4

Item Id: i112199**Item Type: Math Short Answer**

Standards Description:

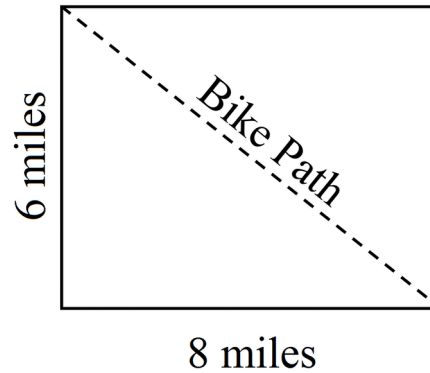
8.G.B.7

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

Primary Standard: cc:8.G.B.7

Points Possible: 1

Greenfield Park is in the shape of a rectangle. A straight bike path cuts across the park from corner to corner, as shown below.



What is the distance, in miles, of the bike path?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

Correct Answer:

10 miles

Item Id: i113093

Item Type: Selected Response

Standards Description:

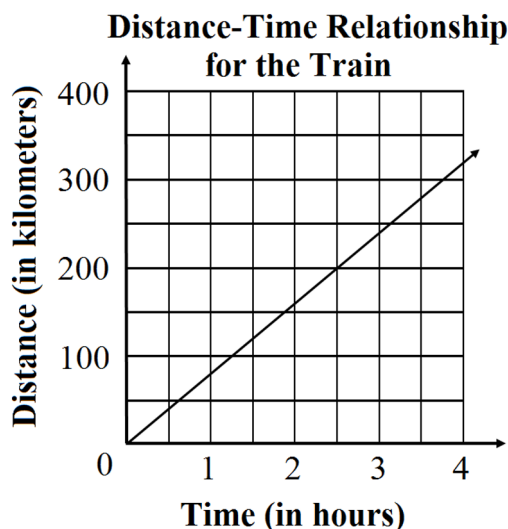
8.F.B.4

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.

Primary Standard: cc:8.F.B.4

Points Possible: 1

A train is moving at a constant speed. The graph below shows the distance-time relationship for the train, where x represents the time, in hours, and y represents the distance traveled, in kilometers.



Which function represents the distance-time relationship shown on the graph?

A. $y = 80x$

Correct.

B. $y = 200x$

Student identified the point $(2.5, 200)$, but did not divide by 2.5 to find the slope.

C. $y = x + 80$

Student confused the concepts of slope and y-intercept and added 80 to x instead of multiplying by x.

D. $y = 2.5x + 200$

Student used the most easily identifiable point of (2.5, 200) and represented the x-coordinate as the rate of change and the y-coordinate as the initial value.

Item Id: i116763**Item Type: Selected Response**

Standards Description:

8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Primary Standard: cc:8.EE.C.8.c

Points Possible: 1

Tiffany starts with \$16,000 in her savings account and deposits an additional \$25 every week. Michelle starts with \$9,000 in her savings account and deposits an additional \$75 every week. There will be a week in the future when Tiffany and Michelle have the same amount of money in their savings accounts.

How much money will be in each savings account when Tiffany and Michelle have the same amount of money?

A. \$14,250

Student set up the system of equations correctly, multiplied $16,000 + 25x = y$ by 3 to solve by elimination, added instead of subtracting to get $57,000 = 4y$, and solved for y .

B. \$19,500

Correct.

C. \$25,000

Student found the sum of the starting amounts of money in each savings account.

D. \$27,750

Student set up a system of equations correctly to get $16,000 + 25x = 9,000 + 75x$, incorrectly combined like terms to get $100x = 25,000$, found x (the number of months when the amounts are the same) to be 250, and substituted 250 into Michelle's equation ($9,000 + 75(250)$).

7

Item Id: i112106**Item Type: Constructed Response**

Standards Description:

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Standard(s) for Mathematical Practice:

MP1 Make sense of problems and persevere in solving them.

Throughout the item, students are required to explain the correspondence between different representations of rental companies.

MP2 Reason abstractly and quantitatively.

In both parts of the item, students are required to decontextualize the situation to make sense of the represented quantities. In addition to interpreting the meaning of the quantities, they must also compare the values in the context of the problem.

MP3 Construct viable arguments and critique the reasoning of others.

In Part B, students must respond to Marshall's claim and explain the flaw in his reasoning.

7A

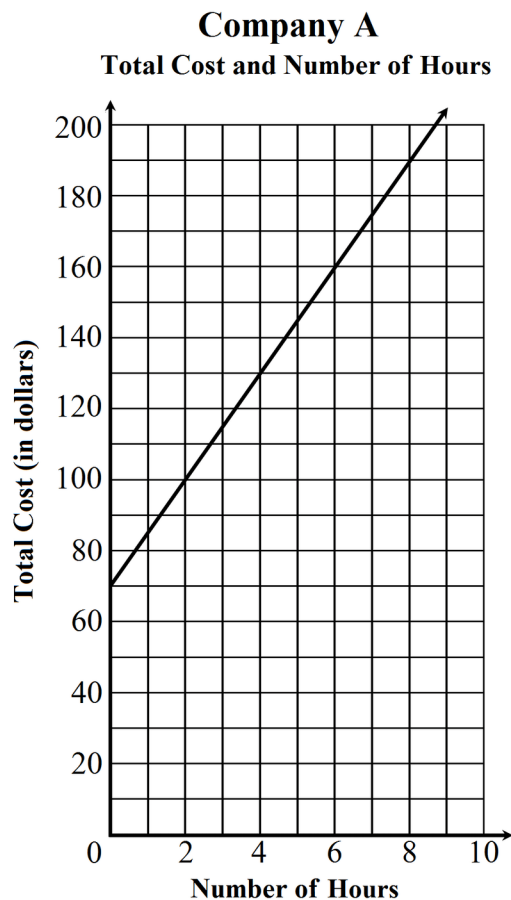
Primary Standard: cc:8.F.A.2

Secondary Standard(s): cc:8.F.B.4

Points Possible: 2

Marshall is comparing different companies that rent sound systems. The total cost, y , for each company includes a fixed rental fee plus an additional fee based on the number of hours, x , the sound system is rented.

Information about the cost for each company is shown below.

**Company B**

x	y
0	50
2	90
4	130
6	170

Company C

$$y = 10x + 90$$

Part A

Which company has the lowest additional fee per hour for renting a sound system? Show or explain how you found your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Company A's rate of change:

(0, 70) and (2, 100)

$$\frac{(100 - 70)}{(2 - 0)} = \frac{30}{2} = 15$$

Company A charges \$15 per hour.

Company B's rate of change:

(0, 50) and (2, 90)

$$\frac{(90 - 50)}{(2 - 0)} = \frac{40}{2} = 20$$

Company B charges \$20 per hour.

Company C's rate of change:

The rate of change is 10.

Company C charges \$10 per hour.

Company C charges the lowest additional fee per hour for renting a sound system.

Evidence Statement(s):

1. Student determined and compared the rates of change for a linear function represented as a graph, a linear function represented as a table, and a linear function represented as an equation.
2. Student interpreted the rates of change for each linear function in terms of the situation they modeled to name the company that charges the lowest additional fee per hour.

Common Misconception(s):

- Student compared the initial values of each company instead of the rates of change.
- Student compared a combination of initial values and rates of change.
- Student confused the rate of change with the initial value in the equation for Company C.
- Student found the rate of change for Company A and/or Company B as the change in y, instead of the change in y divided by the change in x.
- Student found the rate of change for Company A and/or Company B as the change in x divided by the change in y, instead of the change in y divided by the change in x.
- Student thought that the company with the greatest rate of change would be the company that charges the lowest additional fee per hour.

7B

Primary Standard: cc:8.F.A.2

Secondary Standard(s): cc:8.F.B.4

Points Possible: 2

Part B

Marshall claims that the company that has the lowest fixed rental fee is always the company that will represent the lowest total cost for renting a sound system. Is Marshall's claim correct? Justify your answer with an example from the situation.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Company A's initial value:

(0, 70)

Company A's fixed rental fee is \$70.

Company B's initial value:

(0, 50)

Company B's fixed rental fee is \$50.

Company C's initial value:

(0, 90)

Company C's fixed rental fee is \$90.

Marshall's claim is incorrect because the company that charges the lowest fixed rental fee, Company B, is not always the company that will represent the lowest total cost. For example, Company B's total cost for 6 hours is \$170, but Company A's total cost for 6 hours is \$160.

Evidence Statement(s):

1. Student determined and compared the initial values for a linear function represented as a graph, a linear function represented as a table, and a linear function represented as an equation.
2. Student interpreted the initial values together with the total costs for each linear function in terms of the situation they modeled to justify that the company with the lowest fixed rental fee is not always the company that represents the lowest total cost.

Common Misconception(s):

- Student compared the rates of change of each company, instead of the initial values.
- Student compared a combination of initial values and rates of change.
- Student confused the initial value in the equation for Company C with the rate of change.
- Student thought that Marshall's claim was correct; perhaps they only considered the total costs for a rental of less than 4 hours.
- Student recognized that all three companies have the same total cost for 4 hours, and thought that meant all three companies have the same total cost for any number of hours.

8

Item Id: i138646

Item Type: Selected Response

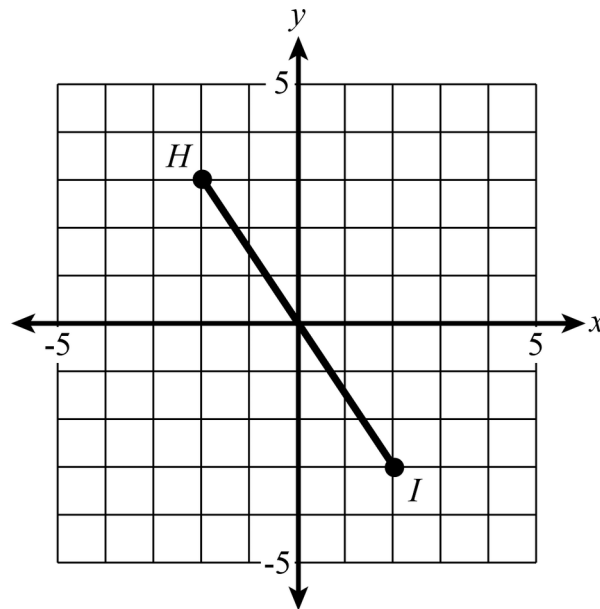
Standards Description:

8.G.B.8

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

Primary Standard: cc:8.G.B.8

Points Possible: 1

Find the length of \overline{HI} to the nearest hundredth of a unit.

A. 3.16

Student found the square root of $a + b$; solved the square root of $(6 + 4)$.

B. 4.47

Student found the square root of $a^2 - b^2$; solved the square root of $(6^2 - 4^2)$.

C. 4.90

Student found the square root of $a \times b$; solved the square root of (6×4) .

D. 7.21

Correct.

Item Id: i113246

Item Type: Selected Response

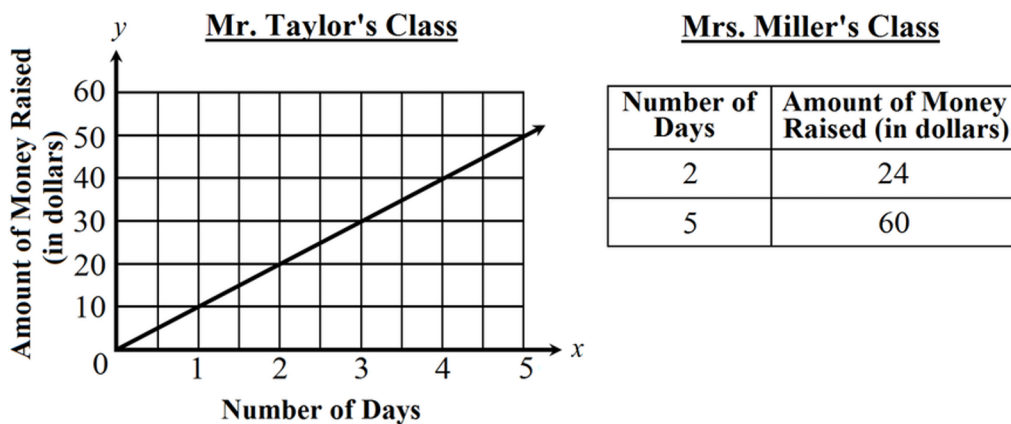
Standards Description:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph.
Compare two different proportional relationships represented in different ways.

Primary Standard: cc:8.EE.B.5

Points Possible: 1

Mr. Taylor's class and Mrs. Miller's class are raising money for charity. The results are recorded in the graph and the table below, where y represents the total amount of money raised, in dollars, and x represents the number of days that have passed. In both classes, the amount of money raised is proportional to the number of days.



How much greater is the daily increase in money in Mrs. Miller's class than in Mr. Taylor's class?

- A. \$2 Correct.
- B. \$4 Student compared the difference between the corresponding y -values on day 2 in the graph and the table.
- C. \$14 Student subtracted the slope of the line in the graph from the first y -value given in the table.

D. \$26

Student calculated the slope of the line that would represent the values in the table as just the change in y , instead of the change in y divided by the change in x , and then subtracted the slope of the line in the graph.

10

Item Id: i113259**Item Type: Selected Response**

Standards Description:

8.F.B.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.

Primary Standard: cc:8.F.B.4

Points Possible: 1

A snowboarder starts at the top of a mountain that is 2,500 feet above sea level. The snowboarder then descends at a constant rate of 650 feet per minute.

Which equation represents this situation, where y represents the current altitude of the snowboarder, in feet, and x represents the number of minutes that have passed?

A. $y = 2,500x - 650$

Student switched the initial value and the rate of change in the equation.

B. $y = 650x + 2,500$

Student represented an ascent instead of a descent.

C. $y = -650x - 2,500$

Student represented the initial value as negative (below sea level) instead of positive (above sea level).

D. $y = -650x + 2,500$

Correct.

Item Id: i129085**Item Type: Selected Response**

Standards Description:

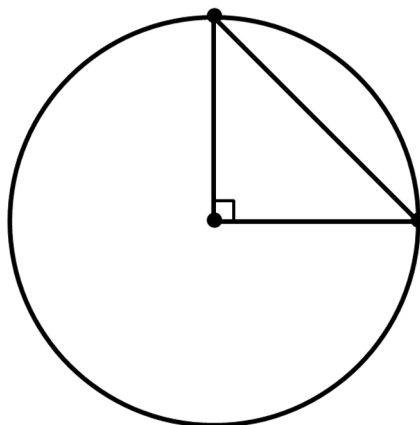
8.G.B.7

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

Primary Standard: cc:8.G.B.7

Points Possible: 1

A right triangle is drawn in a circle, as shown in the picture below. The legs of the right triangle are radii, and each has a length of 6.8 centimeters.



What is the length, in centimeters, of the hypotenuse, to the nearest tenth?

- A. 5.2 Student calculated the square root of $2a + 2b$ instead of $a^2 + b^2$ ($2 \times 6.8 + 2 \times 6.8$).
- B. 9.6 Correct.
- C. 13.6 Student thought that $a^2 + b^2 = (a + b)^2$ when a and b are the same and calculated the square root of $(6.8 + 6.8)^2$.
- D. 92.5 Student did not take the square root of $a^2 + b^2$.

12

Item Id: i112649**Item Type: Selected Response**

Standards Description:

8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Primary Standard: cc:8.F.A.2

Points Possible: 1

Function T is a linear function and is represented by the equation below.**Function T :** $y = 2x - 4$ Function U is a linear function and is represented by the table below.**Function U :**

x	y
-4	0
-2	2
0	4
2	6

Which statement about the functions is true?

A. The initial value in function T is the same as the initial value in function U .

Student compared the value of function T when the input is 0 to the value of function U when the output is 0.

B. The initial value in function T is the opposite of the initial value in function U . Correct.

C. The initial value in function T is half the initial value in function U .

Student compared the initial value in function U with the rate of change in function T .

D. The initial value in function T is greater than the initial value in function U .

Student may have confused the rates of change with the initial values.

Item Id: i116761**Item Type: Math Short Answer**

Standards Description:

8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Primary Standard: cc:8.EE.C.8.c

Points Possible: 1

A school put on a play. Adult tickets were sold for \$5.50, and student tickets were sold for \$3.50. There was a total of 230 tickets sold and a total of \$995 collected from ticket sales.

How many **more** student tickets than adult tickets were sold for the play?

Respond in the space provided.

If your test is on paper, write your answer on the answer sheet.

Correct Answer:

40 tickets

Item Id: i138890**Item Type: Constructed Response**

Standards Description:

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

Standard(s) for Mathematical Practice:

MP5 Use appropriate tools strategically.

Students must accurately employ the Pythagorean Theorem to evaluate if three given side lengths create a right triangle.

MP6 Attend to precision.

Students must accurately explain the converse of the Pythagorean Theorem in their justification.

Primary Standard: cc:8.G.B.6

Points Possible: 2

Triangle LMN has side lengths of 32 inches, 16 inches, and 40 inches. Is triangle LMN a right triangle? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$a^2 + b^2 = c^2$$

$$32^2 + 16^2 = c^2$$

$$1,024 + 256 = c^2$$

$$1,280 = c^2$$

However, $c = 40$, and so $c^2 = 1,600$. Therefore, $a^2 + b^2$ does not equal c^2 in this case because 1,280 is not equal to 1,600.

Since the side lengths of the triangle do not satisfy the Pythagorean Theorem, triangle LMN is not a right triangle.

Evidence Statement(s):

1. Student correctly used the Pythagorean Theorem with the side lengths given.
2. Student understood that a triangle with side lengths that do not satisfy the Pythagorean Theorem is not a right triangle.

Common Misconception(s):

- Student incorrectly applied the Pythagorean Theorem, perhaps using $a^2 + b^2 = c$ or $a + b = c$.
- Student used a side length other than 40 inches as the hypotenuse.
- Student applied the Pythagorean Theorem correctly but came to an incorrect conclusion about triangle LMN ; perhaps thought that the converse of the Pythagorean Theorem stated that a triangle with side lengths that do not satisfy the Pythagorean Theorem is a right triangle.

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Item Id: i111661**Item Type: Selected Response**

Standards Description:

8.EE.A.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.

Primary Standard: cc:8.EE.A.3

Points Possible: 1

A scientist is examining two skin cells. Skin Cell A has a length of 5×10^{-3} cm, and Skin Cell B has a length of 1×10^{-4} cm.

Which statement about the lengths of the skin cells is true?

A. Skin Cell A is $\frac{1}{50}$ as long as Skin Cell B.

Student chose the correct scale between the two skin cells but incorrect relative sizes; perhaps confused by the magnitude of negatives.

B. Skin Cell A is 5 times as long as Skin Cell B.

Student compared the sizes of the first factors in scientific notation but did not compare the base-ten exponents.

C. Skin Cell A is 10 times as long as Skin Cell B.

Student recognized that 10^{-3} is 10 times the value of 10^{-4} , but did not take the first factors in scientific notation into account.

D. Skin Cell A is 50 times as long as Skin Cell B.

Correct.

Item Id: i111882**Item Type: Selected Response**

Standards Description:

8.NS.A.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.

Primary Standard: cc:8.NS.A.1

Points Possible: 1

What is $3.\overline{83}$ written as a fraction?

- A. $3\frac{3}{8}$ Student used numbers from the problem to create a fraction instead of solving mathematically.
- B. $3\frac{83}{100}$ Student confused $3.\overline{83}$ with $3.8\overline{3}$ (with the 3 repeating).
- C. $3\frac{5}{6}$ Correct.
- D. $3\frac{83}{99}$ Student assumed that the 83 was repeating instead of just the 3.

Item Id: i129590**Item Type: Selected Response**

Standards Description:

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Primary Standard: cc:8.EE.A.1

Points Possible: 1

Which expression is equivalent to the one below?

$$(2^6 \times 9^6) \div 18^{14}$$

A. $\frac{1}{18^{-2}}$

Student multiplied the bases and added the exponents when simplifying $(2^6 \times 9^6)$ and got 18^{12} instead of multiplying the bases and keeping the common exponent of 6 to get 18^6 , and then subtracted the exponent 14 from the exponent 12 to get -2 while thinking a negative exponent belongs in the denominator of a fraction.

B. $\frac{1}{18^8}$

Correct.

C. 18^8

Student understood that $(2^6 \times 9^6)$ simplified to 18^6 , but subtracted the exponent 6 from the exponent 14 instead of 14 from 6, OR student successfully simplified to 18^{-8} but did not understand that in order to change a negative exponent to a positive one, the reciprocal must be used.

D. 18^{20}

Student understood that $(2^6 \times 9^6)$ simplified to 18^6 , but added the exponent 6 and the exponent 14.

Item Id: i112979**Item Type: Selected Response**

Standards Description:

8.EE.C.7.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).

Primary Standard: cc:8.EE.C.7.a

Points Possible: 1

Which statement correctly describes the equation below?

$$-2(x + 3) + 4x = 2x - 6$$

A. There is no solution.

Student mistook an equation with infinite solutions for one with no solution.

B. There are infinitely many solutions.

Correct.

C. There is exactly one solution, and the solution is 0.

Student likely simplified the equation to $2x - 6 = 2x - 6$ but mistook this to indicate a single solution of $x = 0$.

D. There is exactly one solution, and the solution is 2.

Student mistook the simplified equation $2x = 2x$ to indicate a single solution of $x = 2$.

Item Id: i111754**Item Type: Math Short Answer**

Standards Description:

8.EE.A.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.

Primary Standard: cc:8.EE.A.2

Points Possible: 1

Evaluate.

$$\sqrt[3]{8}$$

Respond in the space provided.

*If your test is on paper, write your answer on the answer sheet.***Correct Answer:**

2

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Item Id: i112218

Item Type: Multiple Select

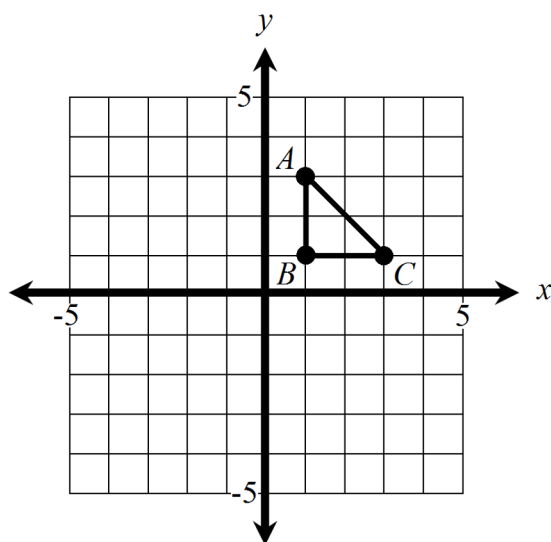
Standards Description:

8.G.A.3

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

Primary Standard: cc:8.G.A.3

Points Possible: 1

Triangle ABC is shown below. Triangle ABC undergoes a transformation to create triangle $A'B'C'$.Which statements about the location of point B' are true?Select **all** that apply.

A. When triangle ABC is reflected over the y -axis to create triangle $A'B'C'$, the coordinates for B' are $(1, -1)$.

Student reflected the figure over the x -axis instead of the y -axis.

B. When triangle ABC is rotated 90° clockwise about point A to create triangle $A'B'C'$, the coordinates for B' are $(3, 3)$.

Student rotated the figure counterclockwise instead of clockwise.

C. When triangle ABC is dilated from the origin by a scale factor of $\frac{1}{4}$ to create triangle $A'B'C'$, the coordinates for B' are $(4, 4)$.

Student confused the effect of dilating by a scale factor of $1/4$ with the effect of dilating by a scale factor of 4.

D. When triangle ABC is translated 2 units to the left and 1 unit down to create triangle $A'B'C'$, the coordinates for B' are $(-1, 0)$.

Correct.

E. When triangle ABC is dilated from the origin by a scale factor of 5 to create triangle $A'B'C'$, the coordinates for B' are $(5, 5)$.

Correct.

Item Id: i131352**Item Type: Constructed Response**

Standards Description:

8.EE.A.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.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

In this item, students must attend to the meaning of quantities in order to compare them.

Primary Standard: cc:8.EE.A.3

Secondary Standard(s): cc:8.EE.A.4

Points Possible: 2

The mass of Earth is about 6×10^{24} kilograms. The mass of the moon is about 7×10^{22} kilograms. The mass of Jupiter is about 2×10^{27} kilograms.

- About how many times as large is Earth's mass compared to the moon's mass? Justify your answer.
- About how many times as large is Jupiter's mass compared to Earth's mass? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$\text{Mass of Earth} = 6 \times 10^{24}$$

$$\text{Mass of the moon} = 7 \times 10^{22}$$

When comparing 6×10^{24} kilograms to 7×10^{22} kilograms, 6 is about the same size as 7 and 10^{24} is 10^2 times as large as 10^{22} . So, Earth's mass is about 1×10^2 times as large as the moon's mass.

$$\text{Mass of Jupiter} = 2 \times 10^{27} = 2,000 \times 10^{24}$$

$$\text{Mass of Earth} = 6 \times 10^{24}$$

When comparing $2,000 \times 10^{24}$ and 6×10^{24} , 2,000 is about 333 times as large as 6 and 10^{24} is equal to 10^{24} . So, Jupiter's mass is about 333 times as large as Earth's mass.

Other approaches to comparing Earth's mass to the moon's mass and Earth's mass to Jupiter's mass are also accepted (e.g., writing the mass of Earth as 600×10^{22} and comparing it to the mass of the moon, 7×10^{22} (about 100 or 10^2 times as large), or comparing Jupiter's mass to Earth's mass by comparing the single digits and the powers of 10 (2 is $\frac{1}{3}$ times as large as 6 and 10^{27} is 10^3 times as large as 10^{24} so Jupiter's mass is about 333 times as large)).

Evidence Statement(s):

1. Student expressed about how many times larger the mass of Earth is compared to the mass of the moon and justified their answer using a sound approach.
2. Student expressed about how many times larger the mass of Jupiter is compared to the mass of Earth and justified their answer using a sound approach.

Common Misconception(s):

- Student ignored the single digit in their explanation and only compared 10^{22} and 10^{24} when determining how many times as large Earth's mass is compared to the moon's mass.
- Student determined that the mass of Jupiter is 3×10^3 times as large as the mass of Earth; compared 2 and 6 and 10^{27} and 10^{24} without converting to the same form.

Item Id: i111674**Item Type: Selected Response**

Standards Description:

8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Primary Standard: cc:8.EE.C.7.b

Points Possible: 1

Solve for x .

$$27 = -0.5(8x - 6)$$

A. -27

Student tried to combine the values in the parentheses as like terms by subtracting $8x - 6 = 2x$, resulting in the equation $27 = -0.5(2x)$.

B. -8.25

Student did not distribute -0.5 to -6 , resulting in the equation $27 = -4x - 6$.

C. -7.5

Student calculated the distribution of -0.5 to -6 as -3 , resulting in the equation $27 = -4x - 3$.

D. -6

Correct.

Item Id: i138832**Item Type: Selected Response**

Standards Description:

8.NS.A.2

Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $.^2$).

Primary Standard: cc:8.NS.A.2

Points Possible: 1

$\sqrt{20}$ and $\sqrt{27}$ are plotted on the number line below.

What could be the value of point M ?

A. 4

Student chose a value that is close to half of the positive difference between 20 and 27.

B. 5

Correct.

C. 6

Student divided 20 and 27 by 2 to get 10 and 13.5 respectively, and then chose a value that when multiplied by 2 is between 10 and 13.5 while being closer to 13.5 than 10.

D. 7

Student subtracted 20 from 27.

Item Id: i129592**Item Type: Selected Response**

Standards Description:

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Primary Standard: cc:8.EE.A.1

Points Possible: 1

Which expression is equivalent to the one below?

$$\frac{4}{(4^2)^5}$$

A. 4^{-10}

Student understood that $(4^2)^5$ simplified to 4^{10} , but thought that the exponent for 4 was 0 and subtracted 10 from 0 to get -10.

B. 4^{-9}

Correct.

C. 4^{-7}

Student added the exponents 2 and 5 in the denominator instead of multiplying to get 4^7 , did not account for the 4^1 in the numerator, and wrote $1/4^7$ as 4^{-7} .

D. 4^{11}

Student understood that $(4^2)^5$ simplified to 4^{10} , but added the exponent 10 to the exponent 1 instead of subtracting.

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Item Id: i138085**Item Type: Selected Response**

Standards Description:

8.EE.A.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.

Primary Standard: cc:8.EE.A.4

Points Possible: 1

Light travels at a speed of 1.9×10^5 miles per second.

How far, in miles, does light travel in 30 seconds?

A. 5.7×10^1

Student multiplied 1.9 and 30 but did not multiply by 10^5 .

B. 5.7×10^4

Student calculated with 10^{-5} instead of 10^5 to get 0.00057, or 5.7×10^{-4} , and used 10^4 instead of 10^{-4} .

C. 5.7×10^6

Correct.

D. 5.7×10^7

Student simplified 1.9×10^5 to 1,900,000, thinking that 10^5 meant adding 5 zeros to the right of the 9 in 1.9, and then multiplied by 30.

Item Id: i112568**Item Type: Multiple Select**

Standards Description:

8.NS.A.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.

Primary Standard: cc:8.NS.A.1

Points Possible: 1

Which numbers are irrational?

Select **all** that apply.

A. $-\frac{29}{3}$

Student identified a rational number; perhaps thought that negative improper fractions were irrational.

B. $-2.\overline{19}$

Student identified a rational number; perhaps thought that repeating decimals were irrational.

C. 3.728459...

Correct.

D. $\sqrt{27}$

Correct.

E. $\sqrt{81}$

Student identified a rational number; perhaps did not know that $\sqrt{81}$ is 9 and thought that only square roots of even numbers were rational.

Item Id: i112446**Item Type: Selected Response**

Standards Description:

8.EE.C.8.b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.

Primary Standard: cc:8.EE.C.8.b

Points Possible: 1

What is the solution to the system of equations below?

$$y = 2x + 4$$

$$y = -3x - 6$$

A. $(-2, -3)$

Student correctly solved for x as -2 , but then substituted -2 for y in the first equation, instead of x , and solved for " y " as -3 .

B. $(-2, 0)$

Correct.

C. $(2, 0)$

Student switched the signs of both slopes when graphing (graphed $y = -2x + 4$ and $y = 3x - 6$) and identified the point of intersection.

D. $(2, 8)$

Student set the equations equal to one another to get $2x + 4 = -3x - 6$, but incorrectly combined like terms to get $-x = -2$, simplified to $x = 2$, and substituted into the equation $y = 2x + 4$.

Item Id: i112712**Item Type: Multiple Select**

Standards Description:

8.EE.A.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.

Primary Standard: cc:8.EE.A.2

Points Possible: 1

Which values are solutions to the equation below?

$$b^2 = 12$$

Select **all** that apply.

- | | |
|-----------------|--|
| A. -6 | Student confused the concept of taking a square root with dividing by 2 and taking the opposite. |
| B. 6 | Student confused the concept of taking a square root with dividing by 2. |
| C. $-\sqrt{12}$ | Correct. |
| D. $\sqrt{12}$ | Correct. |
| E. -144 | Student confused the concept of taking a square root with squaring and taking the opposite. |
| F. 144 | Student confused the concept of taking a square root with squaring. |

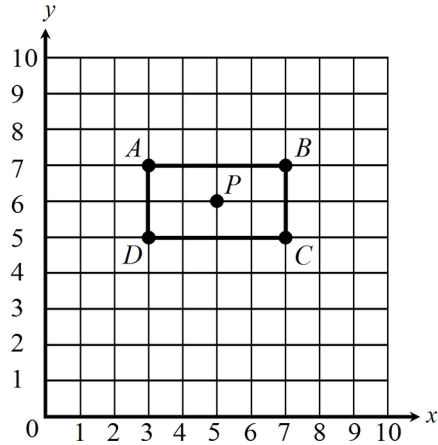
Item Id: i112343**Item Type: Selected Response**

Standards Description:

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

Primary Standard: cc:8.G.A.3

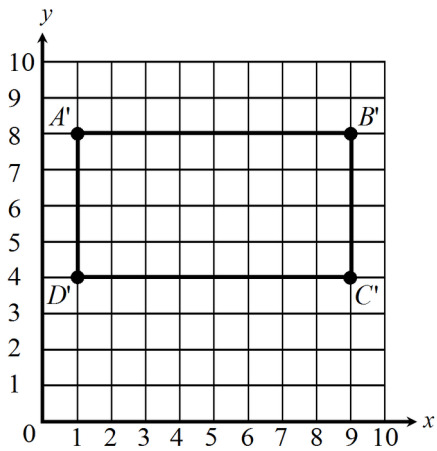
Points Possible: 1

Rectangle $ABCD$ is shown on the coordinate plane below.

The center of rectangle $ABCD$ is at the point P . Which rectangle represents a dilation from point P by a scale factor of 2?

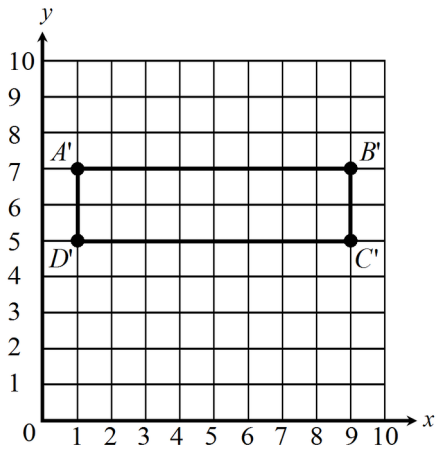
A.

Correct.



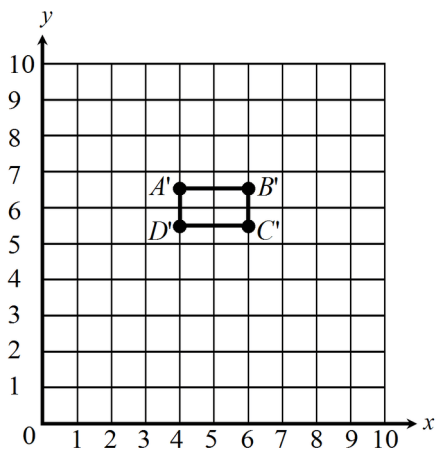
B.

Student dilated the length by a scale factor of 2, but left the width as is.



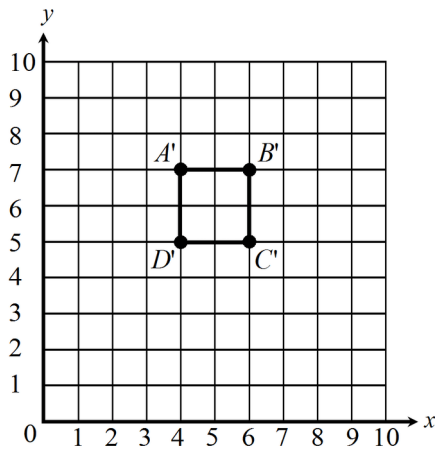
C.

Student used a scale factor of 1/2.



D.

Student dilated the length by a scale factor of $1/2$, and left the width as is.



30

Item Id: i111680**Item Type: Selected Response**

Standards Description:

8.EE.A.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.

Primary Standard: cc:8.EE.A.3

Points Possible: 1

Last year, there were 221,458,249 tons of trash collected in the United States.

What is the **best estimate** for the number of tons of trash collected in the United States last year?

A. 2×10^{-9}

Student confused the magnitude of the number of tons of trash collected, used a negative exponent to denote a very large number, and counted the number of digits in the value to determine the exponent.

B. 2×10^{-8}

Student confused the magnitude of the number of tons of trash collected and used a negative exponent to denote a very large number.

C. 2×10^8

Correct.

D. 2×10^9

Student chose a value that was too large by a power of 10; may have counted the number of digits in the number to determine the exponent.

31

Item Id: i116272**Item Type: Math Short Answer**

Standards Description:

8.EE.C.7.b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Primary Standard: cc:8.EE.C.7.b

Points Possible: 1

Solve the equation below for m .

$$3(0.3m + 6) + m = 75$$

Respond in the space provided.

*If your test is on paper, write your answer on the answer sheet.***Correct Answer:**

$$m = 30$$

Item Id: i138826**Item Type: Selected Response**

Standards Description:

8.NS.A.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $.^2$).

Primary Standard: cc:8.NS.A.2

Points Possible: 1

On a real number line, $\sqrt{71}$ is between which two integers?

A. 6 and 7

Student chose a pair of numbers that includes 7 and a number less than 7 even though 7^2 is less than 71.

B. 7 and 8

Student chose a pair of numbers that includes 8 and a number less than 8 even though 8^2 is less than 71.

C. 8 and 9

Correct.

D. 9 and 10

Student chose a pair of numbers that includes 9 and a number greater than 9 even though 9^2 is greater than 71.

Item Id: i138082**Item Type: Selected Response**

Standards Description:

8.EE.A.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.

Primary Standard: cc:8.EE.A.4

Points Possible: 1

Simplify.

$$\frac{6.0 \times 10^8}{1.2 \times 10^5}$$

A. 4.8×10^3

Student solved for the correct exponent but subtracted 1.2 from 6.0 instead of dividing 6.0 by 1.2.

B. 5.0×10^3

Correct.

C. 5.0×10^{13}

Student divided 6.0 by 1.2 correctly but added the exponents instead of subtracting them.

D. 7.2×10^{13}

Student added 6.0 and 1.2, instead of dividing 6.0 by 1.2, and added the exponents instead of subtracting them.

34

Item Id: i138303**Item Type: Constructed Response**

Standards Description:

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Standard(s) for Mathematical Practice:

MP2 Reason abstractly and quantitatively.

Students must reason quantitatively by logically coming up with examples when considering the validity of the claim made in Part A and when answering the question in Part B. Additionally, students must know and flexibly use different properties of integer exponents.

MP3 Construct viable arguments and critique the reasoning of others.

In Part A, students must critique Miles's reasoning, possibly creating counterexamples to show why the claim is not correct.

34A

Primary Standard: cc:8.EE.A.1

Points Possible: 2

Part A

Miles says that, when a is any integer greater than 0, the value of a^{-3} is always less than $-a^3$ because the exponent in a^{-3} is less than the exponent in $-a^3$. Is Miles's reasoning correct? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

If $a = 1$, then:

$$a^{-3} = 1^{-3} = \frac{1}{1^3} = 1 \text{ and } -a^3 = -1^3 = -1$$

Miles's reasoning is incorrect. When a is any integer greater than 0, a^{-3} will always equal a positive value

while $-a^3$ will always equal a negative value. So a^{-3} is always greater than $-a^3$, when a is any integer greater than 0. Therefore, a smaller exponent does not always mean a smaller value.

Evidence Statement(s):

1. Student applied properties of integer exponents to evaluate Miles's reasoning.
2. Student justified their conclusion by showing and/or explaining that a^{-3} is not always less than $-a^3$; perhaps they provided a counterexample and/or generalized that a^{-3} is always greater than $-a^3$, when a is any integer greater than 0.

Common Misconception(s):

- Student thought that raising any integer to a negative power makes that value negative.
- Student thought that raising any integer to a positive power makes that value positive.

34B

Primary Standard: cc:8.EE.A.1

Points Possible: 2

Part B

Is b^0 equivalent to 0^b , when b is any integer greater than 0? Justify your answer.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

b^0 is not equivalent to 0^b when b is any integer greater than 0 because any positive value raised to a power of 0 always equals 1, and 0 raised to any positive power always equals 0.

Evidence Statement(s):

1. Student recognized that the two expressions are not equivalent.
2. Student justified their conclusion using an understanding of the properties of integer exponents.

Common Misconception(s):

- Student thought that any number raised to a power of 0 always equals 0 instead of 1.
- Student thought that 0 raised to any positive power always equals 1 instead of 0.

Interim Assessment 4

Mathematics

Grade 8

student: _____

teacher: _____

school: _____

DIRECTIONS

In this assessment you will answer a total of 11 questions, including 2 constructed-response question(s). Mark all of your answers to the questions on the answer sheet provided.

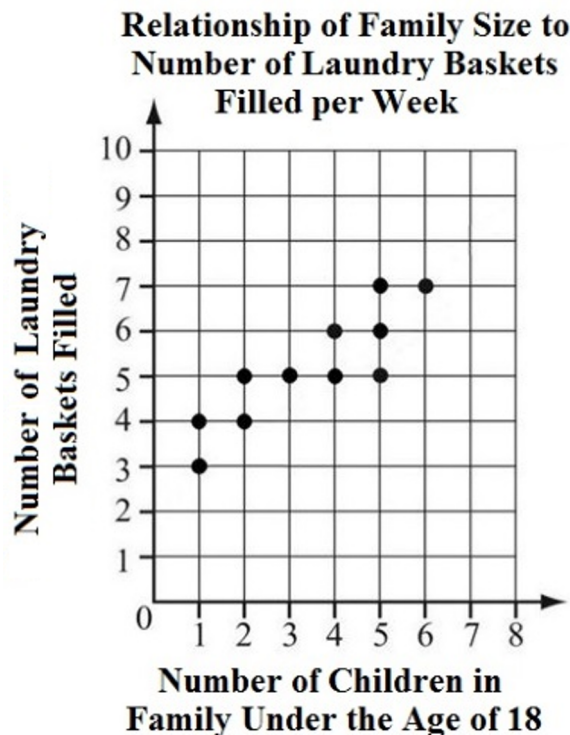
You may use this test booklet to work out the questions, but remember to mark all of your answers on the answer sheet. For constructed-response questions, record your answers directly on the page in the test booklet.

Calculator Section

You may use a calculator to solve the questions in this section.



1. A laundry detergent company did a study. It gave each family in the study a laundry basket and asked the family to record data on the number of times the basket was filled each week. The scatter plot below shows the data collected.



The equation $y = \frac{3}{5}x + 3$ was used to model the data collected. Which statement **best** represents the graph and the equation?

- A. A family with zero children is predicted to fill about $\frac{3}{5}$ of a laundry basket each week.
- B. A family with zero children is predicted to fill about 3 laundry baskets each week.
- C. A family is predicted to fill about $\frac{3}{5}$ of a laundry basket more per week for every 3 children.
- D. A family is predicted to fill about 3 more laundry baskets per week for each additional child.

2. The two-way table of row relative frequencies below shows the results of a survey about food preference for pets.

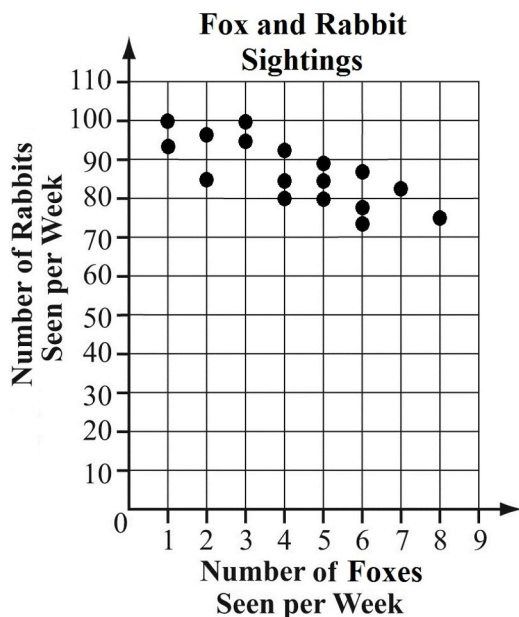
Pets and Food Preference

	Prefer Dry Food	Prefer Wet Food	Total
Dog	0.31	0.69	1.00
Cat	0.30	0.70	1.00

Based on the row relative frequencies in the table above, which statement is true?

- A. There is an association between type of pet and food preference because the row relative frequencies are similar for the dog and cat rows.
- B. There is an association between type of pet and food preference because the row relative frequencies are not similar for the dog and cat rows.
- C. There is not an association between type of pet and food preference because the row relative frequencies are similar for the dog and cat rows.
- D. There is not an association between type of pet and food preference because the row relative frequencies are not similar for the dog and cat rows.

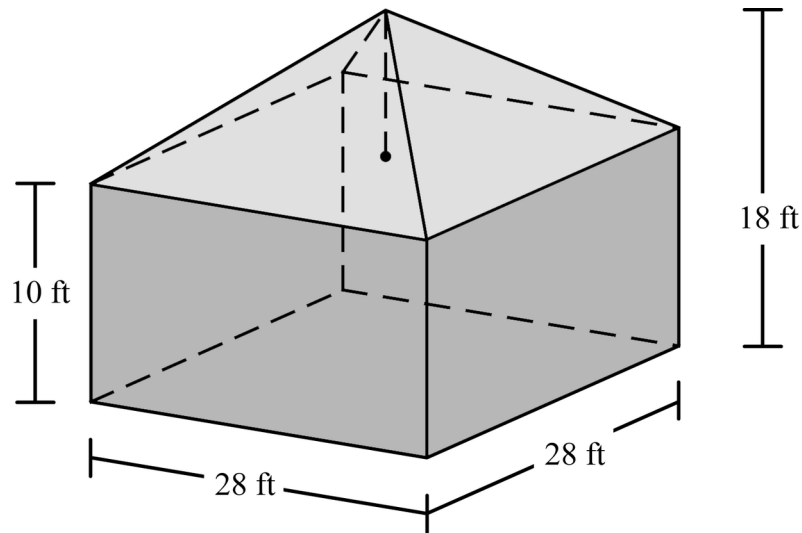
3. A group of farmers collected data on the number of foxes and the number of rabbits seen on their properties per week. The scatter plot below shows the data they collected.



The farmers used the equation $y = -3x + 100$ to model the data collected. Based on the equation, which statement is true?

- A. Each additional fox is associated with 3 more rabbits.
- B. Each additional fox is associated with 3 fewer rabbits.
- C. Each additional fox is associated with 100 more rabbits.
- D. Each additional fox is associated with 100 fewer rabbits.

4. Glen is building a roof for a garage with the dimensions shown below.



The figure is not drawn to scale.

What is the surface area of the roof, in square feet? Round your answer to the nearest hundredth. Show all the steps you took to solve the problem.

Respond in the space provided.

5. A random group of students was surveyed about their vegetable preferences. The results are displayed in the table below.

Vegetable Preferences

	Broccoli	Carrots	Peas	Total
7th graders	7	44	5	56
8th graders	14	36	24	74
Total	21	80	29	130

What proportion of the students who prefer carrots are 7th graders?

- A. 0.34
- B. 0.44
- C. 0.55
- D. 0.79

6. Carlos collected data from a group of students and wrote the equation shown below to model the relationship between the weekly allowance, d , in dollars, and the age, y , in years, of the students.

$$d = 0.56y + 2.8$$

Based on Carlos's equation, which is the **closest** approximation of the difference between the weekly allowances, in dollars, for a 9-year-old student and a 10-year-old student?

- A. \$0.50
- B. \$2.25
- C. \$3.00
- D. \$3.50

7. The two-way table below shows the results of a school survey about the students' siblings and pets.

Students' Siblings and Pets

	Students with Pets	Students with No Pets	Total
Students with Siblings	45	135	180
Students with No Siblings	39	21	60
Total	84	156	240

Ariel claims that students with siblings are more likely to have pets than students with no siblings. Is Ariel's claim correct? Justify your answer using relative frequencies.

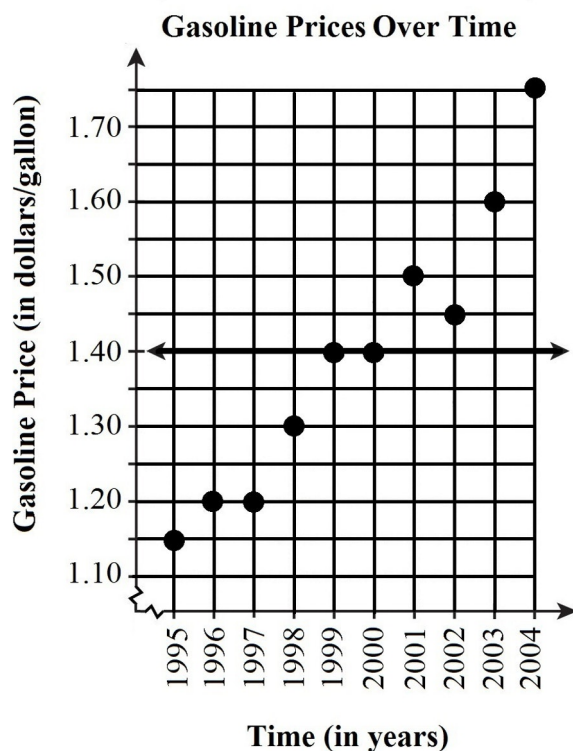
Respond in the space provided.

Non-Calculator Section

You may **not** use a calculator to solve the questions in this section.



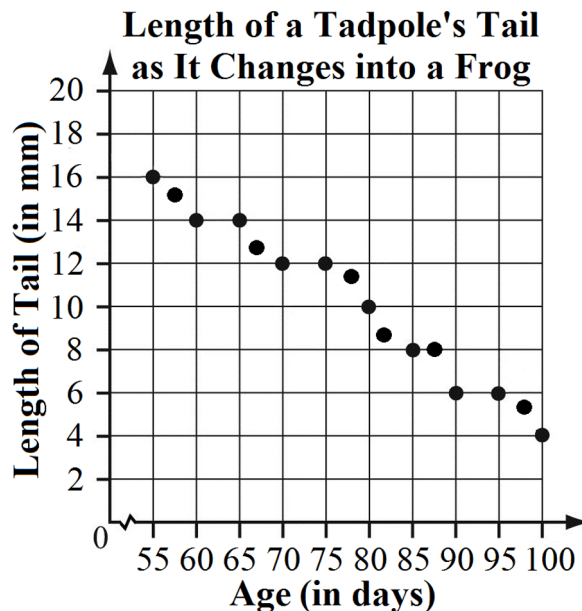
8. Gokul records historical data for gasoline prices to the nearest five cents in the graph and draws a line of best fit.



Which statement is true?

- A. The line is not the line of best fit because it should pass through (1995, 1.15) and (2004, 1.75).
- B. The line is not the line of best fit because there could be a line drawn that would be closer to more points.
- C. The line is the line of best fit because it passes through points that are in the middle of the data set.
- D. The line is the line of best fit because half of the points are above the line and half of the points are below the line.

9. The scatter plot below shows the relationship between the length of a tadpole's tail, in mm, and the age, in days, of the tadpole as it changes into a frog.

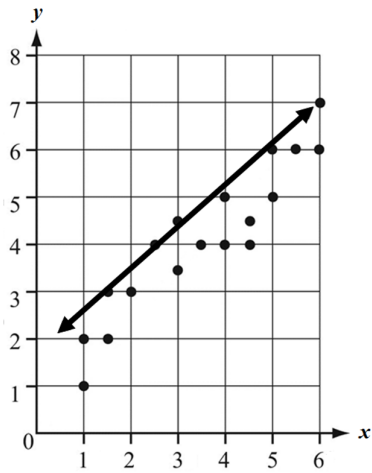


Which statement about the scatter plot above is true?

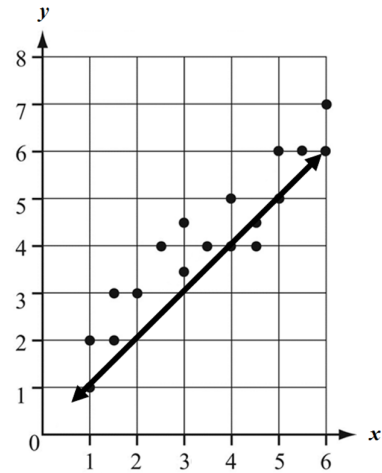
- A. There is a nonlinear association between the tadpole's age and the length of its tail; as the age increases, the length decreases.
- B. There is a positive linear association between the tadpole's age and the length of its tail; as the age increases, the length increases.
- C. There is a negative linear association between the tadpole's age and the length of its tail; as the age increases, the length increases.
- D. There is a negative linear association between the tadpole's age and the length of its tail; as the age increases, the length decreases.

10. Which graph has a line that represents the **best** fit for the recorded data?

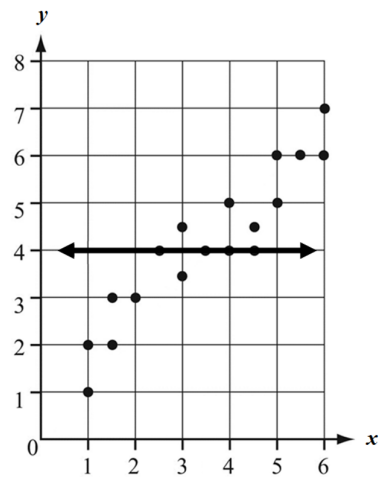
A.



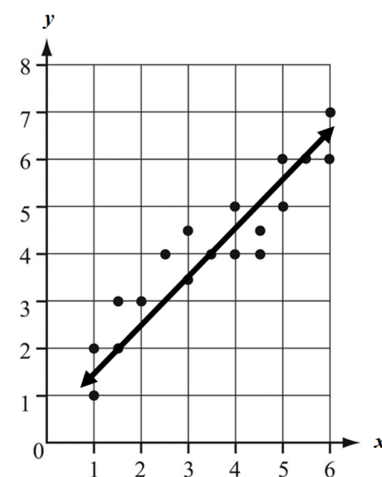
C.



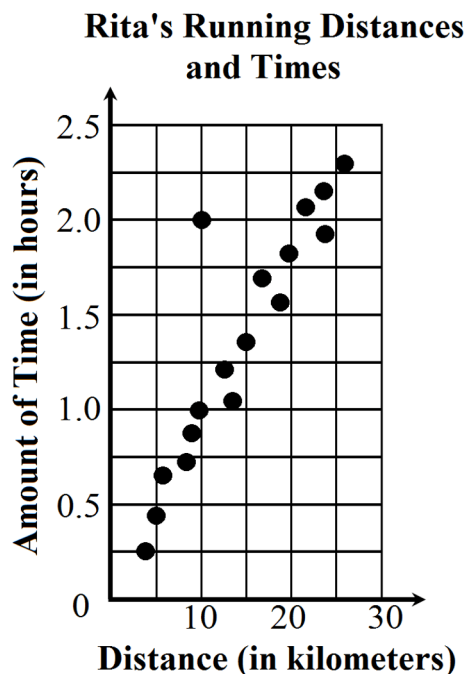
B.



D.



11. Rita is a runner. She records the amounts of time that it takes her to run different distances in the scatter plot below.



Which statements are true?

Select **all** that apply.

- A. There is at least one outlier represented in the scatter plot.
- B. There is a linear association between distance and time in the scatter plot.
- C. There is a nonlinear association between distance and time in the scatter plot.
- D. There is a positive association between distance and time in the scatter plot.
- E. There is a negative association between distance and time in the scatter plot.

Assessment Analysis Guide
Interim Assessment 4
Mathematics
Grade 8

1

Item Id: i112163

Item Type: Selected Response

Standards Description:

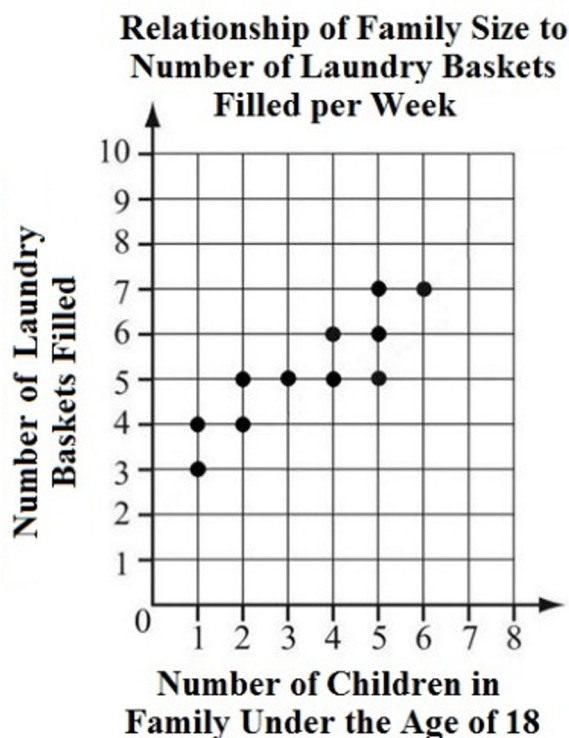
8.SP.A.3

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

Primary Standard: cc:8.SP.A.3

Points Possible: 1

A laundry detergent company did a study. It gave each family in the study a laundry basket and asked the family to record data on the number of times the basket was filled each week. The scatter plot below shows the data collected.



The equation $y = \frac{3}{5}x + 3$ was used to model the data collected. Which statement **best** represents the graph and the equation?

A. A family with zero children is predicted to fill about $\frac{3}{5}$ of a laundry basket each week.

Student interpreted the slope as the y-intercept.

B. A family with zero children is predicted to fill about 3 laundry baskets each week.

Correct.

C. A family is predicted to fill about $\frac{3}{5}$ of a laundry basket more per week for every 3 children.

Student interpreted the slope correctly but interpreted the y-intercept as the change in x-values.

D. A family is predicted to fill about 3 more laundry baskets per week for each additional child.

Student interpreted the y-intercept as the slope.

Item Id: i112326**Item Type: Selected Response**

Standards Description:

8.SP.A.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.

Primary Standard: cc:8.SP.A.4

Points Possible: 1

The two-way table of row relative frequencies below shows the results of a survey about food preference for pets.

Pets and Food Preference

	Prefer Dry Food	Prefer Wet Food	Total
Dog	0.31	0.69	1.00
Cat	0.30	0.70	1.00

Based on the row relative frequencies in the table above, which statement is true?

- A. There is an association between type of pet and food preference because the row relative frequencies are similar for the dog and cat rows. Student may have thought that having similar row relative frequencies meant there is an association.
- B. There is an association between type of pet and food preference because the row relative frequencies are not similar for the dog and cat rows. Student may have known that having relative frequencies that are not similar means there is an association, but they compared the relative frequencies as though they were column relative frequencies.
- C. There is not an association between type of pet and food preference because the row relative frequencies are similar for the dog and cat rows.** Correct.

D. There is not an association between type of pet and food preference because the row relative frequencies are not similar for the dog and cat rows.

Student may have compared the relative frequencies as though they were column relative frequencies and thought that having relative frequencies that are not similar meant that there is not an association.

Item Id: i116542

Item Type: Selected Response

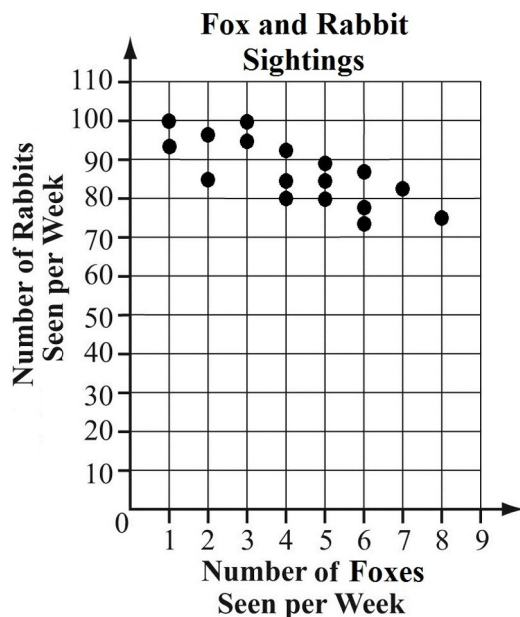
Standards Description:

8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

Primary Standard: cc:8.SP.A.3

Points Possible: 1

A group of farmers collected data on the number of foxes and the number of rabbits seen on their properties per week. The scatter plot below shows the data they collected.



The farmers used the equation $y = -3x + 100$ to model the data collected. Based on the equation, which statement is true?

A. Each additional fox is associated with 3 more rabbits.

Student correctly identified the slope, but interpreted the relative decrease in the number of rabbits as an increase.

B. Each additional fox is associated with 3 fewer rabbits.

Correct.

C. Each additional fox is associated with 100 more rabbits.

Student interpreted the y-intercept as the slope and interpreted the relative decrease in the number of rabbits as an increase.

D. Each additional fox is associated with 100 fewer rabbits.

Student interpreted the y-intercept as the slope, but did correctly identify a decrease in the number of rabbits, not an increase.

Item Id: i111750**Item Type: Constructed Response**

Standards Description:

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

Standard(s) for Mathematical Practice:

MP1 Make sense of problems and persevere in solving them.

In this item, students are not provided with scaffolding and must look for an entry point to answer the multi-step question. Students must identify missing dimensions and determine an appropriate solution pathway that involves identifying a right triangle within the diagram of the three-dimensional roof.

MP4 Model with mathematics.

This item requires students to apply mathematics to solve a complex real-world problem. Students must identify important quantities in a practical situation and map their relationships using a diagram.

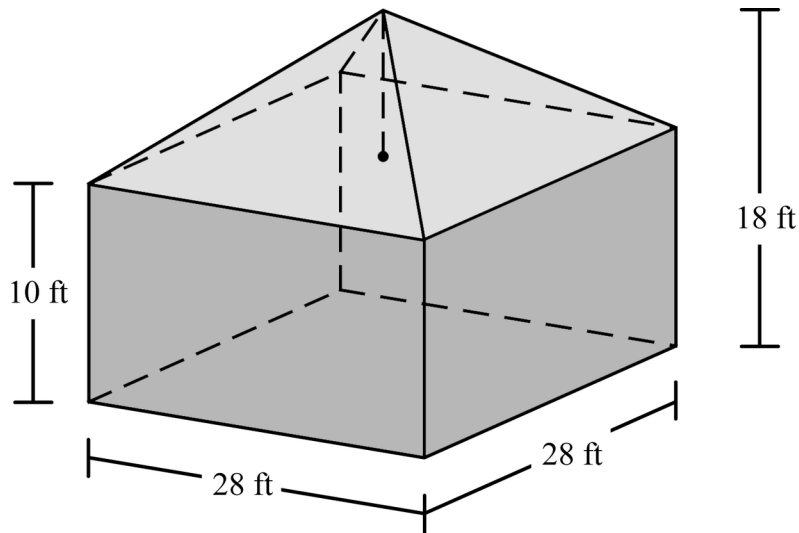
MP5 Use appropriate tools strategically.

In this item, students are likely to create a visual model or label the diagram given to help determine a solution pathway. Students also apply the Pythagorean Theorem to find the height of the triangles.

Primary Standard: cc:8.G.B.7

Points Possible: 4

Glen is building a roof for a garage with the dimensions shown below.



The figure is not drawn to scale.

What is the surface area of the roof, in square feet? Round your answer to the nearest hundredth. Show all the steps you took to solve the problem.

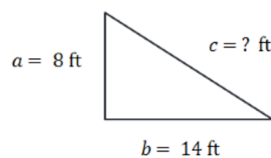
Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

$$a = 18 - 10 = 8 \text{ ft}$$

$$b = 28 \div 2 = 14 \text{ ft}$$



$$a^2 + b^2 = c^2$$

$$8^2 + 14^2 = c^2$$

$$64 + 196 = c^2$$

c is approximately equal to 16.12 ft

So, the height of each of the 4 triangles that make up the roof is about 16.12 ft.

The area of one of the triangles of the roof is:

$$A = \frac{1}{2} bh$$

$$A = \frac{1}{2} (28)(16.12)$$

$$A = 225.68 \text{ ft}^2$$

$$225.68 \times 4 = 902.72 \text{ ft}^2$$

The surface area of the roof is about 902.72 ft^2 .

Evidence Statement(s):

1. Student determined a solution pathway that involves identifying a right triangle in the diagram of the three-dimensional roof with legs that represent the height of the roof and half the length of the base of the garage.
2. Student applied the Pythagorean Theorem to determine the length of the hypotenuse of the right triangle, and recognized that the length of the hypotenuse is also the height of the triangles that make up the roof.
3. Student solved a real-world problem and determined the surface area of the three-dimensional roof.

Common Misconception(s):

- Student used the length of the garage as a leg of the triangle instead of using half the length.
- Student found the length of a leg of the triangle that makes up the roof (using the length and width of the garage) and used it to find the surface area of the roof, instead of finding the heights.
- Student did not find the height of the pyramid (8 ft) that represents the roof, and instead used 10 ft or 18 ft as the height.
- Student incorrectly applied the Pythagorean Theorem, perhaps using $a^2 + b^2 = c$ or $a + b = c$.
- Student found the area of one of the triangles that makes up the roof, instead of all four triangles, when calculating the surface area of the roof.

5

Item Id: i156006**Item Type: Selected Response**

Standards Description:

8.SP.A.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.

Primary Standard: cc:8.SP.A.4

Points Possible: 1

A random group of students was surveyed about their vegetable preferences. The results are displayed in the table below.

Vegetable Preferences

	Broccoli	Carrots	Peas	Total
7th graders	7	44	5	56
8th graders	14	36	24	74
Total	21	80	29	130

What proportion of the students who prefer carrots are 7th graders?

A. 0.34

Student found the proportion of 7th grade students who prefer carrots out of the total number of students ($44/130$) and rounded to the nearest hundredth.

B. 0.44

Student identified the frequency (44) of the 7th grade students who prefer carrots, not the column relative frequency, and wrote it as a decimal.

C. 0.55

Correct.

D. 0.79

Student found the proportion of 7th grade students who prefer carrots ($44/56$), instead of the proportion of students who prefer carrots that are 7th graders, and rounded to the nearest hundredth.

6

Item Id: i116434**Item Type: Selected Response**

Standards Description:

8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

Primary Standard: cc:8.SP.A.3

Points Possible: 1

Carlos collected data from a group of students and wrote the equation shown below to model the relationship between the weekly allowance, d , in dollars, and the age, y , in years, of the students.

$$d = 0.56y + 2.8$$

Based on Carlos's equation, which is the **closest** approximation of the difference between the weekly allowances, in dollars, for a 9-year-old student and a 10-year-old student?

A. \$0.50

Correct.

B. \$2.25

Student subtracted the slope from the y-intercept and rounded 2.24 to 2.25.

C. \$3.00

Student chose an approximation of the y-intercept instead of the slope.

D. \$3.50

Student added the slope and the y-intercept and rounded 3.36 up to 3.5.

Item Id: i112549**Item Type: Constructed Response**

Standards Description:

8.SP.A.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.

Standard(s) for Mathematical Practice:

MP3 Construct viable arguments and critique the reasoning of others.

In this item, students must distinguish correct logic or reasoning from that which is flawed when evaluating Ariel's claim.

MP4 Model with mathematics.

Students must identify important quantities in the two-way table and interpret the relationship between these quantities in order to draw a conclusion.

MP6 Attend to precision.

Students must communicate precisely about how the relative frequencies they calculated justify their conclusion.

Primary Standard: cc:8.SP.A.4

Points Possible: 2

The two-way table below shows the results of a school survey about the students' siblings and pets.

Students' Siblings and Pets

	Students with Pets	Students with No Pets	Total
Students with Siblings	45	135	180
Students with No Siblings	39	21	60
Total	84	156	240

Ariel claims that students with siblings are more likely to have pets than students with no siblings. Is Ariel's

claim correct? Justify your answer using relative frequencies.

Respond in the space provided.

Exemplar Student Response:

Equivalent answers and alternate explanations are also accepted. When prompted, answers may vary due to rounding or estimation.

Students with siblings who have pets:

$$\frac{45}{180} = \frac{1}{4} = 25\%$$

Students with no siblings who have pets:

$$\frac{39}{60} = \frac{13}{20} = 65\%$$

No, Ariel's claim is not correct. The relative frequency of students with siblings who have pets is 25%, which is much lower than the relative frequency of students with no siblings who have pets, which is 65%.

Evidence Statement(s):

1. Student correctly calculated the row relative frequencies for students with siblings who have pets and for students with no siblings who have pets.
2. Student used the calculated row relative frequencies to evaluate Ariel's claim and describe the association between siblings and pets.

Common Misconception(s):

- Student compared the number of students with siblings who have pets (45) to the number of students with no siblings who have pets (39) without calculating the row relative frequencies.
- Student used either the column totals or the table total when calculating the relative frequencies, instead of the row totals.
- Student calculated the correct row relative frequencies but concluded that Ariel's claim is correct; perhaps thought that the closer the relative frequency is to 0, the more likely the situation.

Item Id: i112797

Item Type: Selected Response

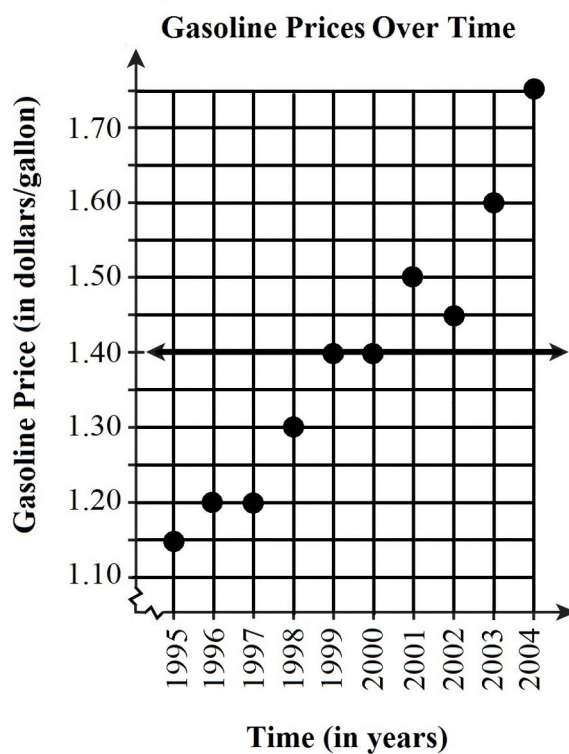
Standards Description:

8.SP.A.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.

Primary Standard: cc:8.SP.A.2

Points Possible: 1

Gokul records historical data for gasoline prices to the nearest five cents in the graph and draws a line of best fit.



Which statement is true?

A. The line is not the line of best fit because it should pass through (1995, 1.15) and (2004, 1.75).

Student identified that the line of best fit is not correct, but thought that the line of best fit always goes through the first and last points of the data set.

B. The line is not the line of best fit because there could be a line drawn that would be closer to more points. Correct.

C. The line is the line of best fit because it passes through points that are in the middle of the data set.

Student chose a statement that is not true because the line does not represent a majority of the data points.

D. The line is the line of best fit because half of the points are above the line and half of the points are below the line.

Student chose a statement that would be true if the line of best fit matched the trajectory of the points.

Item Id: i116540

Item Type: Selected Response

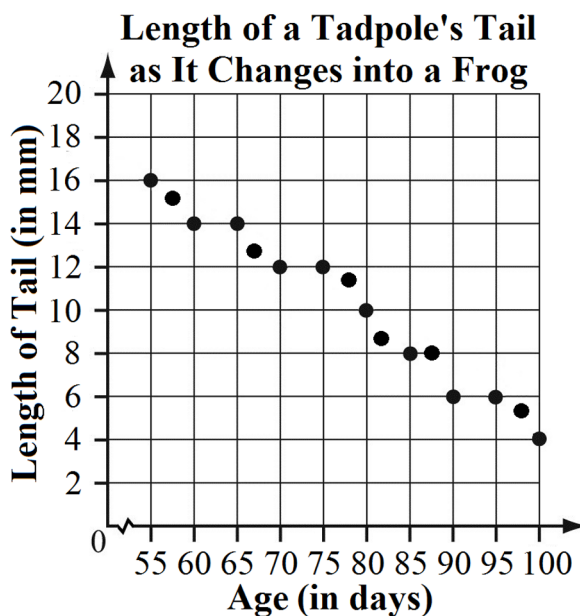
Standards Description:

8.SP.A.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.

Primary Standard: cc:8.SP.A.1

Points Possible: 1

The scatter plot below shows the relationship between the length of a tadpole's tail, in mm, and the age, in days, of the tadpole as it changes into a frog.



Which statement about the scatter plot above is true?

A. There is a nonlinear association between the tadpole's age and the length of its tail; as the age increases, the length decreases.

Student identified a reason that correctly describes the data, but incorrectly identified the pattern with "nonlinear."

B. There is a positive linear association between the tadpole's age and the length of its tail; as the age increases, the length increases.

Student chose a definition and rationale that are not represented by the data in the scatter plot; perhaps confused a decrease in length with an increase.

C. There is a negative linear association between the tadpole's age and the length of its tail; as the age increases, the length increases.

Student correctly chose a negative linear association, but confused a decrease in length with an increase.

D. There is a negative linear association between the tadpole's age and the length of its tail; as the age increases, the length decreases.

Correct.

10

Item Id: i112486

Item Type: Selected Response

Standards Description:

8.SP.A.2

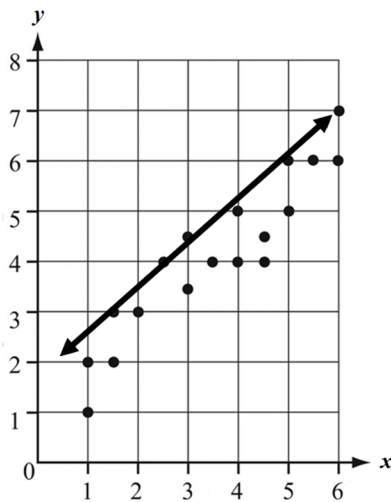
Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Primary Standard: cc:8.SP.A.2

Points Possible: 1

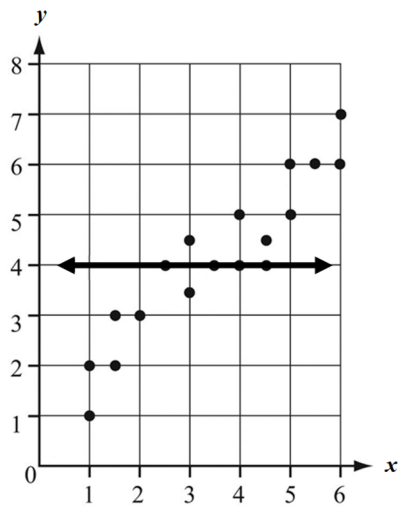
Which graph has a line that represents the **best** fit for the recorded data?

A.



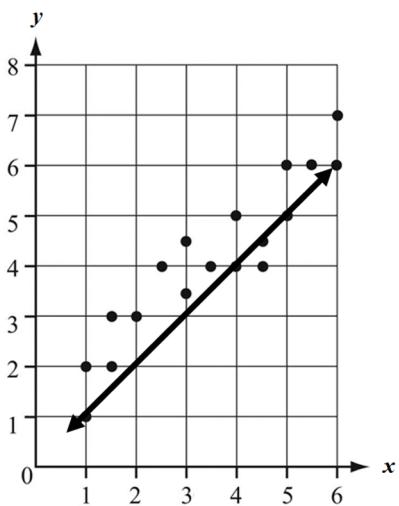
Student chose a line of best fit that connects the uppermost points, but that does not fit a majority of the data.

B.



Student chose a line of best fit that "splits" the data horizontally, so that about half of the data points fall above the line and about half of the data points fall below the line.

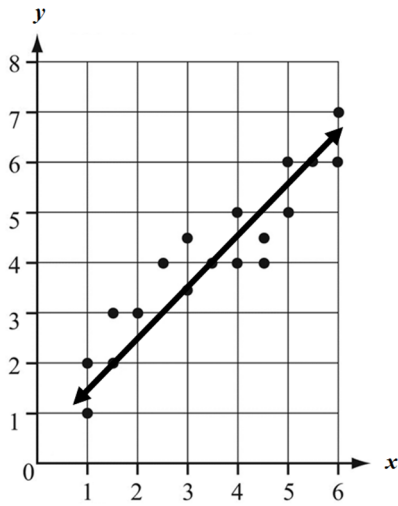
C.



Student chose a line of best fit that connects the lowermost points, but that does not fit a majority of the data.

D.

Correct.



Item Id: i112975

Item Type: Multiple Select

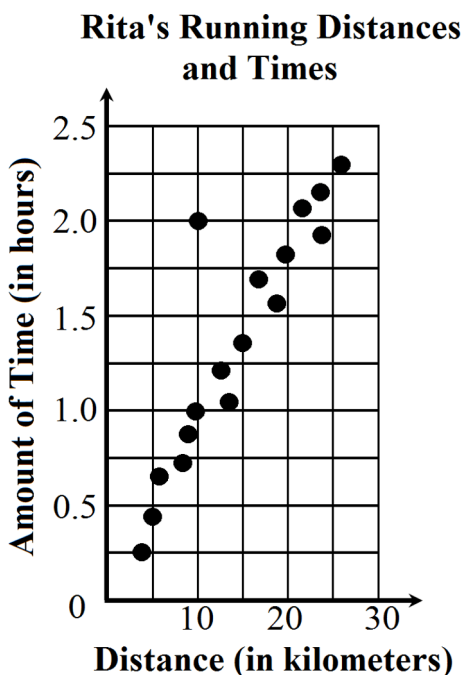
Standards Description:

8.SP.A.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.

Primary Standard: cc:8.SP.A.1

Points Possible: 2

Rita is a runner. She records the amounts of time that it takes her to run different distances in the scatter plot below.



Which statements are true?

Select **all** that apply.

A. There is at least one outlier represented in the scatter plot. Correct.

- B. There is a linear association between distance and time in the scatter plot.** Correct.
- C. There is a nonlinear association between distance and time in the scatter plot. Student confused a nonlinear association with a linear association; perhaps thought that a linear association meant that all points are arranged in a perfect line.
- D. There is a positive association between distance and time in the scatter plot.** Correct.
- E. There is a negative association between distance and time in the scatter plot. Student confused a negative association with a positive association.