Bluebonnet Learning
Secondary Mathematics
EDITION 1

Grade 8

Assessments

STUDENT EDITION

Acknowledgment

Thank you to all the Texas educators and stakeholders who supported the review process and provided feedback. These materials are the result of the work of numerous individuals, and we are deeply grateful for their contributions.

Notice

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GRADE 8

MODULE 1

Transforming Geometric Objects

Name _____ Date _____

1. Koda drew a triangle with coordinates (1, 3), (3, 2), and (4, 2). She drew an image of the triangle with coordinates (−1, 3), (−3, 2), and (−4, 2). Which rule describes the transformation?

   A. $(x, y) \rightarrow (-x, y)$

   B. $(x, y) \rightarrow (x, -y)$

   C. $(x, y) \rightarrow (x - 2, y)$

   D. $(x, y) \rightarrow (x, y - 2)$

2. Michael draws a square on a coordinate plane. Then, he draws an image of the square 3 units to the right of the original square. Which statements are true? Select **TWO** correct answers.

   F. Each side length of the image is 3 times the corresponding side length of the original figure.

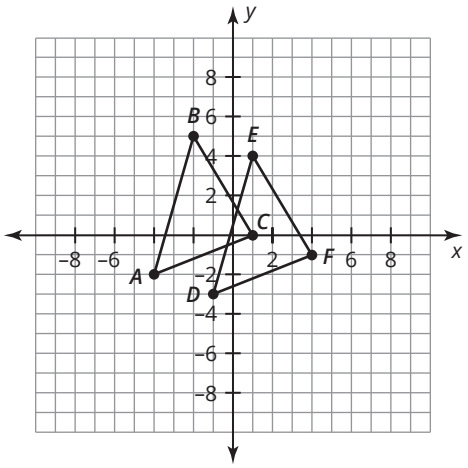
   G. The orientation of the original figure and image are the same.

   H. The area of the image is larger than the area of the original figure.

   J. The corresponding angle measures of the original figure and the image are equal.

   K. Each angle measure of the image is 9 times the corresponding angle measure of the original figure.

3. Which rule best describes the transformation used to create $\triangle DEF$ from $\triangle ABC$?



A. $(x, y) \rightarrow (-x, y)$

B. $(x, y) \rightarrow (x + 3, y - 1)$

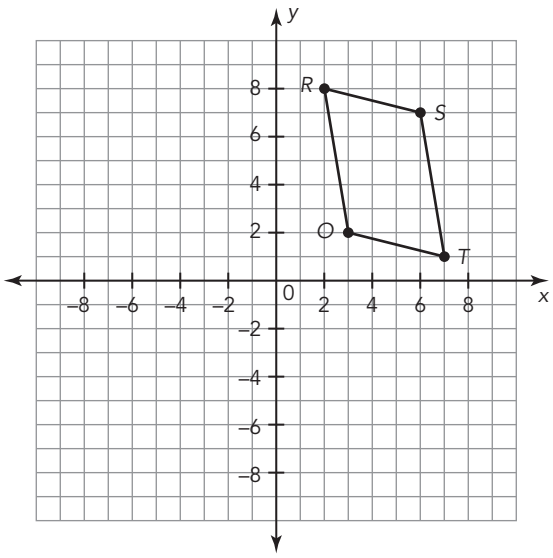
C. $(x, y) \rightarrow (-y, x)$

D. $(x, y) \rightarrow (x + 1, y - 3)$

4. Triangle PQR is translated 4 units right and 7 units down. Write a rule that describes this transformation.

5. A transformation is applied to a figure to create a new figure on the coordinate grid. Which type(s) of transformation preserve(s) congruence? Explain your reasoning.

6. Parallelogram *RSTO* is translated 4 units down and 5 units to the left to form Parallelogram *R′S′T′O′*. Which statement is true?



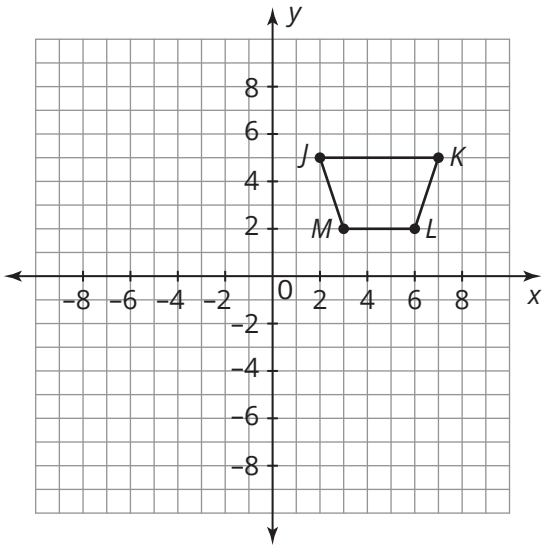
F. Each side length of Parallelogram *RSTO* is 2 times the corresponding side length of Parallelogram *R′S′T′O′*.

G. The sum of the angle measures of Parallelogram *RSTO* is greater than the sum of the angle measures of Parallelogram *R′S′T′O′*.

H. Each side length of Parallelogram *RSTO* is $\frac{1}{2}$ times the corresponding side length of Parallelogram *R′S′T′O′*.

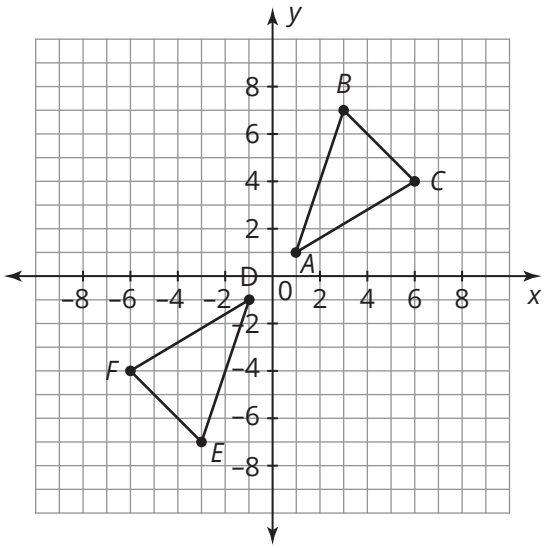
J. Parallelogram *RSTO* is congruent to Parallelogram *R′S′T′O′*.

7. Consider Trapezoid *JKLM*.



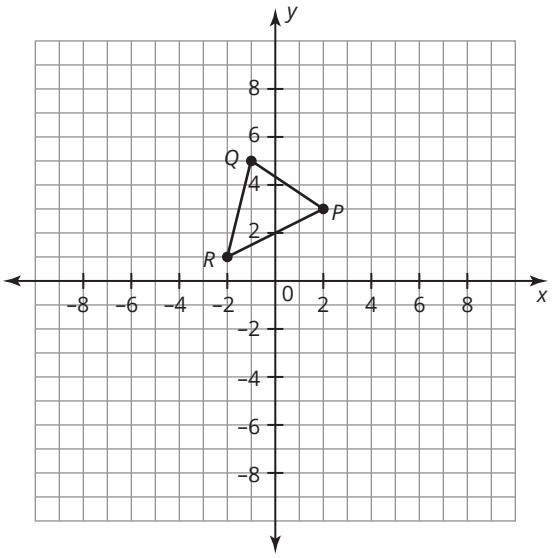
Reflect Trapezoid *JKLM* over the *x*-axis and write the algebraic rule to describe this transformation.

8. Consider $\triangle DEF$ and $\triangle ABC$. The triangles are congruent.



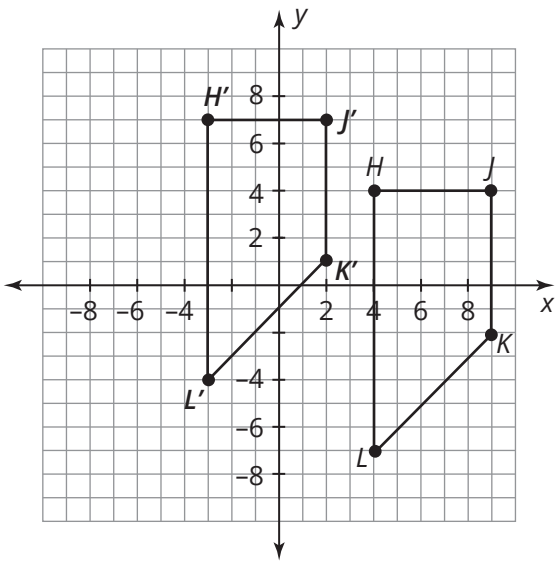
Describe the transformation and write the algebraic rule used to create $\triangle DEF$ from $\triangle ABC$.

9. Consider $\triangle PQR$.



When you translate $\triangle PQR$ 8 units to the left and 3 units down to form $\triangle UVW$, what would be the ordered pairs of the corresponding vertices? Write the algebraic rule for the transformation.

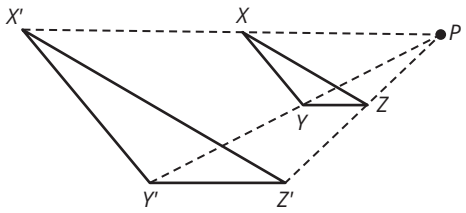
10. Trapezoid *HJKL* was transformed to create Trapezoid *H′J′K′L′*.



The transformation is represented by the rule $(x, y) \rightarrow (x + a, y + b)$, what is the value of a?

Name _____ Date _____

1. Triangle XYZ has been enlarged with P as the center of dilation to form $\triangle X'Y'Z'$.



Which **TWO** conclusions are correct?

A. $\frac{XY}{X'Y'} = \frac{YZ}{Y'Z'} = \frac{XZ}{X'Z'}$

B. $\triangle X'Y'Z' \cong \triangle XYZ$

C. $\frac{YZ}{Y'Z'} = \frac{XZ}{X'Y'} = \frac{XY}{X'Z'}$

D. $X'X = Y'Y = Z'Z$

E. $\triangle X'Y'Z' \sim \triangle XYZ$

2. Write an algebraic rule for a transformation on the coordinate grid that does NOT preserve congruence. Explain your reasoning.

3. A trapezoidal door mat is similar in shape to a trapezoidal rug. Each dimension of the door mat is $\frac{1}{3}$ the size of the rug. Which statement is true?

F. The area of the door mat is $\frac{1}{6}$ the area of the rug.

G. The area of the door mat is $\frac{1}{9}$ the area of the rug.

H. The perimeter of the door mat is $\frac{1}{6}$ the perimeter of the rug.

J. The perimeter of the door mat is $\frac{1}{9}$ the perimeter of the rug.

4. A polygon is graphed on a coordinate plane with (x, y) representing the location of a certain point on the polygon. The polygon is transformed using the rule $(x, y) \rightarrow (ax, ay)$. Which statement must **NOT** be true?

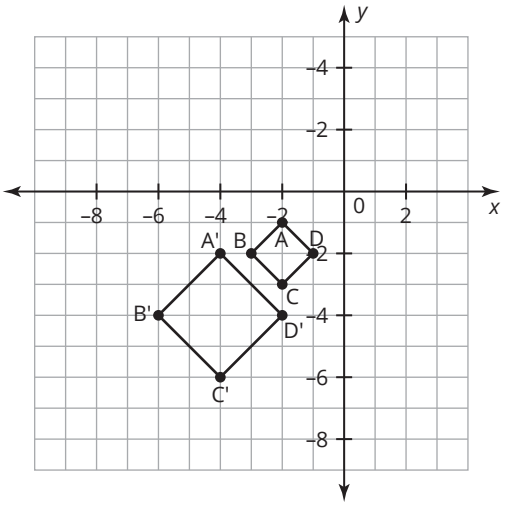
A. If a is greater than 1, the image of the polygon is larger than the original polygon.

B. If a is between 0 and 1, the image of the polygon is smaller than the original polygon.

C. If a is greater than 1, the image of the polygon is smaller than the original polygon.

D. If a is equal to 1, the image of the polygon is congruent to the original polygon.

5. Quadrilateral $ABCD$ is dilated with the origin as the center of dilation to create Quadrilateral $A'B'C'D'$.



Which rule best represents this transformation?

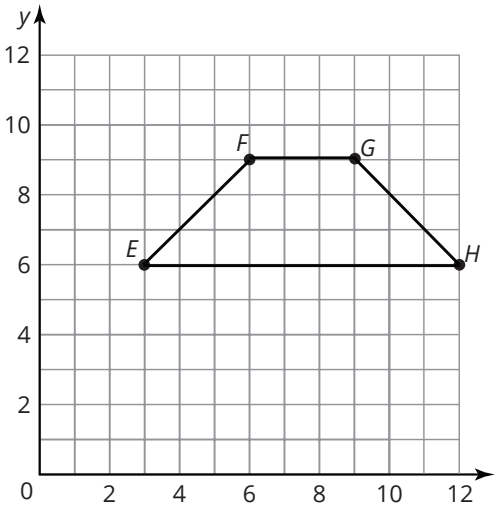
F. $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

G. $(x, y) \rightarrow (3x - 5, 3y - 5)$

H. $(x, y) \rightarrow \left(x, \frac{5}{2}y\right)$

J. $(x, y) \rightarrow (2x, 2y)$

6. Trapezoid *EFGH* is transformed according to the rule $(x, y) \rightarrow \left(\frac{1}{3}x, \frac{1}{3}y\right)$ to create Trapezoid *E′F′G′H′*.



Which statement is true?

A. The side lengths of Trapezoid *E′F′G′H′* are three times the corresponding side lengths of Trapezoid *EFGH*.

B. The angle measures of Trapezoid *E′F′G′H′* are greater than the corresponding angle measures in Trapezoid *EFGH*.

C. The side lengths of Trapezoid *E′F′G′H′* are $\frac{1}{3}$ times the corresponding side lengths of Trapezoid *EFGH*.

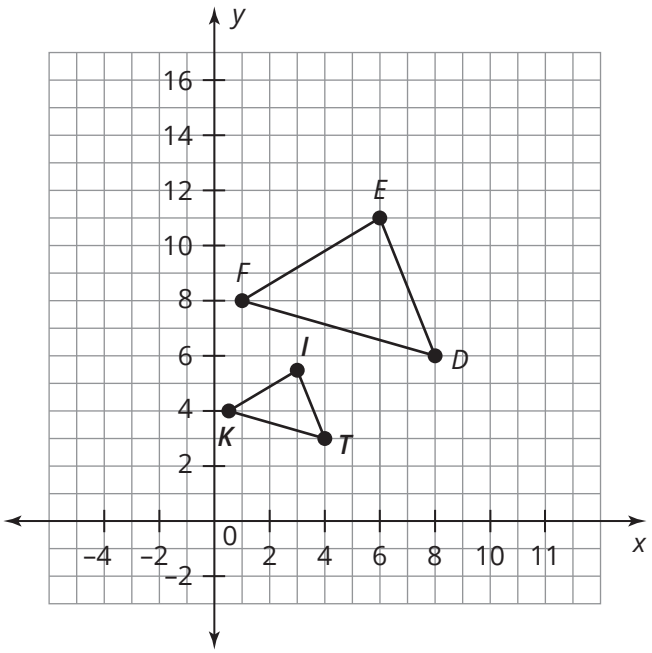
D. The angle measures of Trapezoid *E′F′G′H′* are less than the corresponding angle measures of Trapezoid *EFGH*.

7. Suppose that $\triangle FAR$ is similar to $\triangle TIP$. Identify the corresponding sides and state the relationship between the lengths of the corresponding sides.

8. Rectangle $QRST$ has coordinates $Q(-8, 5)$, $R(-8, 7)$, $S(-5, 7)$, and $T(-5, 5)$. Dilate the rectangle by a scale factor of 4 with a center of dilation at the origin. Write a rule to describe this transformation and use the rule to determine the coordinates of Rectangle $Q'R'S'T'$.

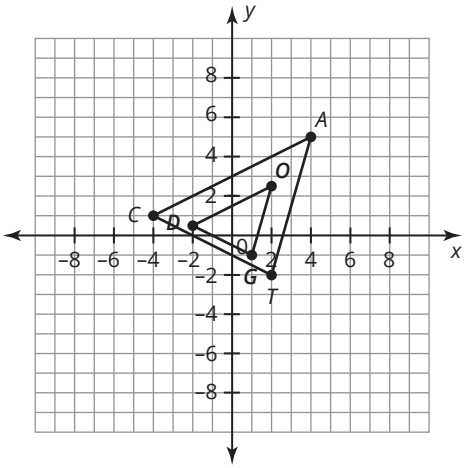
9. $\triangle FED$ has vertices with coordinates $F(1, 8)$, $E(6, 11)$, and $D(8, 6)$.

The dilation of $\triangle FED$ using the origin as the center of dilation and a scale factor of $\frac{1}{2}$ forms $\triangle KIT$.

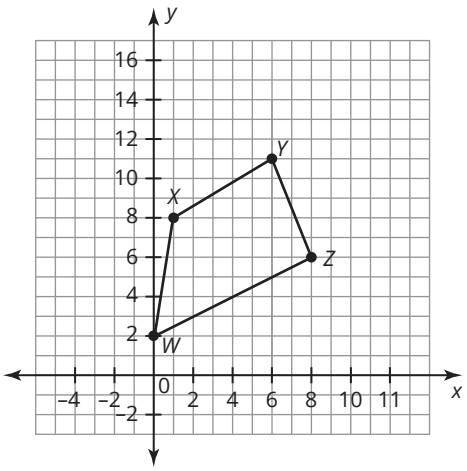


Describe the perimeter and area of $\triangle KIT$ in relation to $\triangle FED$.

10. Triangle *CAT* is dilated using the origin as the center of dilation to form △*DOG*. What is the scale factor?



11. Quadrilateral *WXYZ* is shown on the coordinate grid. Dilate the quadrilateral with the origin as the center of dilation using the rule $(x, y) \rightarrow (1.5x, 1.5y)$ to graph Quadrilateral *W′X′Y′Z′*.



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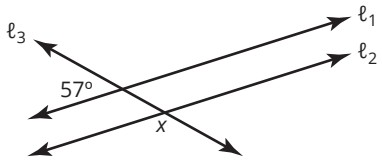
1. In the figure shown, $\ell_1 \parallel \ell_2$.



What is the value of x?

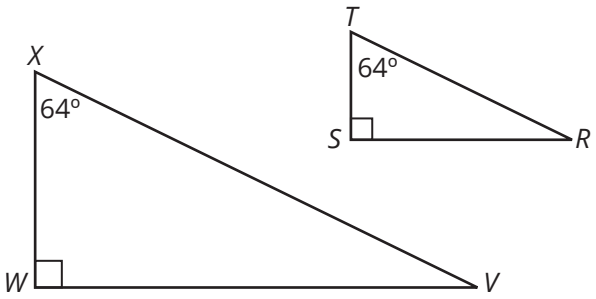
A. 147°

B. 57°

C. 123°

D. 33°

2. Which conclusion about the two triangles shown is correct?



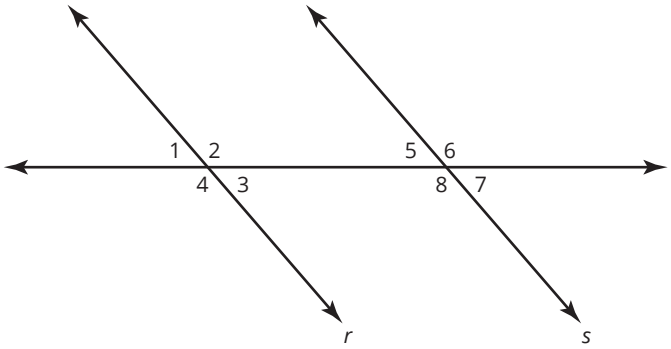
F. $\triangle VWX \sim \triangle RST$ by the AA Similarity theorem.

G. $\triangle VXW \sim \triangle TRS$ by the AA Similarity theorem.

H. The triangles are not similar.

J. There is not enough information to determine whether the triangles are similar.

3. In the figure shown, $r \parallel s$.



If the m∠1 is 34°, which statements are true?

A. The m∠6 is also 34° because corresponding angles are congruent.

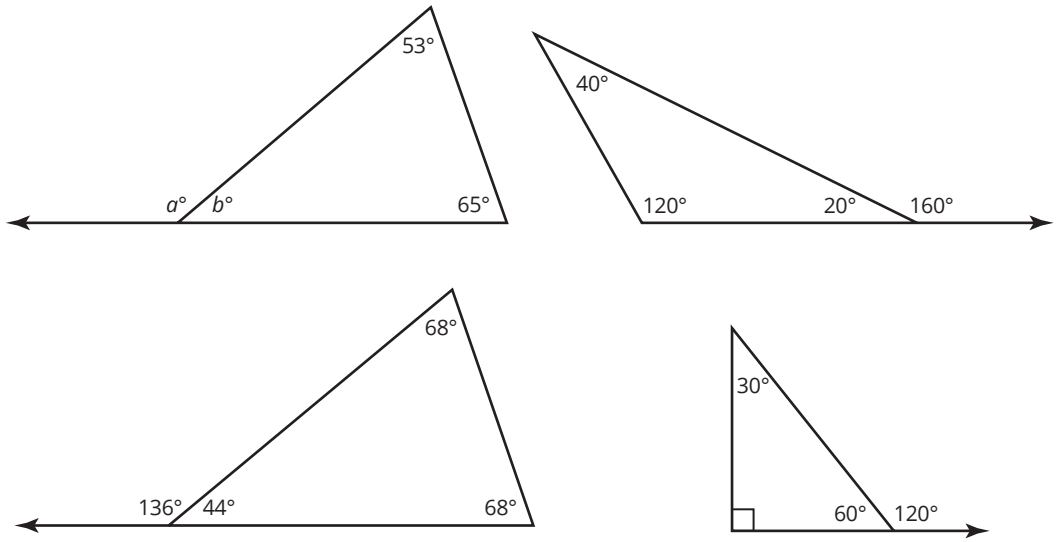
B. The m∠ 3 is also 34° because vertical angles are congruent.

C. The m∠7 is 56° because ∠1 and ∠7 are complementary angles.

D. The m∠7 is 146° because ∠1 and ∠7 are supplementary angles.

E. The sum of m∠1 and m∠6 is 180° because they are supplementary angles.

4. Four triangles are shown. One side of each triangle lies on a ray, and the triangles are not drawn to scale.



Based on these triangles, which statement is true?

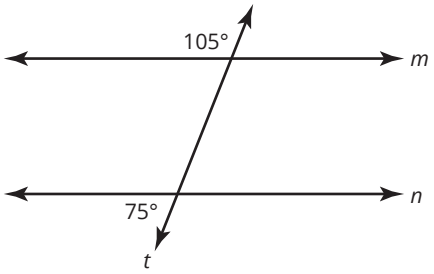
F. $a = 298$, because $53 + 65 = 118$ and $118 + 180 = 298$.

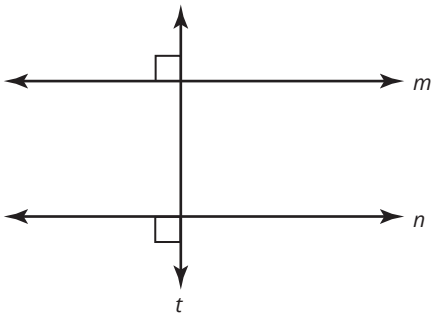
G. $a = 168$, because $180 - 65 = 115$ and $115 + 53 = 168$.

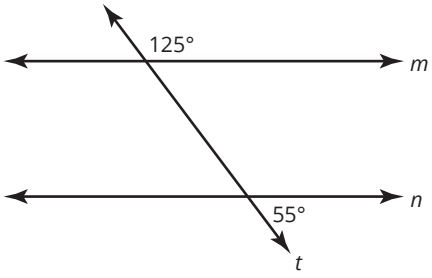
H. $a = 62$, because $53 + 65 = 118$ and $180 - 118 = 62$.

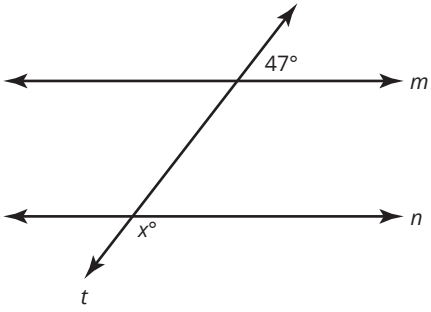
J. $a = 118$, because $180 - (53 + 65) = 62$ and $180 - 62 = 118$.

5. In each diagram, line *m* is parallel to line *n*, and line *t* intersects lines *m* and *n*.









Based on the diagrams, which statement is true?

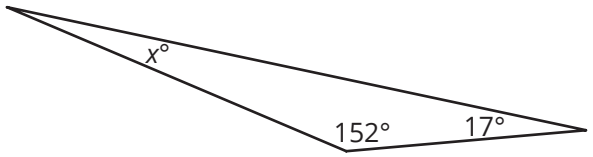
A. The value of *x* is 47°, because the two angles shown in each diagram are congruent.

B. The value of *x* is 43°, because the two angles shown in each diagram are complementary.

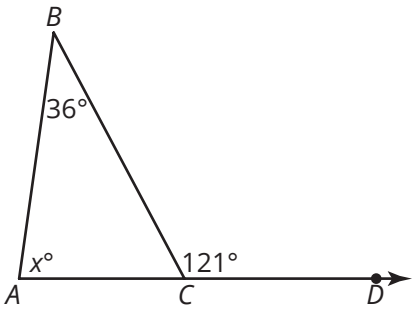
C. The value of *x* is 133, because the two angles shown in each diagram are supplementary.

D. The value of *x* is less than 90°, because the two angles shown in each diagram are acute angles.

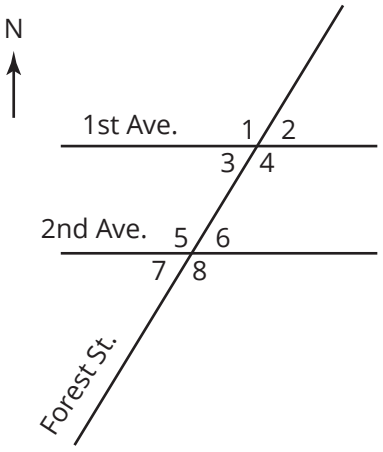
6. Determine the value of x in the diagram.



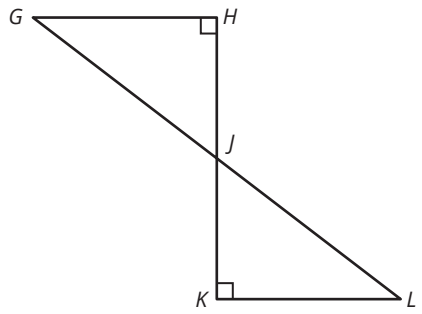
7. Determine the value of x in the diagram.



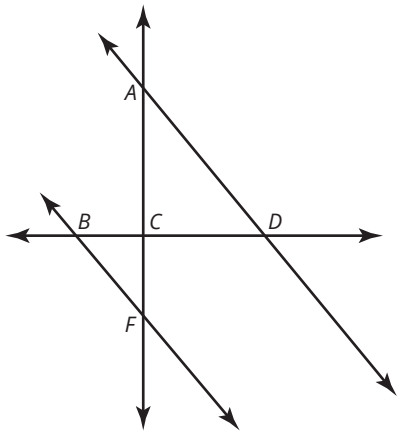
8. The map shows a portion of downtown Prairie View. 1st Avenue is parallel to 2nd Avenue. If $m\angle 2 = 53°$, what are the measures of the other seven angles in the figure?



9. Determine whether the triangles are similar. If there is sufficient information to determine that the triangles are similar, write a similarity statement and explain your reasoning. If there is not sufficient information, explain your reasoning.

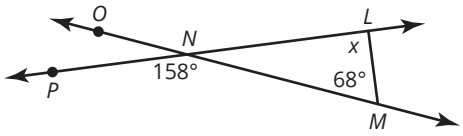


10. In the figure shown, $\overline{AD} \parallel \overline{BF}$, $\overline{BD} \perp \overline{AF}$.

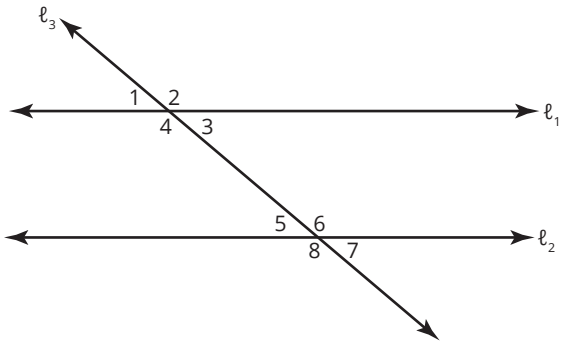


Is $\triangle ACD \sim \triangle BCF$? Explain your reasoning.

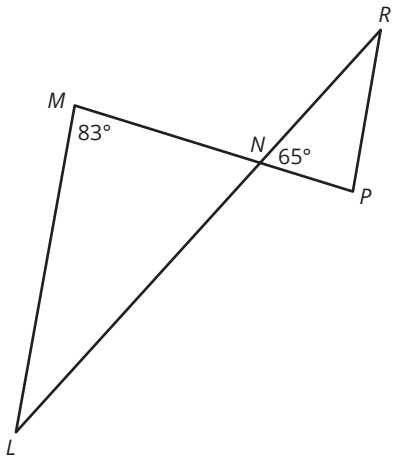
11. What is the value of x?



12. In the figure shown, $\ell_1 \parallel \ell_2$. When $m\angle 6 = 146°$, what is the measure of angle 1?



13. In the figure, $\overline{LM} \parallel \overline{PR}$. What is the measure of angle R?



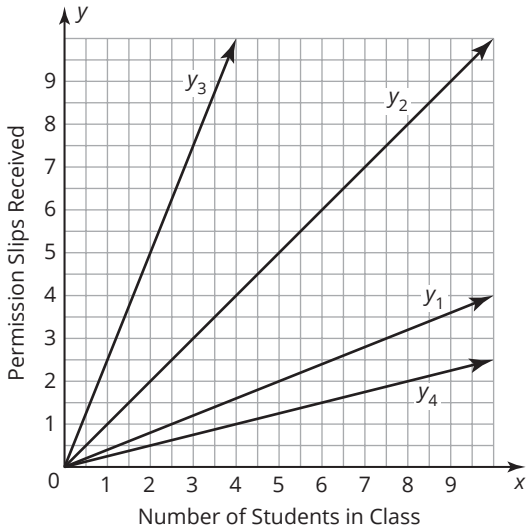
GRADE 8

MODULE
2

Developing Function Foundations

Name _____ Date _____

1. A class is taking a trip to the aquarium. The teacher has received only 2 permission slips for every 5 students in the class. Use the graph to answer the question below.



Which line represents the problem situation?

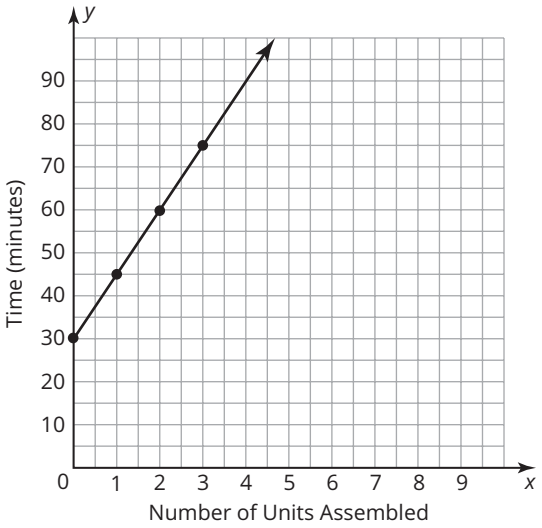
A. y_1

B. y_2

C. y_3

D. y_4

2. Which statement correctly describes the relationship represented by the graph?



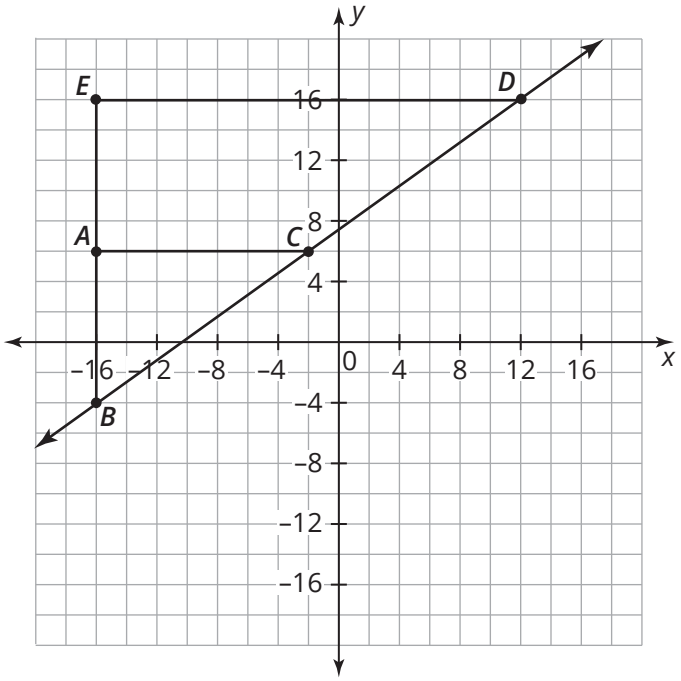
F. The relationship is linear and proportional.

G. The relationship is linear and non-proportional.

H. The relationship is non-linear and proportional.

J. The relationship is non-linear and non-proportional.

3. Triangle *ABC* and triangle *EBD* are similar right triangles. The coordinates of all vertices are integers.



Which statement is true about the slope of $\overline{BC}$ and the slope of $\overline{BD}$?

A. The relationship between the slope of $\overline{BC}$ and the slope of $\overline{BD}$ cannot be determined because the triangles are overlapping.

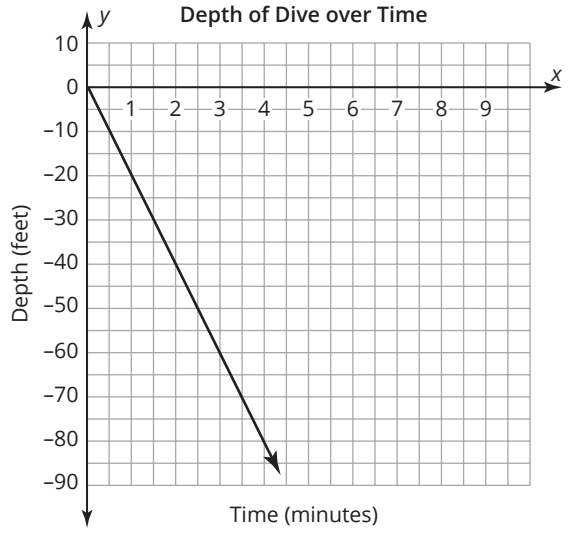
B. The slope of $\overline{BC}$ is greater than the slope of $\overline{BD}$, because the ratio of the change in *y*-values of the endpoints to the change in *x*-values of the endpoints is greater for $\overline{BC}$ than it is for $\overline{BD}$.

C. The slope of $\overline{BC}$ is less than the slope of $\overline{BD}$, because the ratio of the change in *y*-values of the endpoints to the change in *x*-values of the endpoints is less for $\overline{BC}$ than it is for segment $\overline{BD}$.

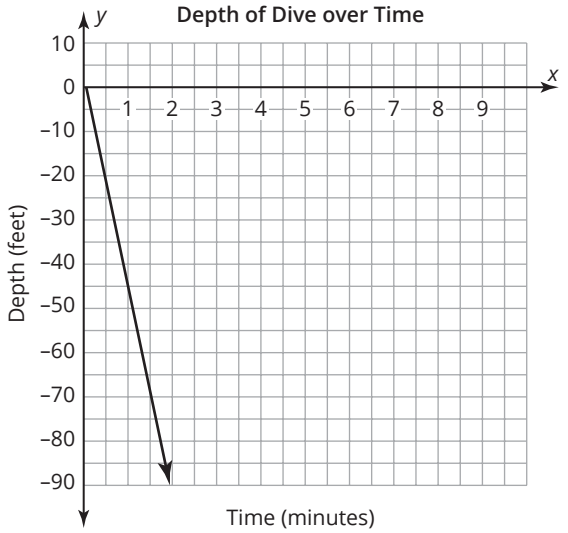
D. The slope of $\overline{BC}$ is equal to the slope of $\overline{BD}$, because the ratio of the change in *y*-values of the endpoints to the change in *x*-values of the endpoints is the same for $\overline{BC}$ as it is for $\overline{BD}$.

4. A deep sea diver swims downwards 20 feet every minute. Which graph has a slope that best represents this rate?

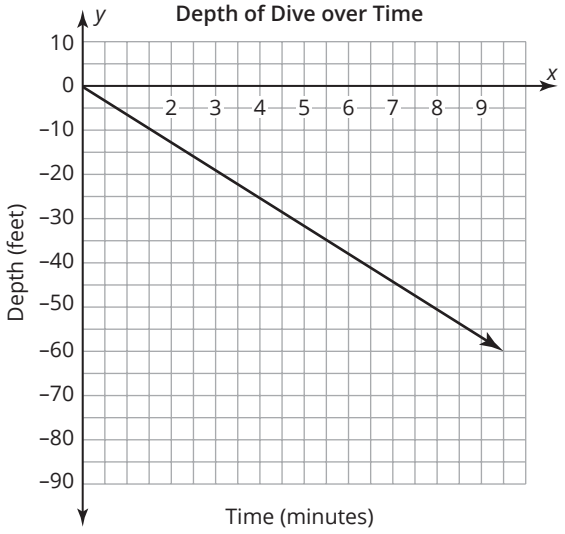
F.



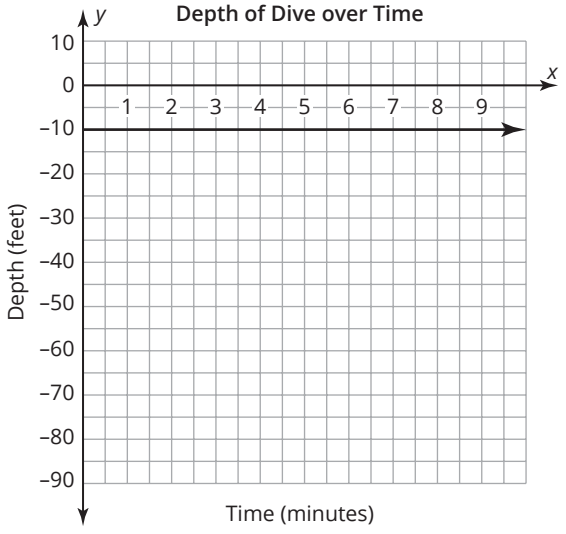
G.



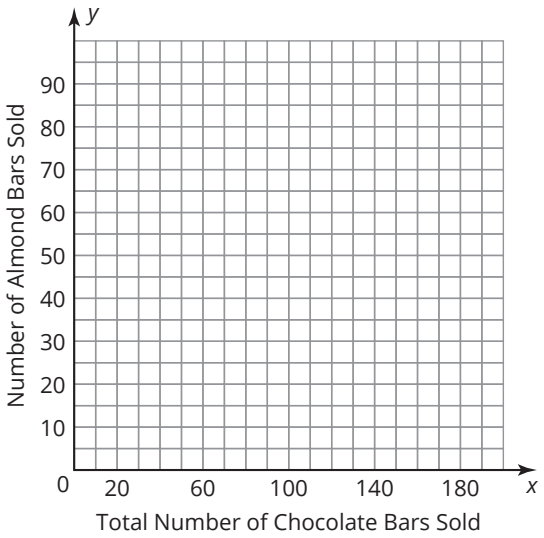
H.



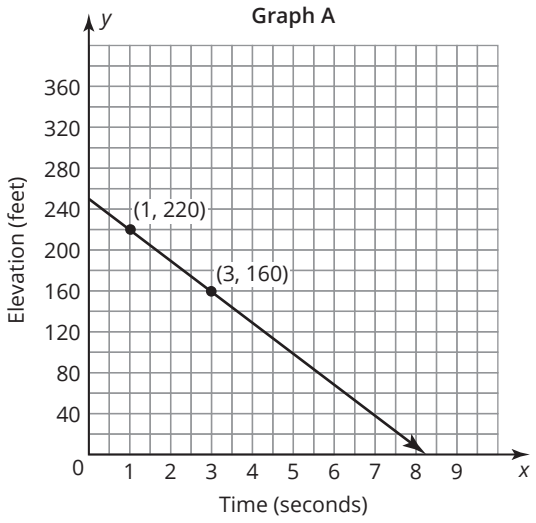
J.

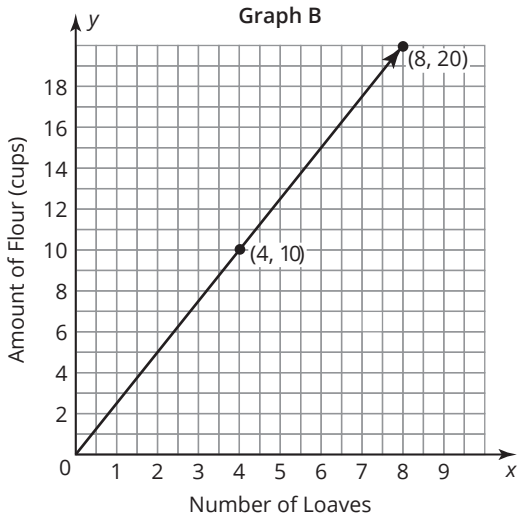


5. Natalia is selling chocolate bars to raise money for her club. She finds that 2 out of every 9 boxes of chocolate bars sold are almond bars. Graph the problem situation on the coordinate plane.



Use Graphs A and B to answer Questions 6 and 7.

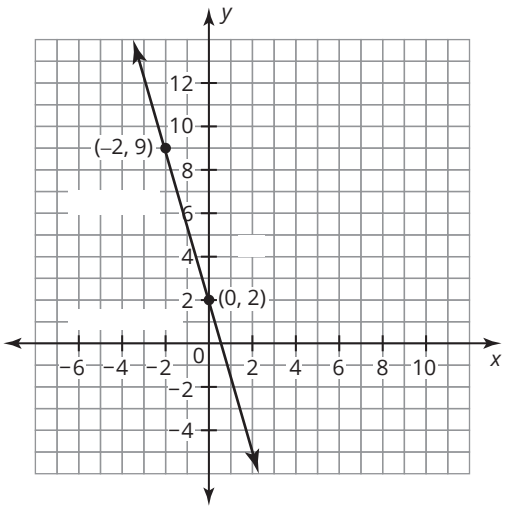




6. Determine the rate of change shown in each graph.

7. Determine whether each graph represents a proportional relationship. Explain your reasoning.

8. Consider the graph shown. Determine the slope of the graph.



9. The value of y varies directly with x. When $y = 12$, $x = 1.5$. What is the value of y when x is 9? Explain your reasoning.

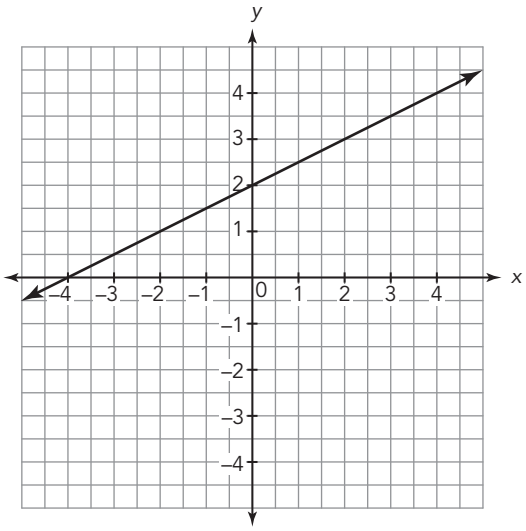
10. The value of y is 2 more than half of x. Which of these represents this relationship? Select **TWO** correct answers.

A. $y = 2x + \left(-\frac{1}{2}\right)$

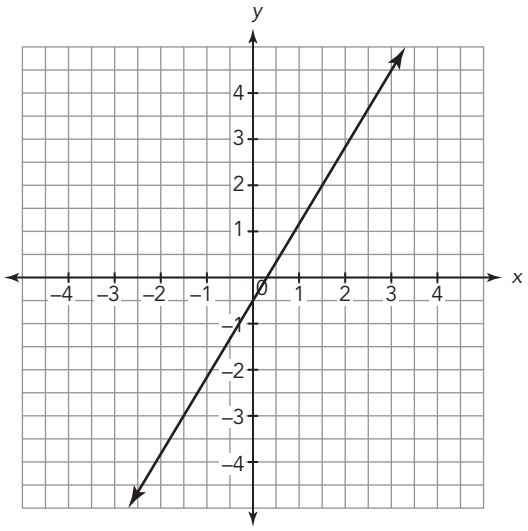
B.

x	-4	10	18
y	0	7	11

C.



D.



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

11. Consider the following table.

Number of Bull's-Eyes Made	Points Displayed
0	1000
4	5800
7	9400
10	13,000

Calculate the rate of change of the linear relationship represented by the table.

Name _____ Date _____

1. Jamal sells toolboxes for farming tools. He plans on selling them during a fair this weekend. Jamal estimates he will sell the boxes for $30 each with an additional shipping fee of $10, regardless of order size. Which equation best represents this situation?

   A. $y = -30x - 10$

   B. $y = 30x + 10$

   C. $y = -30x + 10$

   D. $y = 30x - 10$

2. Which table of ordered pairs, when plotted, will show a linear non-proportional relationship between x and y?

F.

x	−2	−1	0	5
y	−4	−2	0	10

G.

x	y
−2	−1
2	1
6	3
10	5

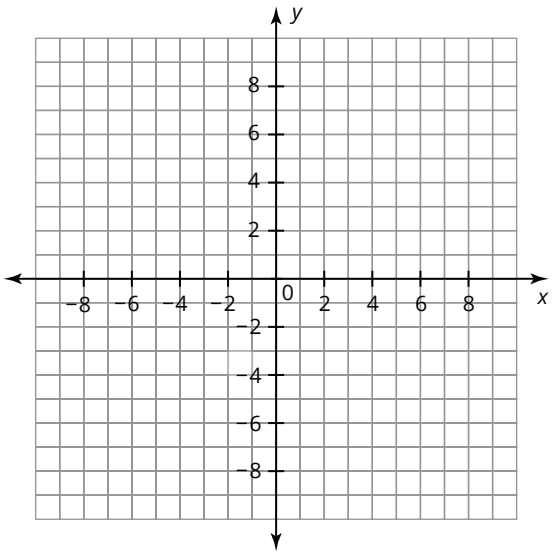
H.

x	y
−4	6
−2	3
3	−4.5
7	−10.5

J.

x	−2	1	4	6
y	−8	−2	4	8

3. Given that the points $(-4, 2\frac{1}{2})$ and $(8, -2)$ lie on a line, what is the equation of the line?



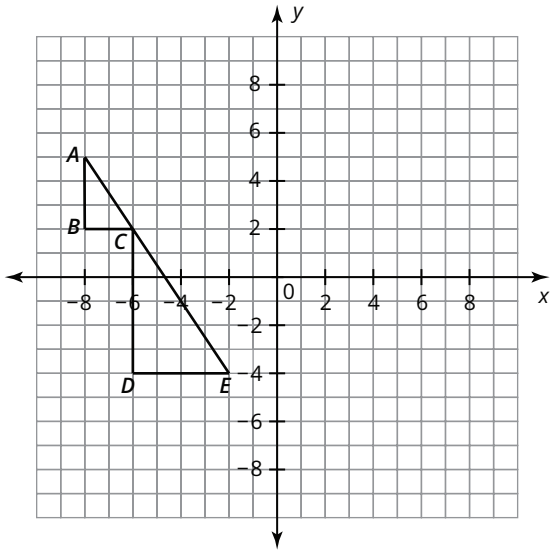
A. $y = -\frac{3}{8}x + 1$

B. $y = -\frac{8}{3}x + 1$

C. $y = -\frac{3}{8}x - 11$

D. $y = \frac{8}{3}x - 11$

4. Triangles *ABC* and *CDE* are similar right triangles.



Which proportion can be used to show that the slope of $\overline{AC}$ is equal to the slope of $\overline{CE}$?

F. $\frac{5-2}{-8-(-6)} = \frac{-4-2}{-2-(-6)}$

G. $\frac{-4-2}{-8-(-6)} = \frac{5-2}{-2-(-6)}$

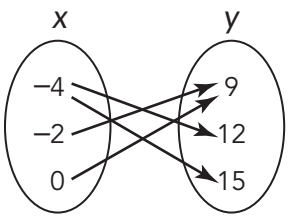
H. $\frac{5-2}{-2-(-6)} = \frac{-4-2}{-8-(-6)}$

J. $\frac{5-2}{8-(-6)} = \frac{-4-2}{2-(-6)}$

5. Select all the relations that are functions.

A. $(-3, 2), (-1, 7), (-3, 1), (0, 9), (2, -4)$

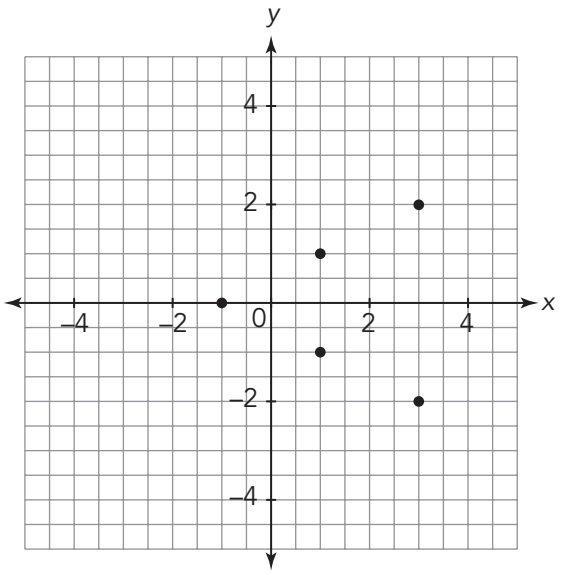
B.



C.

x	1	2	3	4
y	2	4	6	13

D.



E. $y = 4x + 7$

6. Write the equation of the line that passes through $(2, -1)$ with $m = -1$.

7. Alyssa participated in a 12-kilometer walk-a-thon to raise money for her favorite charity. She walked at a constant rate during the entire walk-a-thon. The table shows Alyssa's times at the beginning, the middle, and the end of the walk-a-thon.

Time (hours)	0	1.25	2.5
Distance Walked (kilometers)	0	6	12

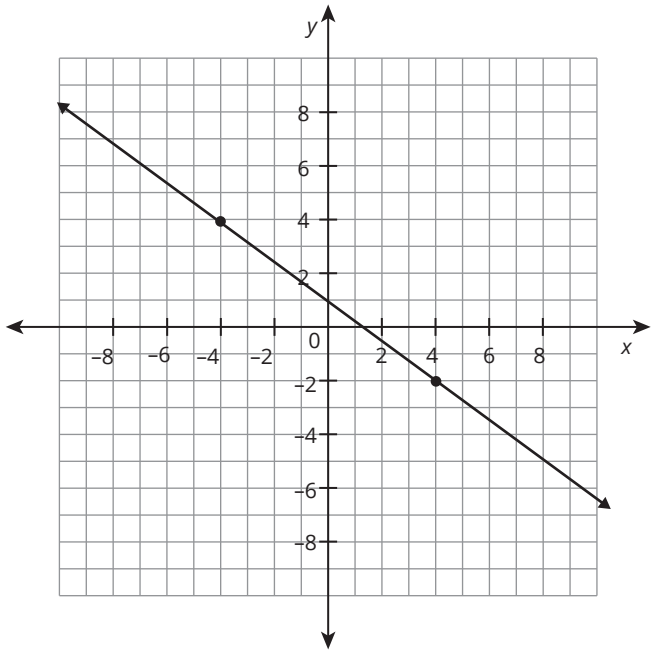
What is the slope? What is the *y*-intercept? Explain the meaning of each of these terms in the problem situation.

8. Mariana has a cell phone plan that has a monthly charge plus a per text fee. The table shows Mariana's monthly bill for October, November, and December along with the number of texts she sent during those months.

Month	Number of Texts	Monthly Bill (dollars)
October	45	37.25
November	118	40.90
December	200	45.00

Determine the *y*-intercept from the table of values and write it as an ordered pair. Explain what the *y*-intercept represents in the problem situation, where *y* represents the monthly cell phone bill for *x* texts.

Use the graph to answer Questions 9 and 10.



9. Determine the slope and *y*-intercept of the graphed line.

10. Write the equation that represents the graphed line.

11. Determine whether the relation is a function. Explain your reasoning.

    Input: Jorge has swim practice on Mondays, Thursdays, and Saturdays and soccer on Wednesdays and Saturdays.

    Output: Jorge's sports practices per day.

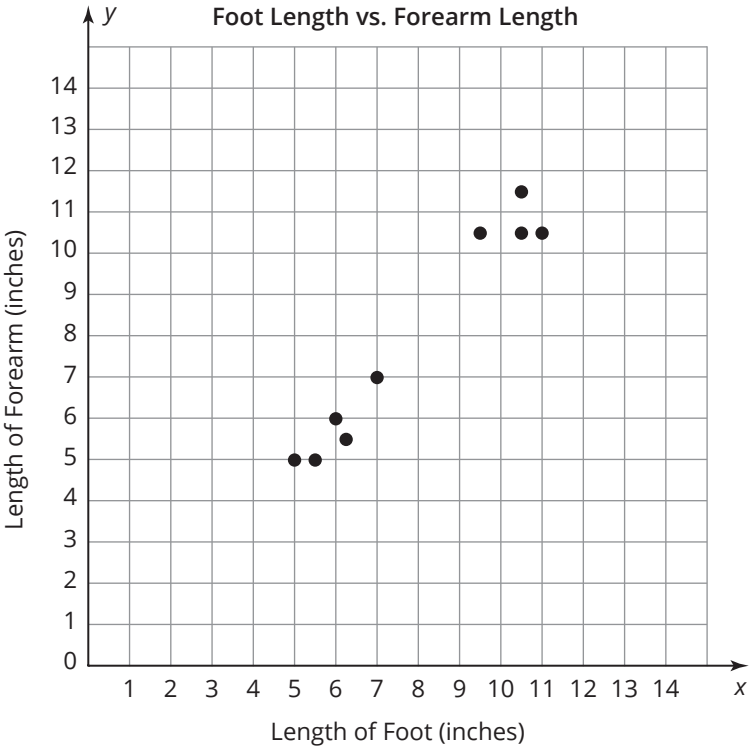
GRADE 8

MODULE 3

Data Data Everywhere

Name _____ Date _____

1. The scatterplot shows the foot lengths and forearm lengths for a group of people. Based on the scatterplot, what is the best prediction of a person's foot length in inches if the length of their forearm is 13 inches?



A. 10.5 in.

B. 11 in.

C. 12.5 in.

D. 14 in.

2. Lucia is training for a marathon. She decides to track her time per mile, in minutes, for 8 weeks. A trend line for the data is given. Which equation best fits the data?

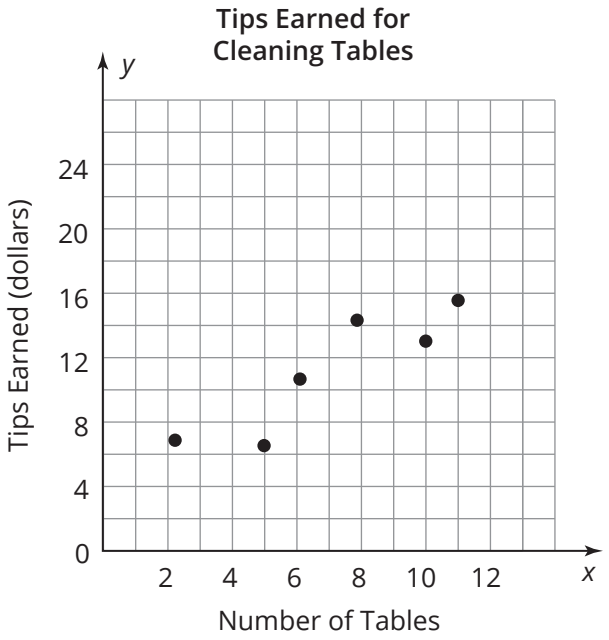
F. $y = 0.18x + 10.06$

G. $y = -0.18x + 10.06$

H. $y = 2x + 8.6$

J. $y = -2x + 8.6$

3. Javier works in a restaurant. Sometimes he clears tables. The scatterplot shows how much he earned in tips by clearing tables on different days. Which statements could be a good prediction of how much Javier will earn by clearing tables? Select **TWO** correct statements.



A. Javier will earn about $10 for clearing 6 tables.

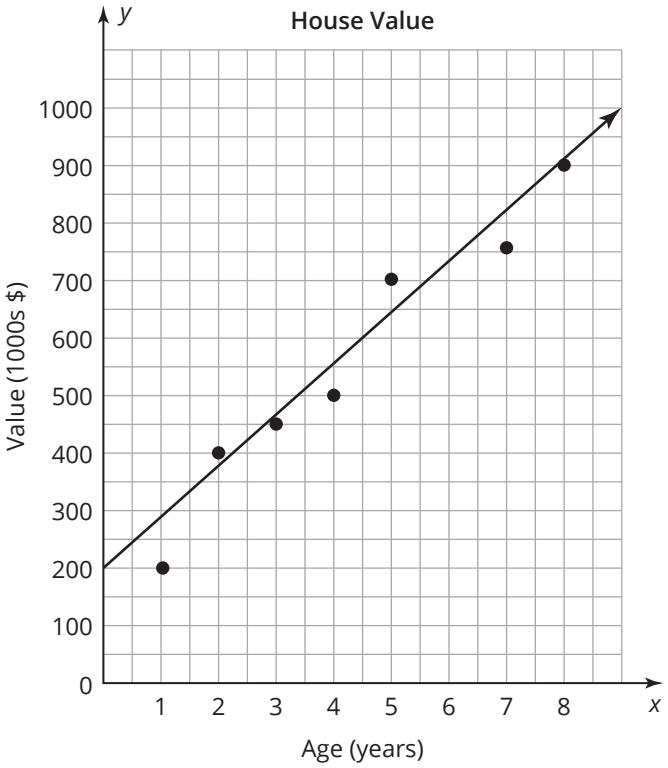
B. Javier will earn about $6 for clearing 6 tables.

C. Javier will earn about $12 for clearing 11 tables.

D. Javier will earn about $16 for clearing 13 tables.

E. Javier will earn about $13 for clearing 10 tables.

4. Juliana and Ben bought a house. They keep track of their house's value over the years. A trend line is given for the data. Which equation best fits the trend line for the data and can be used to make predictions?



F. $y = 75x + 200$

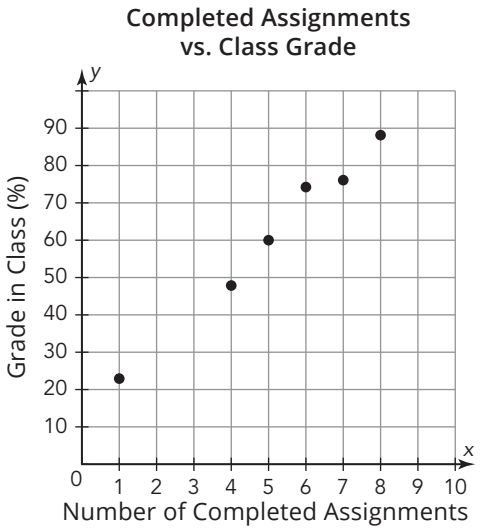
G. $y = -75x + 200$

H. $y = 75x - 200$

J. $y = -75x - 200$

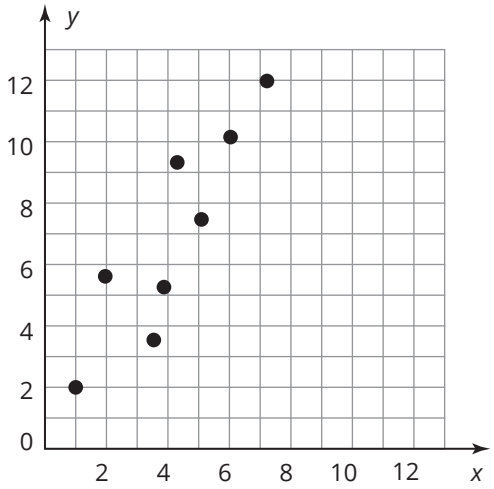
5. The table and the graph show the number of completed assignments for 7 students and their class grade, as a percentage.

Number of Completed Assignments	7	10	6	5	4	1	8
Grade in Class (%)	76	92	74	60	48	23	88

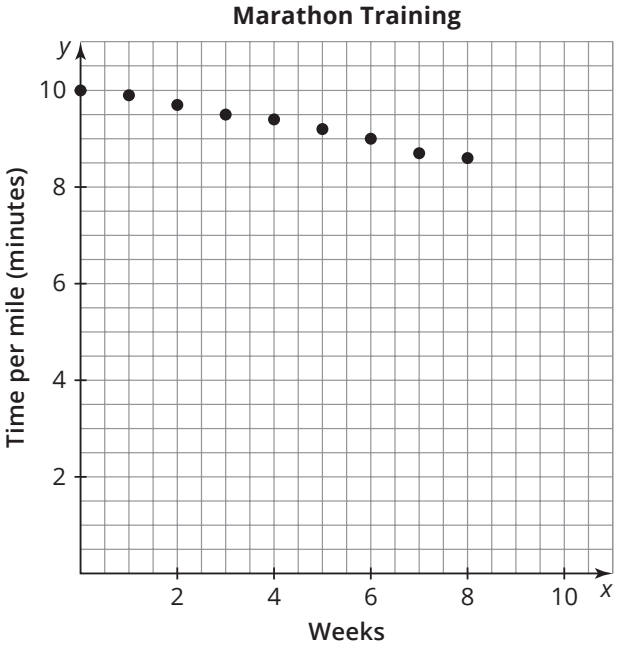


Draw a trend line. Based on the scatterplot and your trend line, what is the best prediction of the number of completed assignments for a student who has a class grade of 43%?

6. Consider the scatterplot shown. For the scatterplot, determine if the relationship shown is linear, non-linear, or neither. If the relationship is linear, state whether the relationship is positive, negative, or neither.



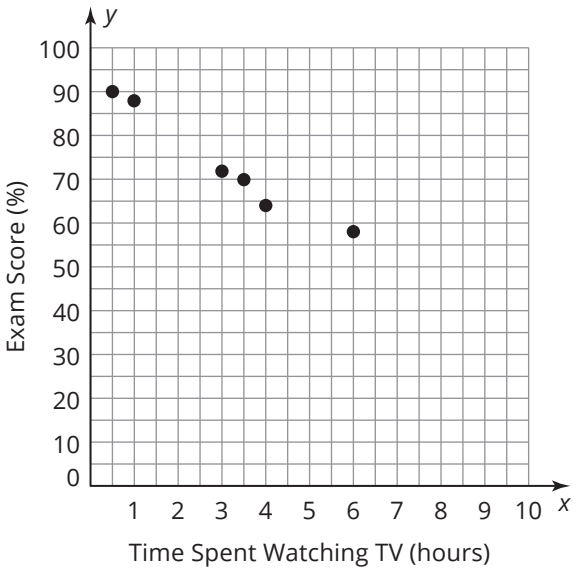
7. Lucia is training for a marathon. She decides to track her time per mile, in minutes, for 8 weeks.



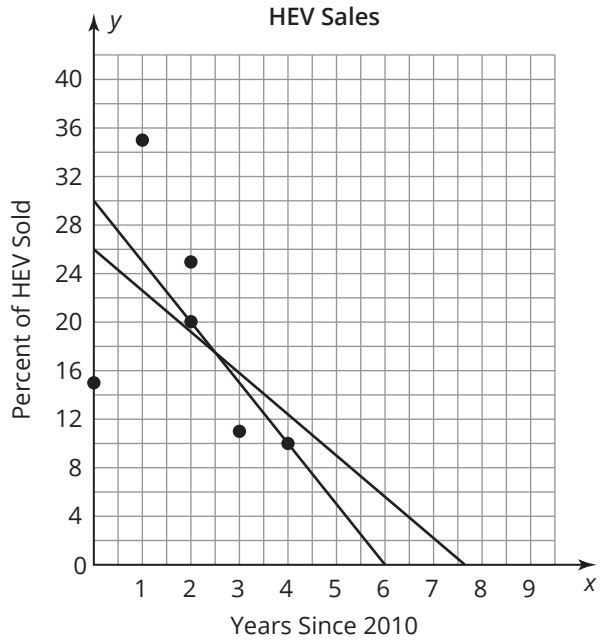
Is there a linear association between the number of weeks Lucia trains and her time per mile? Explain your reasoning.

8. Consider the scatterplot shown.

   Predict the exam score if a person watches 7 hours of TV.

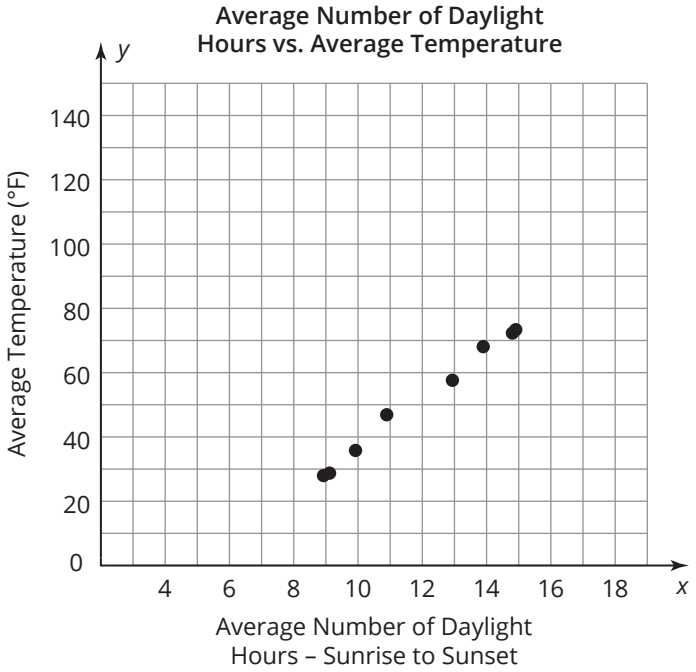


9. A car dealership tracks its car sales based on the type of car. The graph shows the percent of sales that were Hybrid Electric Vehicles (HEV) for the years since 2010. The trend line for the data is given.



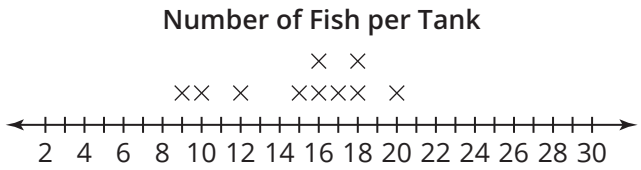
   Write the equation of the line that best fits the data.

10. The graph shows several months of weather data for New York. Based on the scatterplot, what is the best prediction for the temperature if there were 16 hours of daylight?



Name _____ Date _____

1. A local zoo has an Aquarium House exhibit with a variety of fish. They recorded the number of fish in each of their tanks. The data are shown.



What is the mean absolute deviation of the data?

A. 2

B. 2.88

C. 15.1

D. 28.8

2. James is practicing to run the quarter mile race in an upcoming track meet. He wrote down his times, in seconds, during practice. His data is shown.
65, 92, 71, 83, 86, 69, 79, 90
What is the mean absolute deviation of the data?

F. 8.4

G. 8.5

H. 79.3

J. 79.4

3. Mrs. Flores wants to determine which year-end celebration to choose for the students. She wants student input, so she needs to choose a sample of 20 students from the school. Which of the samples shown are random samples? Select all that apply.

A. Give each student a number and use a random number generator to select 20 numbers.

B. Choose the 20 students who volunteer for the school fundraising event this Friday.

C. Put all students' names on slips of paper in a box and select 20 names without looking.

D. Choose the first 20 students from an alphabetized school roster.

E. Choose the last 20 students who arrive to school that day.

4. Ricardo wants to find out if students at a local high school go to the football games. He decides to take a sample rather than ask every student. He asks the first 15 freshmen leaving the library. Which statement about the sample is true?

   F. This sample includes the entire student population.

   G. This sample is representative of the population.

   H. This sample is not a random sample.

   J. This sample gives all students an equal chance of being selected.

5. Jackson wants to estimate the number of minutes students spend waiting for the bus each morning. He decides to take a random sample of 10 anonymous students. The results are shown.

   Determine the mean absolute deviation for the data set.

Student	Wait Time (min)
A	6
B	9
C	4
D	9
E	10
F	18
G	5
H	12
I	8
J	7

Use the information shown for Items 6–7.

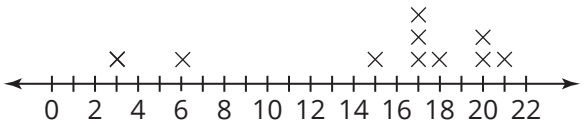
Nakota is helping set up the sports drinks for a weekend carnival for seventh-graders at his school. He needs to choose three flavors to serve. Rather than asking every single seventh-grader in the school, he decides to take a sample of students.

6. Suppose Nakota decides to use 10 seventh-graders from Mr. Brown's class as the sample. Is this sample a random sample? Explain your reasoning.

7. Suppose Nakota assigns every student in seventh grade a different number, writes each number on a slip of paper, places the slips in a cloth bag, and selects 10 slips from the bag without looking. Is this sample a random sample? Explain your reasoning.

8. Joey has a collection of 48 stuffed animals in assorted sizes in his bedroom. He wants to calculate the approximate total volume of space that his stuffed animals take up. Brianna has a suggestion on how to randomly select stuffed animals. She says, "You can pick the 5 largest stuffed animals to estimate the total volume of space that the animals will take up." Will Brianna's method result in a random sample? Explain your reasoning or suggest a way to modify her strategy.

9. Nicky wants to estimate the number of points each player earns while playing a math computer game. He decided to take a random sample of 10 anonymous players. The results are shown.



Calculate the mean absolute deviation for the number of points each player earns while playing the math computer game.

10. Mrs. Tanaka recorded the weight, in pounds, of each of her 8 great grandchildren. Her data is shown.
45, 52, 31, 27, 38, 60, 44, 55
What is the mean absolute deviation of the data?

GRADE 8

MODULE
4

Modeling Linear Equations

Name _____ Date _____

1. What is the solution to the equation $2x - 5 = 19 - 6x$?

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

   B. $x = 1\frac{2}{3}$

   C. $x = -3$

   D. $x = 3$

2. Ethan and his brother Samuel are selling bags of popcorn to raise money for their baseball team to travel to Florida for a tournament.

   - Ethan is selling his bags of popcorn for $7.50 each and has already raised $120.00.
   - Samuel is selling his bags of popcorn for $6.00 each and has already raised $162.00.

   Which equation can be used to determine x, the number of bags of popcorn Ethan and Samuel must each sell, so that the total amount of money they raise is the same?

   F. $120 - 7.50x = 162 - 6x$

   G. $7.50x - 120 = 6x - 162$

   H. $120x + 7.50 = 162x + 6$

   J. $7.50x + 120 = 6x + 162$

3. Which scenario could be modeled by the equation $2x + 12 = 8 + 4x$?

A. Emma is wanting to join an online streaming service. She found two options online. The first option costs $12 to activate and $2 per month for the service. The second option costs $8 to activate the service and an additional $4 per month. At how many months will the two streaming options cost Emma the same amount?

B. Liam saves $2 per week of his allowance but must repay his mom $12 out of his savings for money she loaned him. Liam's sister saves $4 per week of her allowance but must repay her mom $8 she borrowed from her out of the money she saves. After how many weeks of saving will Liam and his sister have the same amount of money saved?

C. Currently, the temperature in Syracuse, NY, is -12 degrees Fahrenheit and it is 8 degrees Fahrenheit in Chicago, IL. If the temperature in Syracuse rises 4 degrees per hour and it rises 8 degrees per hour in Chicago, after how many hours will Syracuse and Chicago have the same temperature?

D. Juan swam 12 miles at a rate of 2 miles per hour and 8 miles at a rate of 4 miles per hour. How many hours does it take Juan to swim 20 miles?

4. Minh is trying to decide which amusement park to go to during vacation. Amusement park A costs $2.50 per ride with a $40 entry fee. Amusement park B costs $4.00 per ride with a $30 entry fee. Which inequality can be used to determine x, the minimum number of rides Minh has to go on so that the total charge at amusement park A costs less than the total charge at amusement park B?

   F. $2.5x + 40 < 4x + 30$

   G. $2.5x + 40 > 4x + 30$

   H. $2.5 + 40x < 4 + 30x$

   J. $2.5 + 40x > 4 + 30x$

5. At a fruit stand, each pound of apples has a cost of x dollars. Which situation can be represented by the inequality $7x > 2x + 4$?

   A. The cost of 7 pounds of apples is greater than the cost of 6 bunches of bananas.

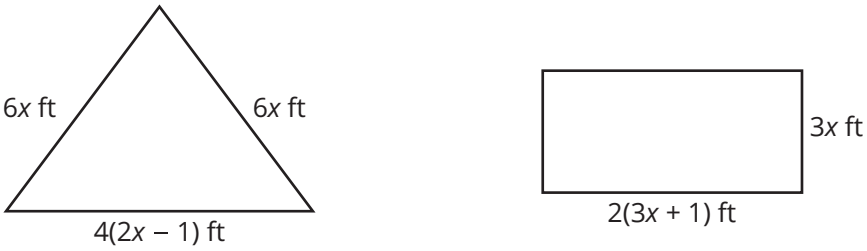
   B. The cost of 7 pounds of apples is $4 greater than the cost of 2 pounds of apples.

   C. The cost of 7 pounds of apples is greater than the cost of 2 pounds of apples plus a $4 bunch of bananas.

   D. The cost of 7 pounds of apples is less than the cost of 2 pounds of apples plus a $4 bunch of bananas.

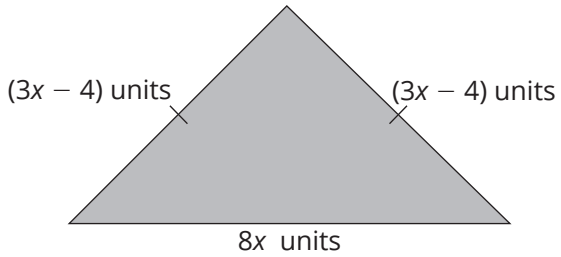
6. What is the solution to this equation?
$5x - 23 = 10(x - 1)$

7. The side lengths of a triangle and a rectangle are shown in the diagram.



The perimeter of the triangle is equal to the perimeter of the rectangle. What is the value of x?

8. The perimeter of the triangle shown is $12x$. The dimensions of the triangle are given in units.



Select the equation(s) used to determine the value of x.

A. $3x - 4 + 8x = 12x$

B. $8x + 3x - 4 = 12$

C. $14x - 8 = 12x$

D. $12x = 2x - 8$

E. $12x = 6x - 8 + 8x$

9. What value of x makes this equation true?
$\frac{1}{3}(9x + 9) = \frac{1}{6}(18x + 6)$.

10. What is the solution to this equation?

    $3(0.1x + 2) = 14.8 - 0.8x$

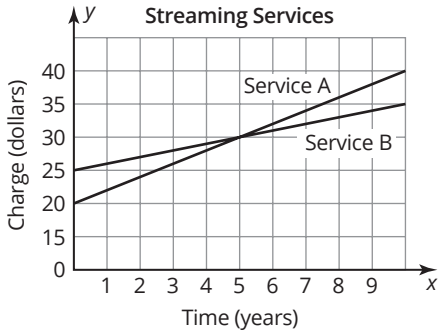
11. Write a real-world situation that models the equation $10x + 15 = 12x$.

12. Chloe and Ava are playing games at the arcade. Chloe started with $15 on her game card, and the game she is playing charges $0.75 per game. Ava started with $12.75 on her game card, and the game she is playing charges $0.50 per game.

    Chloe and Ava played the same number of games and their game cards now have the same balance. How many games did they play?

Name _____ Date _____

1. The graph models the linear relationship between the yearly charges for two video streaming services.



Based on the graph, which statement appears to be true?

A. After 6 years, both services will charge $30.

B. After 5 years, both services will charge $30.

C. After 6 years, both services will charge $40.

D. After 5 years, both services will charge $40.

2. A school club pays a T-Shirt company $180 to create a logo and $5 for each shirt they print. The club sells the T-Shirt for $10. Select the TWO equations that represent this situation when y represents the money earned in dollars and *x* represents the number of T-Shirts sold.

F. $y = 10x + 180$

G. $y = 15x + 180$

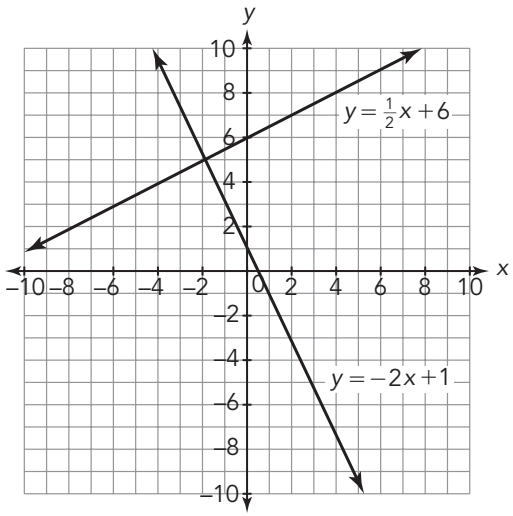
H. $y = 5x + 180$

J. $y = 5x$

K. $y = 10x$

3. The graph on the coordinate plane represents the given system. Verify algebraically that the ordered pair (−2, 5) satisfies the system of equations.

$$\begin{cases} y = -2x + 1 \\ y = \frac{1}{2}x + 6 \end{cases}$$



4. Complete the table to represent the system of linear equations.

$$\begin{cases} y = \frac{2}{3}x + 2 \\ y = -\frac{5}{6}x - 1 \end{cases}$$

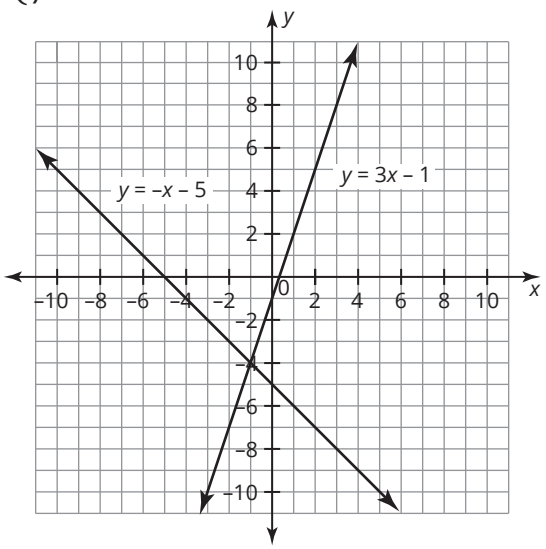
x	$y = \frac{2}{3}x + 2$	$y = -\frac{5}{6}x - 1$
−3		
−2		
−1		
1		
2		

5. As a fundraiser, the middle school debate club plans to sell T-Shirts that feature the school logo. The company producing the T-Shirts will charge the club $250 for the design and set-up costs, plus $10 per T-Shirt. The club members have decided to sell the T-Shirts for $15 each.

   Write an equation that represents the production cost in dollars to make the T-Shirts. Then, write an equation that represents the amount of money the club will make from selling the T-Shirts.

6. Use the graph to determine the solution of the system of equations.

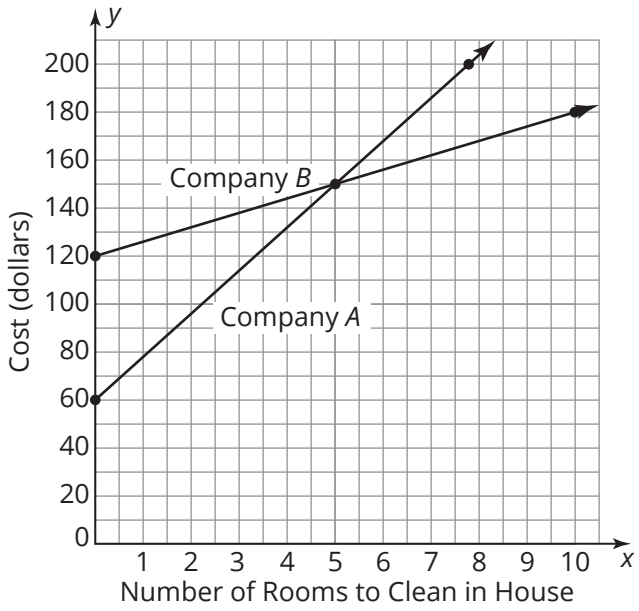
$$\begin{cases} y = 3x - 1 \\ y = -x - 5 \end{cases}$$



7. Aaliyah's company sells baseball style caps with custom logos. The table shows the production cost and income for different numbers of hats.
   Complete the table to determine the profit for different numbers of hats.

Number of Hats	Income (dollars)	Production Cost (dollars)	Profit (dollars)
0	0	240	
20	240	400	
40	480	560	
50	600	640	
60	720	720	
70	840	800	
80	960	880	

8. Ava wants to hire a company to clean her grandma's house.
The cost each company charges for rooms is shown in the graph.
Company *A* charges $18 per room and a $60 registration fee.
Company *B* charges $6 per room and a $120 registration fee.



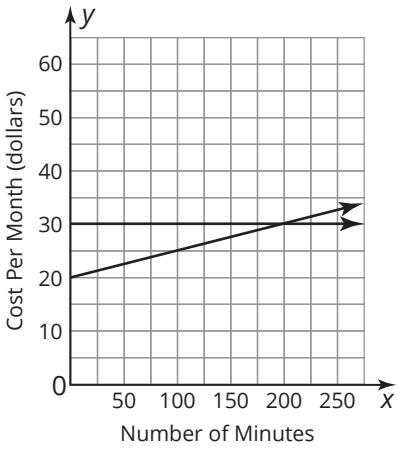
Identify and interpret what the point of intersection means in the context of the problem situation.

9. The local floral nursery makes ceramic planters. It costs $30 plus an additional $2 per planter to produce x number of planters. They plan on selling the planters for $5 each. The table shows the production cost and the income for different numbers of planters.

Number of Planters	Income (dollars)	Production Cost (dollars)
0	0	30
5	25	40
10	50	50
15	75	60
20	100	70
25	125	80

Write an equation that represents the production cost, y, in dollars to make x number of ceramic planters. Then, write an equation that represents the income, y, from selling x number of ceramic planters.

10. Liam is choosing between two Internet plans for his smartphone. The Gold Plan costs $20 per month plus $0.05 per minute. The Platinum Plan costs $30 per month for unlimited usage. At how many minutes will the Gold Plan and the Platinum Plan cost the same amount?



GRADE 8

MODULE
5

Applying Powers

Name _____ Date _____

1. The length of a micrometer is approximately 0.00003937 inch. How is this number written in scientific notation?

   A. 0.3937×10^{-4}

   B. 3.937×10^{-5}

   C. 39.37×10^{-6}

   D. 3937×10^{-8}

2. Which list shows these numbers in order from least to greatest?

   $12\frac{5}{8}$, 12.62, $\sqrt{146}$, 12.39, $12\frac{3}{4}$

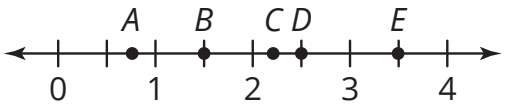
   F. 12.39, 12.62, $\sqrt{146}$, $12\frac{3}{4}$, $12\frac{5}{8}$

   G. $\sqrt{146}$, 12.39, 12.62, $12\frac{5}{8}$, $12\frac{3}{4}$

   H. 12.62, 12.39, $\sqrt{146}$, $12\frac{3}{4}$, $12\frac{5}{8}$

   J. $12\frac{3}{4}$, $12\frac{5}{8}$, 12.62, 12.39, $\sqrt{146}$

3. The points on the number line represent values of four different numbers.



Which points best represent a value between $\sqrt{3}$ and $\sqrt{7}$?

A. Point *A*

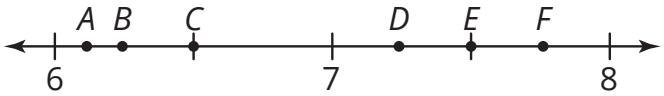
B. Point *B*

C. Point *C*

D. Point *D*

E. Point *E*

4. Use the number line to answer the question.



Which point on the number line best represents the location of $\sqrt{60}$? Explain your reasoning.

5. List the numbers in order from least to greatest.

$2\frac{3}{5}, -\frac{7}{4}, \frac{\pi}{2}, -2.1, \frac{8}{3}, \sqrt{8}, 125\%, -\sqrt{4}$

6. Approximate the value of the irrational number.
$\sqrt{30}$

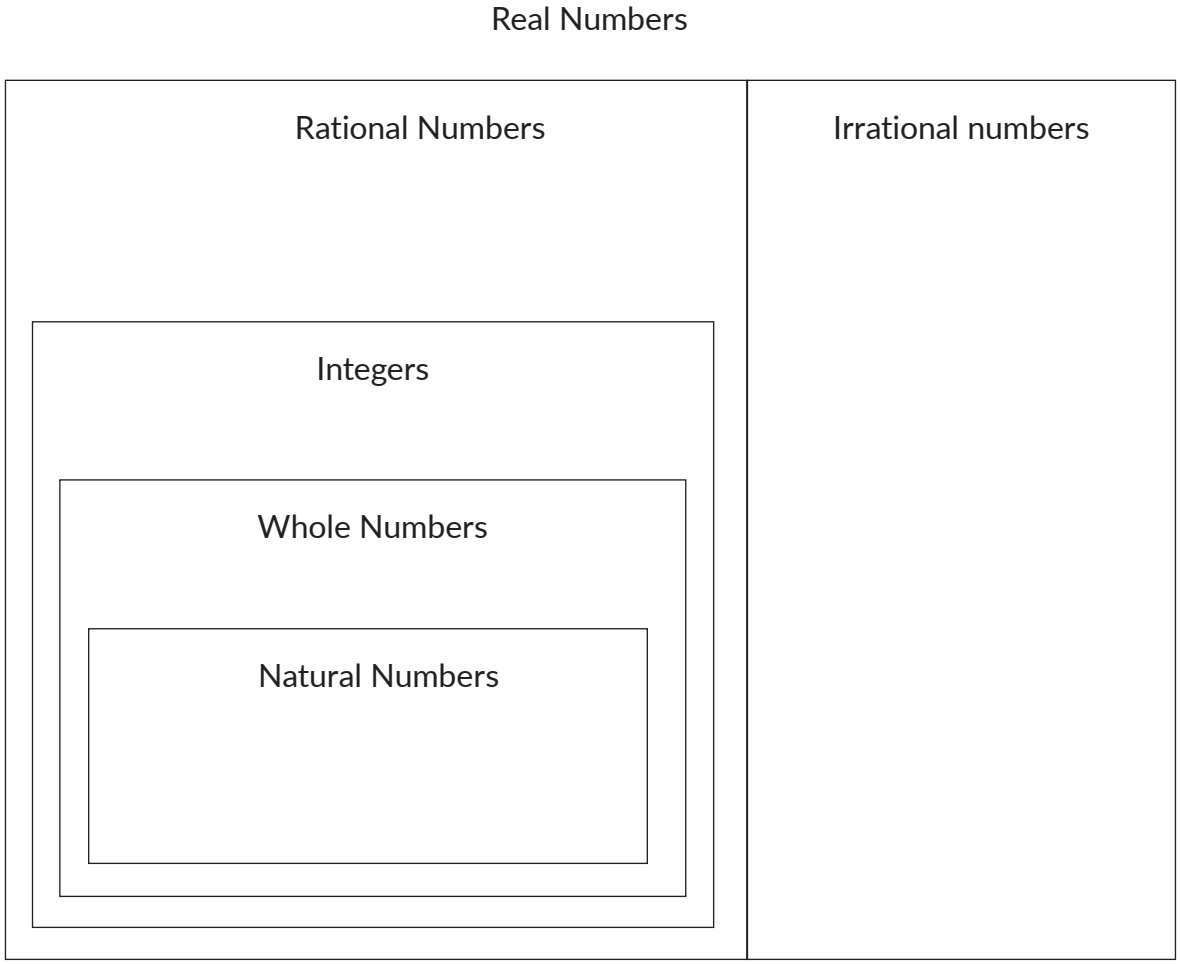
7. The table shows the diagonal lengths of different types of children's books.

Types of Children's Books	Diagonal Length (inches)
Board book	$\sqrt{56.25}$
Paperback	$\frac{38}{4}$
Hard cover	$\frac{9^2}{8}$
Story collection	$\frac{47}{5}$

List the types of children's books in order from longest to shortest diagonal length in inches.

8. Write each number from the list in the most appropriate section of the Venn diagram, showing the relationship among the six number sets that make up the set of real numbers.

0.9%	$-\frac{5}{16}$	$0.\overline{84}$	-6.15×10^9	$\lvert -2 \rvert$
π	$\sqrt{8}$	315%	$4\frac{1}{2}$	7^2
$\frac{39}{9}$	$-\sqrt{36}$	2.4131313...	-4.23	$-0.\bar{4}$
$-\sqrt{3}$	72%	$\frac{16}{4}$	$\sqrt{64}$	0



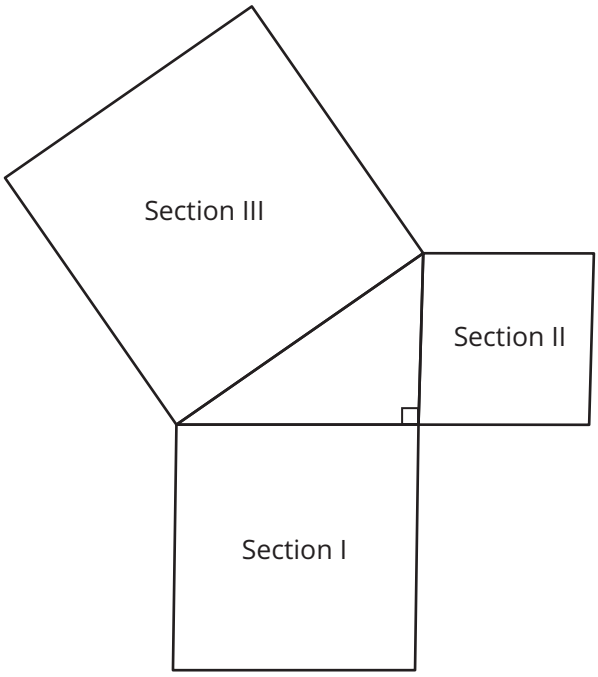
9. Complete the table by writing each number in either scientific notation or standard notation.

Quantity	Measurement in Standard Form	Measurement in Scientific Notation
Diameter of a grain of sand (in.)		2.4×10^{-3}
Distance from Earth to the sun (miles)		9.3×10^{7}
Approximate speed of light (km per hour)	1,080,000,000	
Mass of a dust particle (kg)	0.000000000753	

10. Jasmine has been saving money in her bank account for the past few years. When she went to the bank to find out the balance of the account, she was told she had 3.9×10^3 dollars. How much money does Jasmine have in standard form?

Name _____ Date _____

1. A landscape designer is planning for a new garden installation. The diagram shows the 3 sections of the garden.



Based on the information, which statement is true?

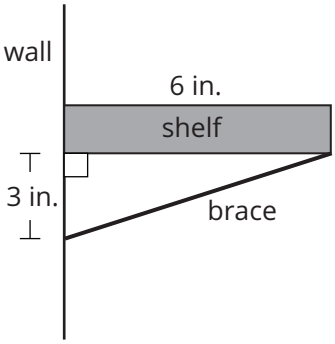
A. The area of Section III is the same as the area of Section I and Section II combined.

B. The area of Section II is the same as the area of Section I and Section III combined.

C. The area of Section I is the same as the area of Section II and Section III combined.

D. The area of Section I and II combined is greater than the area of Section III.

2. Valentina is building a brace to attach her shelf to the wall as shown in the diagram. She will attach the brace to the front edge of the 6-inch shelf and 3 inches down the wall from the bottom of the shelf. Which measurement is closest to the length of the brace she will need in inches?



F. 5.2 in.

G. 6.7 in.

H. 27 in.

J. 45 in.

3. Which measurements could **NOT** represent the side lengths of a right triangle?

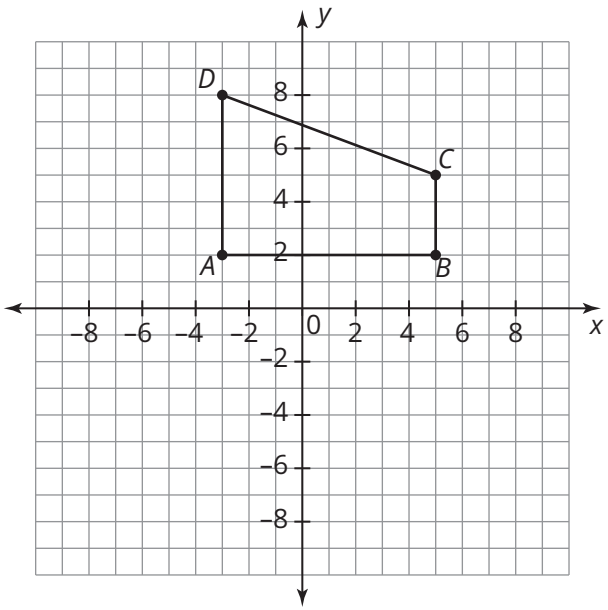
A. 10.5, 14, 17.5

B. 15, 36, 39

C. 4, 7.5, 9

D. $9\frac{3}{5}$, 18, $20\frac{2}{5}$

4. Trapezoid *ABCD* is shown. Which measurement is closest to the length of diagonal *BD* in units?



F. 8.5 units

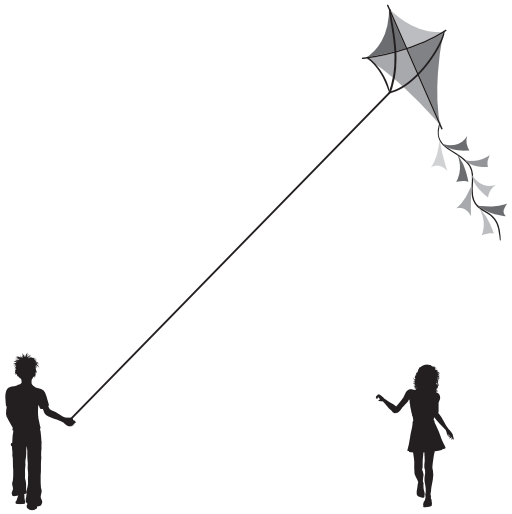
G. 10 units

H. 14 units

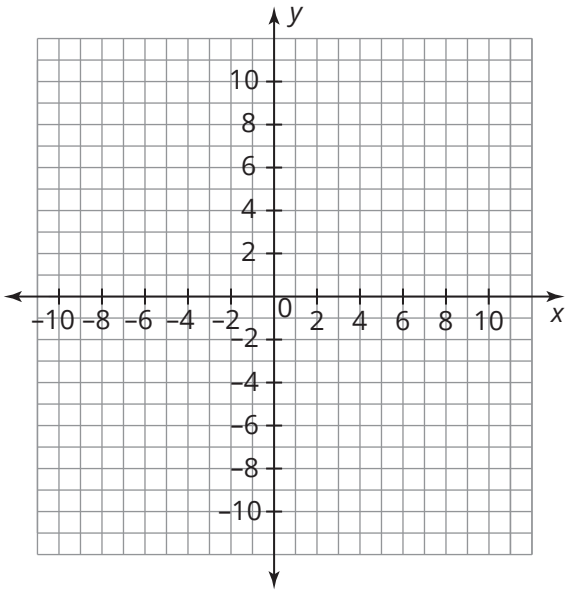
J. 18.5 units

5. Luna purchased a phone with a rectangular screen that measures 6.5 centimeters in width and 12 centimeters in length. She wants to know the diagonal length of the screen. Round your answer to the nearest hundredth of a centimeter.

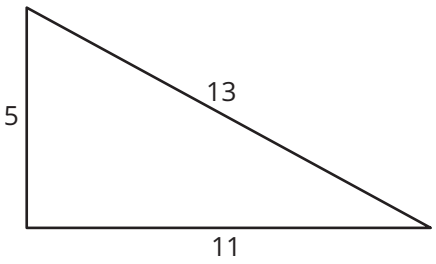
6. Sebastian is flying a kite at the park with a friend. He is standing and holding the handle to the kite 3.5 feet off the ground. The kite is hovering directly over Sebastian's friend Tina who is standing 16 feet away from him. If Sebastian has let out 34 feet of kite string, how high above the ground is the kite in feet?



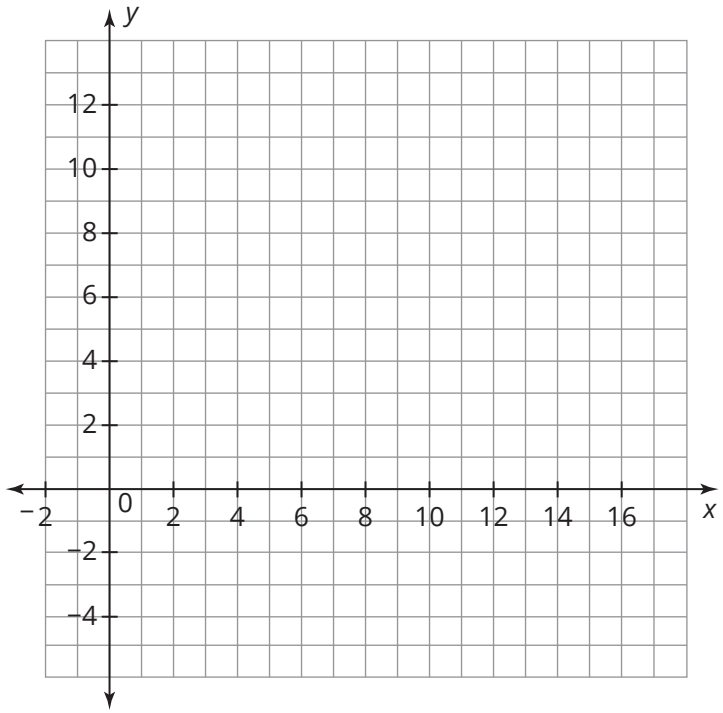
7. Determine the distance between the pair of points. Round to the nearest tenth, if necessary. Use the coordinate plane if necessary.
(1, 5) and (−6, −2)



8. Determine whether the triangle shown is a right triangle. Explain your reasoning.

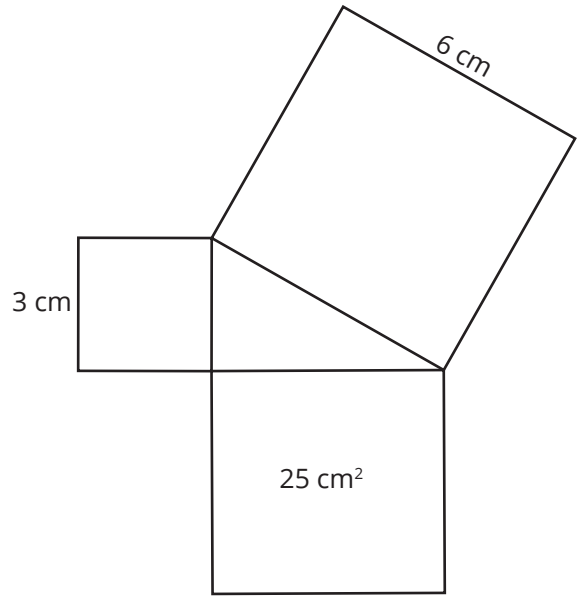


9. Point *A* is located at (2, 10) on a coordinate grid. Point *A* is translated 13 units down and 12 units to the right to create point *A*′. Use the coordinate plane shown if necessary.



Determine the distance between point *A* and point *A*' in units. Round your answer to the nearest hundredth, if necessary.

10. The three squares are joined at their vertices to form a triangle. Is the triangle formed a right triangle? Explain your reasoning.



Name _____ Date _____

1. Emily invested $1800 in an account paying 2% annual simple interest. Emily made no additional withdrawals or deposits. What was her account balance after 5 years?

   A. $180.00

   B. $1836.00

   C. $1980.00

   D. $1987.35

2. Avery deposits $1500 into each of two savings accounts.

   - Account A earns 3.5% annual simple interest.
   - Account B earns 3.5% interest compounded annually.

   Avery does not make any additional deposits or withdrawals into either account. Which amount is closest to the difference between the interest Avery would earn in Account B and the interest she would earn in Account A at the end of 4 years?

   F. $0

   G. $11.28

   H. $3431.28

   J. $1511.28

3. A customer applied for a loan for $15,000 to buy a motorcycle. The customer qualified for different loan options. Which loan option would allow the customer to pay the least amount of interest?

   A. A 3-year loan with a 7% annual simple interest rate

   B. A 4-year loan with a 5% annual simple interest rate

   C. A 5-year loan with a 4.5% annual simple interest rate

   D. A 6-year loan with a 3.7% annual simple interest rate

4. Sarah opened an investment account at a bank that pays 4% interest compounded annually. The table shows the activity in the account for three years.

Year	Beginning Balance for Year	Amount Deposited at Beginning of Year	New Balance	Interest Rate	Interest Earned	Ending Balance for Year
1	$0.00	$1000.00	$1000.00	4%	$40.00	$1040.00
2	$1040.00	$0.00	$1040.00	4%	$41.60	$1081.60
3	$1081.60	$0.00	$1081.60	4%	$43.26	$1124.86

Which statement explains why the balance in this account has grown?

F. The balance in the account has grown only because interest was earned on the account.

G. The balance in the account has grown only because regular deposits were made to the account.

H. The balance in the account has grown because regular deposits were made to the account and interest was earned on the previous year's balance.

J. There is not enough information to determine why the balance in the account has grown.

5. The cost of tuition at the public university that Diego plans to attend is $9,600 for the first year.
   - Diego's parents will pay for one-third of the tuition.
   - Diego will use $1,500 from his savings to help pay for tuition.

   What is the minimum amount of money Diego will need to save every month to reach his goal of paying off the remaining tuition cost at the end of 12 months?

   A. $141.67

   B. $275.00

   C. $400.00

   D. $408.34

Use the information to solve items 6 and 7.

Sebastian deposited $1500 into each of two savings accounts. Account A pays 4% annual simple interest. Account B pays 4% interest compounded annually. Sebastian made no additional deposits or withdrawals into either account.

6. Calculate the value of Account A and the value of Account B at the end of 20 years. Show any formulas you use.

7. Which account will be worth more at the end of 20 years? How much more?

Use the information to solve items 8 and 9.

Carlos needs a loan to buy a tractor for his farm. He qualified for a loan at two different banks.

Local Bank	Online Financial Institution
• Loan Amount: $25,000 • Annual Simple Interest Rate: 6.5% • Loan Length: 4 years	• Loan Amount: $25,000 • Annual Simple Interest Rate: 4% • Loan Length: 6 years

8. What is the total amount Carlos will pay, including loan amount and interest, for each loan? Show your calculations.

9. From which bank would you recommend Carlos take out his loan to buy his tractor? Explain your reasoning.

10. Parker is getting ready to attend community college in the fall. The tuition is $2375 per semester. He plans to attend for two semesters each year for two years and then he will transfer to a state university for another two semesters each year for two years. The university tuition is $9250 per semester. Parker plans to live on campus at the state university, which will cost an additional $4880 per year. What is the total cost for Parker to attend two years at the community college and two years at the state university?

Name _____ Date _____

1. A metal waste bin is in the shape of a cylinder. The waste bin has a diameter of 7 centimeters and a height of h centimeters. Which equation can be used to determine V, the volume of the cylinder in cubic centimeters?

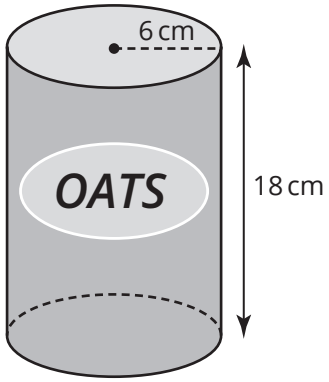
   A. $V = \pi(7)^2h$

   B. $V = \pi(3.5)^2h$

   C. $V = \pi(7)h$

   D. $V = \pi(3.5h)^2$

2. A cylindrical container of oats has the dimensions shown in the diagram.



   Which measurement is closest to the total surface area of the container in square centimeters?

   F. 150.80 cm^2

   G. 678.58 cm^2

   H. 848.23 cm^2

   J. 904.78 cm^2

3. A sphere has a diameter of 28 millimeters. Which measurement is closest to the volume of the sphere in cubic millimeters?

   A. 11,294.04 mm^3

   B. 11,494.04 mm^3

   C. 12,294.04 mm^3

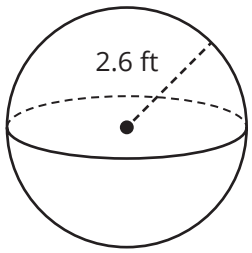
   D. 12,494.04 mm^3

4. The volume of a cone is 120 cubic centimeters. The height of the cone is 4.5 centimeters. Determine the radius of the cone. Round to the nearest hundredth, if necessary.

5. A local candy shop has a new cone-shaped cup.

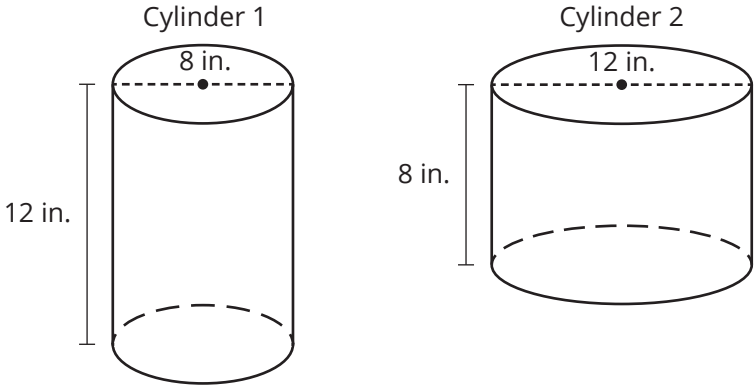
   Each cup has a radius of 4.6 centimeters and a height of 7 centimeters. What is the volume of one cone-shaped cup? Round to the nearest hundredth.

6. Determine the volume of the sphere. Round to the nearest hundredth, if necessary.



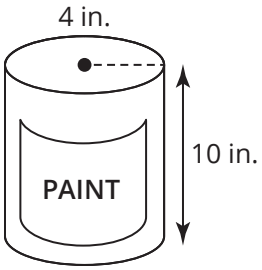
7. A cylindrical poster tube has a height of 10 inches and a diameter of 6 inches. You need to add a label to the body of the tube before putting it on display. What is the lateral surface area of the cylinder? Round to the nearest hundredth, if necessary.

8. A shipping company offers two different cylinder-boxes to mail out their items.



Suppose it costs $0.02 per square inch for cardboard. Which box costs more to use? Explain your reasoning.

9. Determine the volume of the cylinder. Round the answer to the nearest hundredth, if necessary.



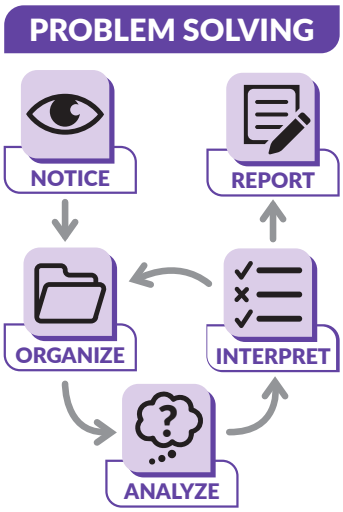
10. The volume of a cylinder is 84.5π cubic meters. The radius is 2.6 meters. Determine the height of the cylinder in meters.

GRADE 8

The slope of a new wheelchair ramp, which describes its steepness and direction, can be determined by using the formula slope $= \frac{rise}{run}$.

Performance Tasks

1 Performance Task



Writing and Graphing Equations

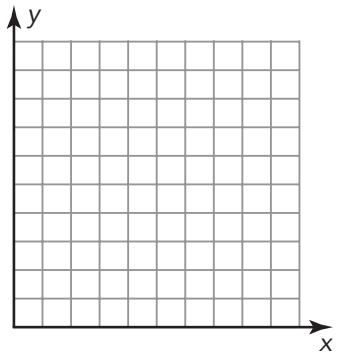
The high school carpentry class removed an old wheelchair ramp to replace it with a new ramp. The previous ramp had a rise of 1 inch for every 1 foot, but the new ramp had a rise of 1 inch for every 18 inches. Both the old and new ramps had the same total run of 30 feet.

- Which ramp is steeper? Explain your reasoning using a sketch of each ramp.

One of the students measured the rise of the new ramp at the middle point of the ramp at a run of 15 feet.

- Use similar triangles to determine the rise at 15 feet and then at 30 feet. Explain your determinations using a new sketch.

- Write linear equations for each ramp and use the grid below to graph and label the lines.



- Explain whether the equations represent proportional relationships, and identify any constants of proportionality.
- What is the relationship between the constant of proportionality and the slope of the line?

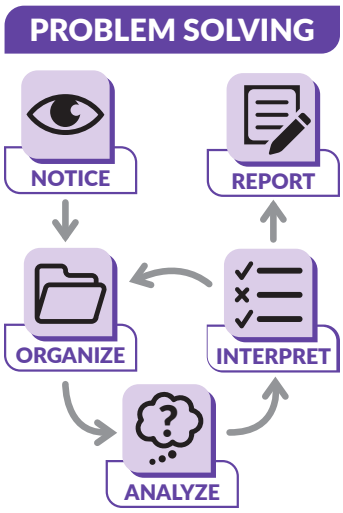
Your work should include:

- Comparison of the steepness of the two ramps. (3 points)
- Sketch and calculations showing similar triangles to determine heights. (3 points)
- Linear equations and a corresponding graph for each ramp. (3 points)
- Statement about proportionality and any constants of proportionality. (3 points)

Rubric: 12 Total Points

	0 points	1 point	2 points	3 points
Comparison of Steepness of Ramps	No comparison given.	The comparison is incorrect.	The comparison is correct, but the explanation is missing.	The comparison is correct and has a complete explanation.
Sketches and Calculations	No sketches or calculations given.	The sketch is given, but the calculations are missing.	The sketch is correct, but the calculations include errors.	The sketch and the calculations are complete and correct.
Equations	No equations given.	One or both equations are incorrect.	Both equations are correct, but the variables aren't defined.	Both equations are complete and correct with variables defined.
Statement	No statement given.	The statement is given but contains errors. No mention of the constants of proportionality.	At least two statements of proportionality, the constants of proportionality, and slope are correct.	All statements of proportionality, the constants of proportionality, and slope are correct.

2 Performance Task



Slope

Natalia is planning a birthday party and is considering several locations. After searching online, Natalia gathered the following information about the cost of each location.

The Springtime Hotel	Royal Willow Resort	Atlantis Gardens Hotel
We take care of all your birthday party needs!	Celebrate like royalty!	You bring the fun. We take care of the rest!

The Springtime Hotel

Number of Guests	Cost ($)
0	800
10	950
25	1175
50	1550

Royal Willow Resort

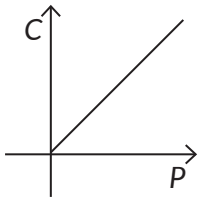
Number of Guests	Cost ($)
12	300
30	750
45	1125
70	1750

Atlantis Gardens Hotel

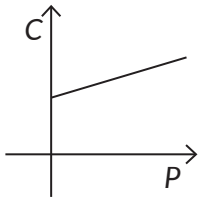
Number of Guests	Cost ($)
15	2300
32	2300
48	2300
75	2300

- Which graph corresponds to each party location? Explain how you know.

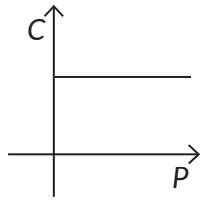
Graph 1



Graph 2



Graph 3



- Calculate the slope for each party location. Explain the meaning of each slope in context and then compare them.

- Calculate the *y*-intercept for each party location. Explain the meaning of each *y*-intercept in context and then compare them.

- Write a linear equation to represent the cost of each location.

- Do your equations support your explanation of the earlier question of matching the table of values to the graphs? Explain.

- Use your equations to determine which location Natalia should select for 60 guests.

- Natalia has a budget of $2150 to spend on the birthday party. She wants to invite as many people as possible. Use your equations to determine which location Natalia should choose.

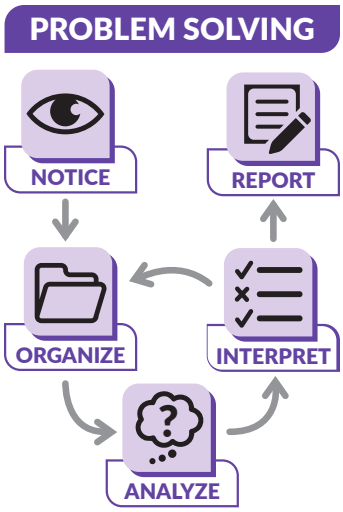
Your work should include:

- Matching locations to graphs with an explanation. (3 points)
- Calculations and comparisons of the slopes of each line. (3 points)
- Calculations and comparisons of the *y*-intercepts of each line. (3 points)
- Equations for each location. (3 points)
- Statements about which location Natalia should select based on given information. (3 points)

Rubric: 15 Total Points

	0 points	1 point	2 points	3 points
Matching Locations to Graphs	No locations are matches to the graphs.	The locations are matched incorrectly to the graphs.	Only one location is matched incorrectly or there is no explanation.	The locations are matched correctly and the explanation is complete and correct.
Calculation and Comparison of Slopes	All calculations and comparisons are either incorrect or not given.	Two or more of the calculations and comparisons are incorrect.	One of the calculations or comparisons is incorrect.	All of the calculations and comparisons are correct.
Calculation and Comparison of *y*-Intercepts	All calculations and comparisons are either incorrect or not given.	Two or more of the calculations and comparisons are incorrect.	One of the calculations or comparisons is incorrect.	All of the calculations and comparisons are correct.
Equations	All equations are incorrect or not given.	Two or more equations are incorrect.	One equation is incorrect.	All equations are correct.
Selections of Location	Both statements for the best location are incorrect or not given and does not include math work.	One statement is incorrect or there is not sufficient math work.	Both statements for the best location are correct, but math work includes errors.	Both statements for the best location are correct with supporting math work.

3 Performance Task



Equations with Variables on Both Sides

Kaya is planning an end of summer party. She is comparing the prices of different venues for different numbers of guests. She knows she will have at least ten guests attend, but she does not know the total number of guests.

Go-Kart	Arcade	Laser Tag	Bowling	Skating
$75 for the first 10 people Each additional person $15	$230 for the first 10 people Each additional person $10	$200 for the first 10 people Each additional person $20	$149.50 for the first 10 people Each additional person $15	$149.50 for the first 10 people Each additional person $15

Determine the total number of guests that would need to attend the party for each given situation to be true.

- The cost of a go-kart party is the same as the cost of an arcade party.
- The cost of an arcade party is the same as the cost of a laser tag party.
- The cost of a laser tag party is twice the cost of a go-kart party.
- The cost of a bowling party is the same as the cost of a skating party.
- The cost of the go-kart party is the same as the cost of a bowling party.
- For a $1000 budget, which party venue would allow Kaya to invite the most party guests for her budget?

Your work should include:

- Defined variable(s). (1 point)
- Expressions for each venue and equations for each given situation. (3 points)
- Work shown to determine each solution. (2 points)
- Interpretation of solutions to determine the number of people for each given situation. (3 points)
- Statement about party venue that allows most guests for a given budget with supporting math work. (3 points)

Rubric: 12 Total Points

	0 points	1 point	2 points	3 points
Variable	No variable is defined.	Variable is defined.	N/A	N/A
Expressions and Equations	No expressions or equations are given.	Expressions are given for each party venue, but no equations are shown for scenarios.	Expressions and equations are given but contain errors.	Expressions are given for each party venue and accurate equations are given to represent each scenario.
Calculations	No calculations are shown.	Calculations are shown but include errors.	Complete, accurate calculations are shown.	N/A
Interpretation of Solutions	No interpretation is given.	Interpretation is given but includes logic errors.	Interpretation is given but interprets a as the total number of people instead of the number of additional people.	Accurate interpretation of solutions is given.
Statement about the venue that allows most guests for $1000	The incorrect party venue is selected, and math work is incorrect or not included.	The incorrect party venue is selected, or math work has many computation errors.	The correct party venue is selected, but math work has minor computation errors.	The correct party venue is selected with correct supporting math work.

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