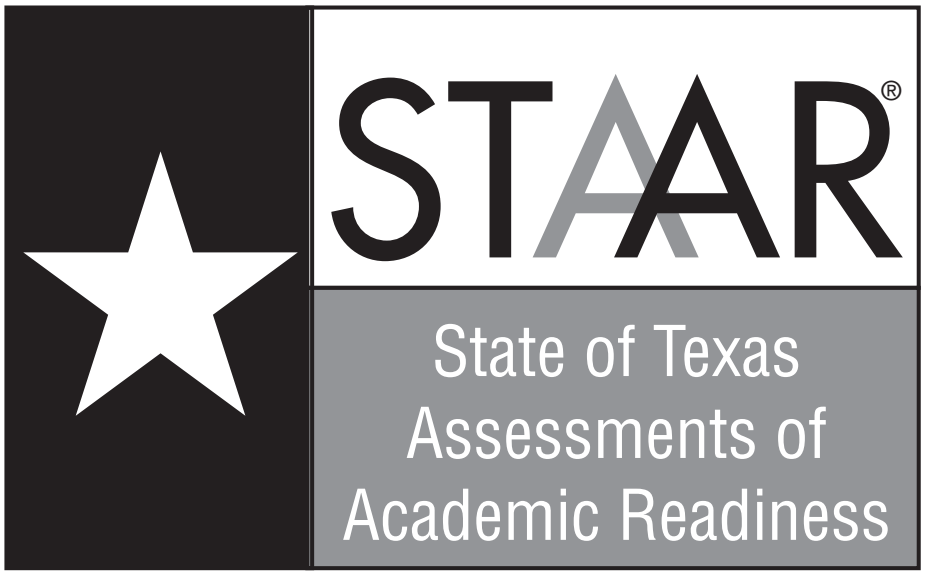

GRADE 8

Mathematics

Administered May 2022

RELEASED

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STAAR GRADE 8 MATHEMATICS REFERENCE MATERIALS

STAAR® State of Texas Assessments of Academic Readiness

LINEAR EQUATIONS

Slope-intercept form	$y = mx + b$
Direct variation	$y = kx$
Slope of a line	$m = \frac{y_2 - y_1}{x_2 - x_1}$

CIRCUMFERENCE

Circle	$C = 2\pi r$	or	$C = \pi d$

AREA

Triangle	$A = \frac{1}{2}bh$
Rectangle or parallelogram	$A = bh$
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$
Circle	$A = \pi r^2$

SURFACE AREA

	Lateral	Total
Prism	$S = Ph$	$S = Ph + 2B$
Cylinder	$S = 2\pi rh$	$S = 2\pi rh + 2\pi r^2$

VOLUME

Prism or cylinder	$V = Bh$
Pyramid or cone	$V = \frac{1}{3}Bh$
Sphere	$V = \frac{4}{3}\pi r^3$

ADDITIONAL INFORMATION

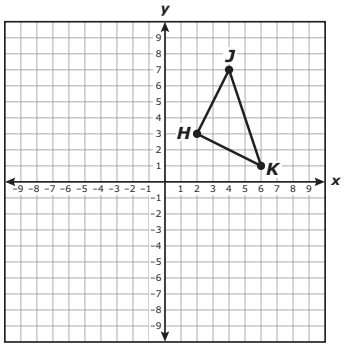
Pythagorean theorem	$a^2 + b^2 = c^2$
Simple interest	$I = Prt$
Compound interest	$A = P(1 + r)^t$

MATHEMATICS

DIRECTIONS

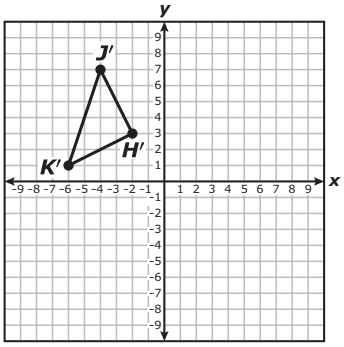
Read each question carefully. For a multiple-choice question, determine the best answer to the question from the four answer choices provided. For a griddable question, determine the best answer to the question. Then fill in the answer on your answer document.

1 Triangle *HJK* is graphed on the coordinate grid. Triangle *HJK* will be transformed using the rule $(x, y) \rightarrow (-x, y)$ to create triangle *H′J′K′*.



Which graph represents triangle *H′J′K′*?

A



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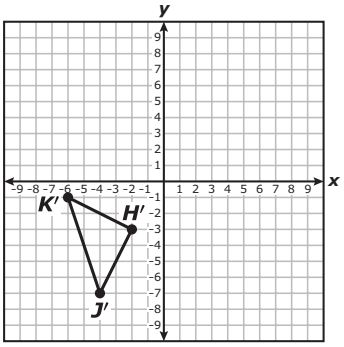

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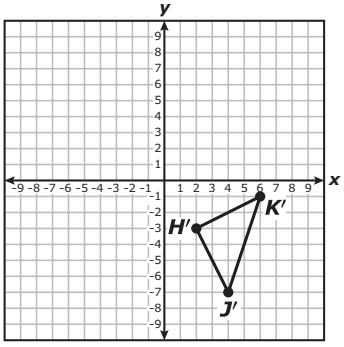
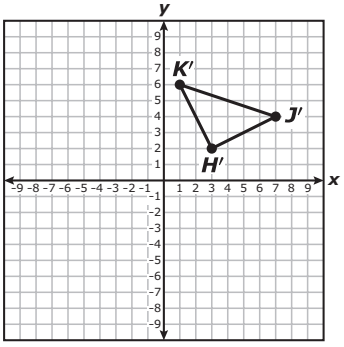
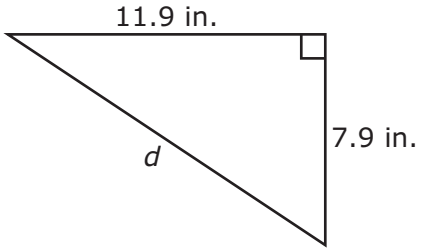


D



GO ON

2 The diagram shows a right triangle and the lengths of two of its sides in inches.



Which measurement is closest to the value of d in inches?

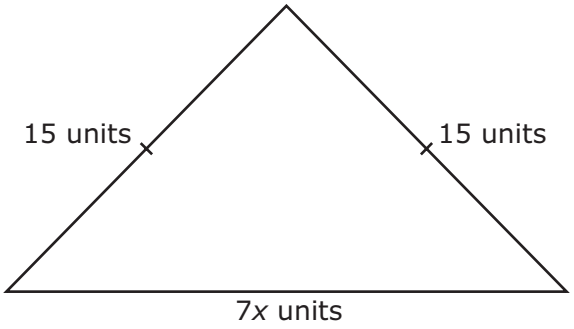
F 6.3 in.

G 4.0 in.

H 14.3 in.

J 19.8 in.

3 The perimeter of the triangle shown is $17x$ units. The dimensions of the triangle are given in units.



Which equation can be used to find the value of x?

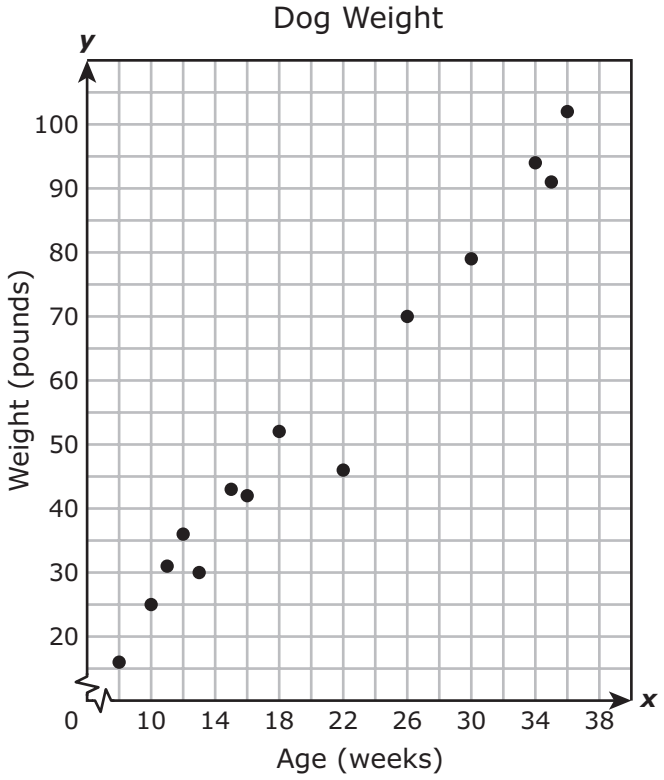
A $17x = 30 + 7x$

B $17x = 15 + 22x$

C $17x = 7 + 30x$

D $17x = 22 + 15x$

4 The scatterplot shows the relationship between the weight in pounds and the age in weeks of a certain dog breed.



Based on the scatterplot, which is the best prediction of the weight in pounds of a dog that is 28 weeks old?

F 12 lb

G 75 lb

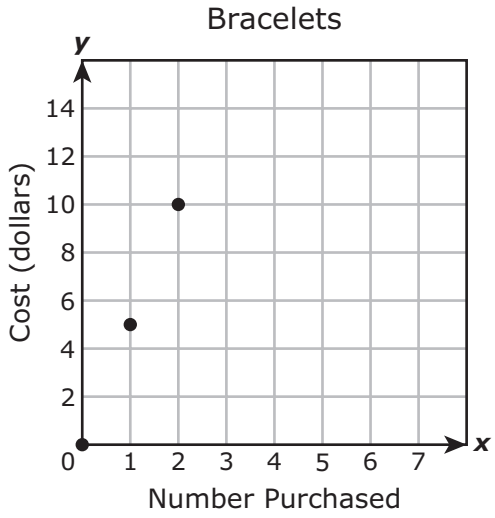
H 45 lb

J 105 lb

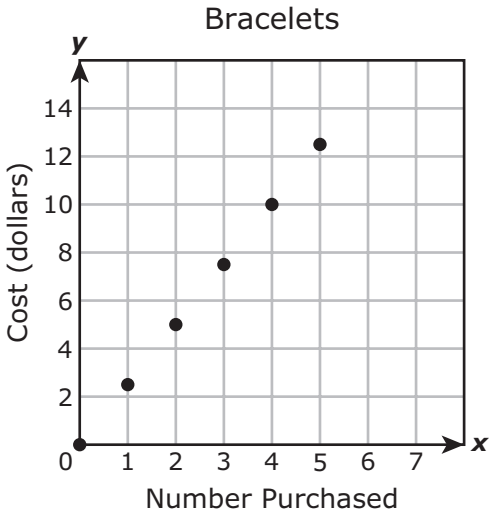
5 Gwen spent $12.50 to purchase 5 bracelets. Each bracelet cost the same amount.

Which graph has a slope that best represents this rate?

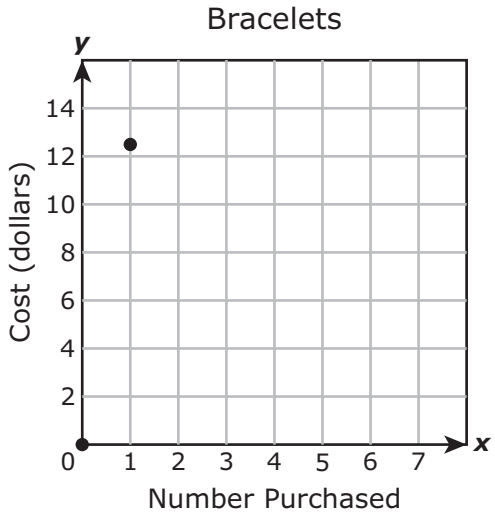
A



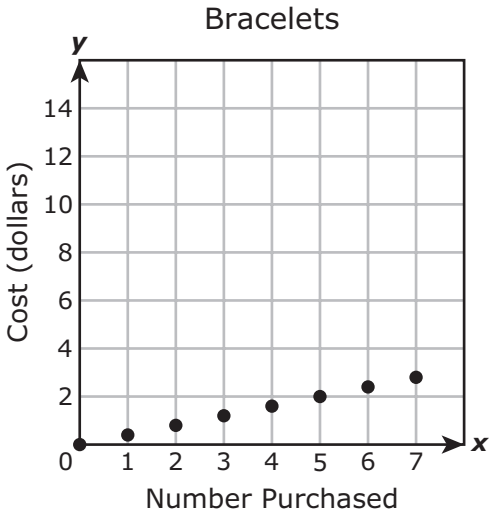
C



B



D



6 A cylinder has a height of 5 feet and a diameter of 2 feet. Which measurement is closest to the volume of the cylinder in cubic feet?

F $62.8\ ft^3$

G $15.7\ ft^3$

H $78.5\ ft^3$

J $157.1\ ft^3$

---

7 A list of numbers ordered from least value to greatest value is shown. One number is missing.

$$\frac{18}{5},\ 3.71,\ ____,\ \sqrt{17}$$

Which number could be the missing number?

A 4.5

B 3.8%

C $\frac{57}{15}$

D $(3.9)^2$

8 A rectangle is graphed on a coordinate grid. Which transformation will result in a rectangle that is NOT congruent to the original rectangle?

F A dilation by a scale factor of 3

G A rotation of 180° counterclockwise

H A translation 90 units to the right

J A reflection across the *x*-axis

---

9 There are a total of 463,100 books in a library. What is the value of the exponent when this number is written in scientific notation?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

10 Monica wants to open a savings account with a deposit of $3,000. Monica will not make any additional deposits or withdrawals after she opens the account. Her bank offers two different savings accounts.

- Account X pays 2.1% simple annual interest.
- Account Y pays 2.4% interest compounded annually.

Which statement about these accounts at the end of 5 years is true?

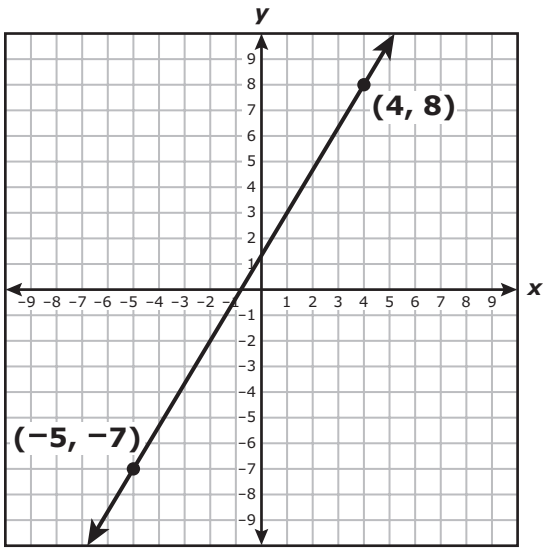
F Account X would earn Monica about $62.70 more interest than Account Y.

G Account Y would earn Monica about $62.70 more interest than Account X.

H Account X would earn Monica about $45.00 more interest than Account Y.

J Account Y would earn Monica about $45.00 more interest than Account X.

11 The graph of a linear function is shown on the coordinate grid.



What is the *y*-intercept of the graph of this function?

A $\frac{3}{2}$

B $\frac{4}{5}$

C $\frac{5}{3}$

D $\frac{4}{3}$

12 A circle is graphed on a coordinate grid with its center at $(-4, 7)$.

The circle will be translated p units to the right and v units down.

Which rule describes the center of the new circle after this translation?

F $(x, y) \rightarrow (-4 + p, 7 + v)$

G $(x, y) \rightarrow (-4 + p, 7 - v)$

H $(x, y) \rightarrow (-4 - p, 7 - v)$

J $(x, y) \rightarrow (-4 - p, 7 + v)$

---

13 Rhonda's job is to drive a car for a company. Each month she is paid the same salary. She is also paid extra money for the number of miles she drives the car each month.

- In July Rhonda drove 640 miles and was paid a total of $3,502.00.
- In August Rhonda drove 820 miles and was paid a total of $3,601.00.

Which function can be used to find y, the total amount she is paid in a month if she drives x miles?

A $y = 5.47x$

B $y = 4.39x$

C $y = 0.55x + 3{,}150$

D $y = 3{,}150x + 0.55$

14 The table shows the cost per year of attending different types of colleges.

Type of College	Cost per Year (dollars)
Public — 2 year (in state)	4,000
Public — 4 year (in state)	11,000
Public — 4 year (out of state)	28,000
Private — 4 year	38,000

A student is planning to attend college in 5 years. The student has saved $1,200 and plans to save another $50 per month over the next 60 months.

Based on this information about the student's plan, which statement about the possible choices for a college is true?

F The student would be able to afford the costs for one year at a private 4-year college.

G The student would be able to afford out-of-state costs for half a year at a 4-year public college.

H The student would be able to afford in-state costs for half a year at a public 4-year college.

J The student would be able to afford in-state costs for one year at a public 2-year college.

15 Fulgurites are pieces of glass in the shape of a cylinder produced when lightning strikes sand. A student found a fulgurite with a height of 21 inches and a diameter of 6 inches.

Which equation can be used to find V, the volume of the fulgurite in cubic inches?

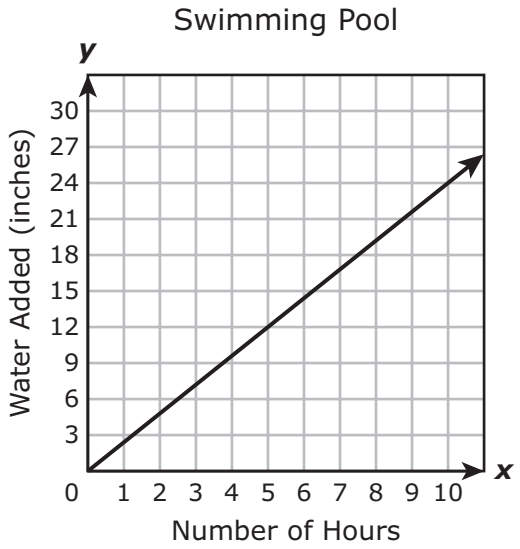
A $V = \pi(6)^2(21)$

B $V = \pi(3)^2(21)$

C $V = \pi(6)(21)$

D $V = \pi(3)(21)$

16 The line graphed on the coordinate grid can be used to determine the number of inches of water added to a swimming pool after different numbers of hours.



Which statement best describes the slope of the graphed line?

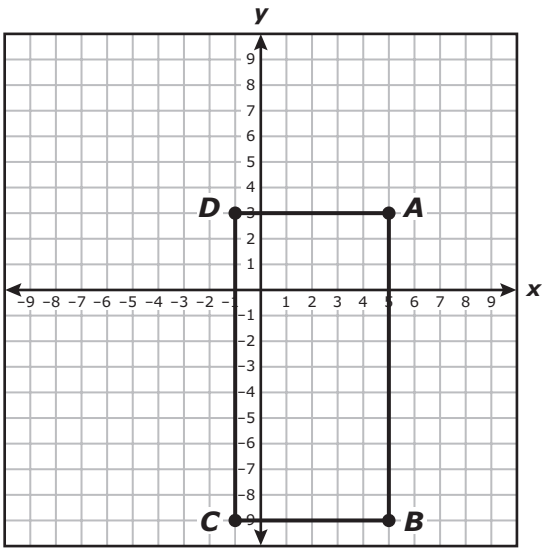
F The water is being added at a rate of 0.42 inch per hour.

G The water is being added at a rate of 0.80 inch per hour.

H The water is being added at a rate of 2.40 inches per hour.

J The water is being added at a rate of 1.25 inches per hour.

17 The coordinates of the vertices of a rectangle are A (5, 3), B (5, – 9), C (– 1, – 9), and D (– 1, 3).



Which measurement is closest to the distance between point B and point D in units?

A 5.8 units

B 13.4 units

C 10.4 units

D 9.1 units

18 Which situation describes a non-proportional relationship?

F The circumference of a circle with a radius of x units can be represented by $y = 2\pi x$.

G The perimeter of an equilateral triangle with a side length of x units can be represented by $y = 3x$.

H The total surface area of a cylinder with a radius of 1 unit and height of x units can be represented by $y = 2\pi x + 2\pi$.

J The radius of a circle with a diameter of x units can be represented by $y = \frac{1}{2}x$.

---

19 Pentagon *PQRST* was graphed on a coordinate grid. Pentagon *PQRST* was rotated 90° counterclockwise about the origin to form pentagon *P′Q′R′S′T′*.

Which statement is true?

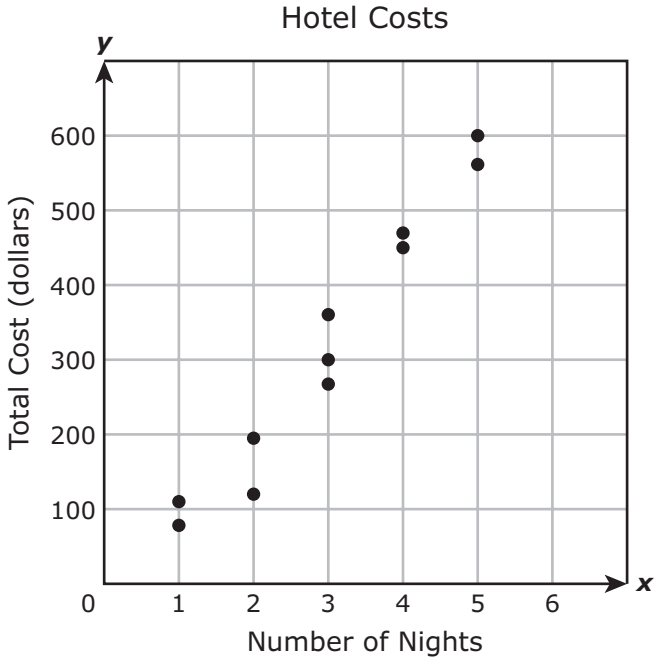
A The area of pentagon *P′Q′R′S′T′* is not equal to the area of pentagon *PQRST*.

B Pentagon *P′Q′R′S′T′* is not congruent to pentagon *PQRST*.

C The perimeter of pentagon *P′Q′R′S′T′* is greater than the perimeter of pentagon *PQRST*.

D The angle measures of pentagon *P′Q′R′S′T′* are congruent to the corresponding angle measures of pentagon *PQRST*.

20 The scatterplot shows the relationship between the number of nights spent in a hotel and the total cost for the hotel.



Which conclusion is best supported by the scatterplot?

F As the number of nights spent in a hotel increases, the total cost for the hotel increases.

G As the number of nights spent in a hotel increases, the total cost for the hotel decreases.

H As the number of nights spent in a hotel increases, the total cost for the hotel remains the same.

J There is no relationship between the number of nights spent in a hotel and the total cost for the hotel.

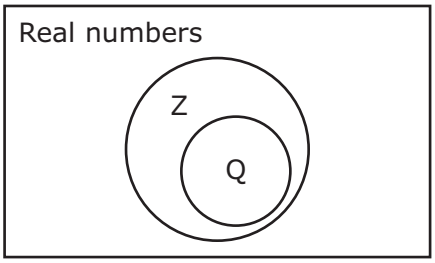
21 Set Q and Set Z are subsets of the real number system.

$$Q = \{\text{rational numbers}\}$$

$$Z = \{\text{integers}\}$$

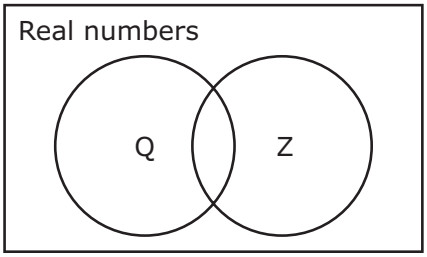
Which Venn diagram best represents the relationship between Set Q and Set Z?

A



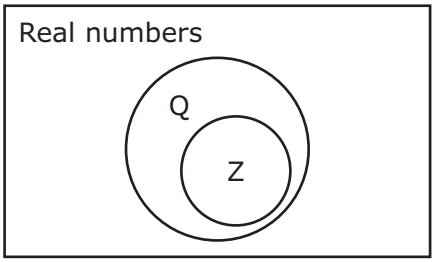
, because all rational numbers are integers

B



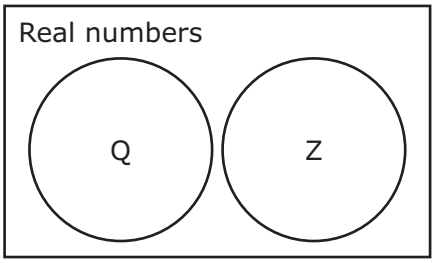
, because some integers are not rational numbers

C



, because all integers are rational numbers

D



, because the rational numbers and the integers have no elements in common

22 A teacher bought sets of books at a cost of $17.95 per set. The teacher also paid a one-time shipping fee of $22.

Which table shows the relationship between the total cost of the books and the number of sets of books the teacher bought?

F

Cost of Books

Sets of Books	Total Cost (dollars)
16	369.95
20	457.95
24	545.95
28	633.95

H

Cost of Books

Sets of Books	Total Cost (dollars)
16	682.10
20	753.90
24	825.70
28	897.50

G

Cost of Books

Sets of Books	Total Cost (dollars)
16	746.90
20	834.90
24	922.90
28	1,010.90

J

Cost of Books

Sets of Books	Total Cost (dollars)
16	309.20
20	381.00
24	452.80
28	524.60

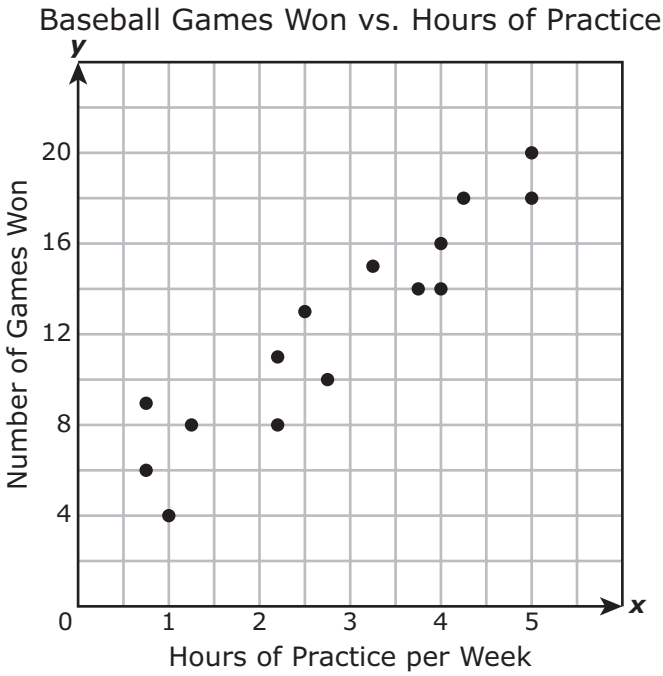
23 Two customers spent the same total amount of money at a restaurant.

- The first customer bought 8 hot wings and left a $4 tip.
- The second customer bought 10 hot wings and left a $2.80 tip.
- Both customers paid the same amount per hot wing.

How much does one hot wing cost at this restaurant in dollars and cents?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

24 The scatterplot shows the relationship between the number of games a baseball team won in a season and the number of hours the team practiced each week during the season.



Based on the scatterplot, which is the best prediction of the number of games a baseball team won if the team practiced 3 hours each week during the season?

F 10 games

G 20 games

H 13 games

J 15 games

25 Which measurements could represent the side lengths in feet of a right triangle?

A 10 ft, 24 ft, 26 ft

B 14 ft, 14 ft, 14 ft

C 3 ft, 3 ft, 18 ft

D 2 ft, 3 ft, 5 ft

26 The table shows the coordinates of the vertices of pentagon *ABCDE*.

x	y
−1	1
1	6
4	1
2	−5
−6	−2

Pentagon *ABCDE* is dilated by a scale factor of $\frac{7}{3}$ with the origin as the center of dilation to create pentagon $A'B'C'D'E'$. If (x, y) represents the location of any point on pentagon *ABCDE*, which ordered pair represents the location of the corresponding point on pentagon $A'B'C'D'E'$?

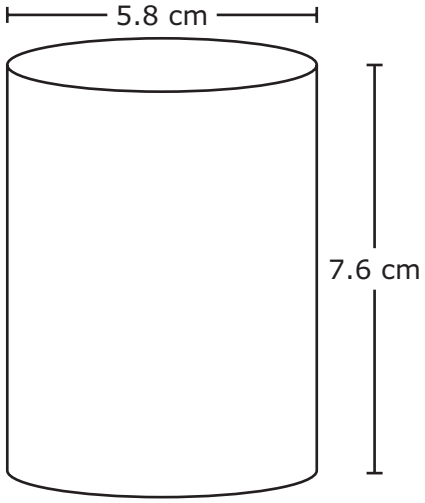
F $(\frac{3}{7}x, \frac{3}{7}y)$

G $(x+\frac{7}{3}, y+\frac{7}{3})$

H $(x+\frac{3}{7}, y+\frac{3}{7})$

J $(\frac{7}{3}x, \frac{7}{3}y)$

27 The dimensions of a cylinder are shown in the diagram.



Which measurement is closest to the lateral surface area in square centimeters of the cylinder?

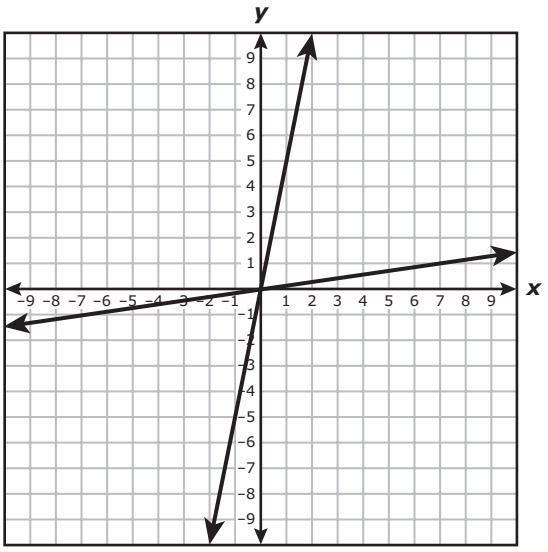
A 164.9 cm^2

B 277.0 cm^2

C 138.5 cm^2

D 191.3 cm^2

28 The two lines graphed on the coordinate grid represent a system of equations.



What is the *x*-coordinate of the ordered pair that best represents a solution to both equations?

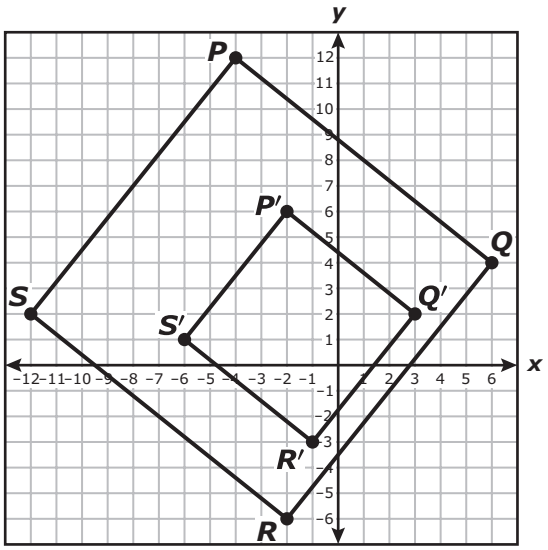
F $\frac{1}{7}$

G 0

H 5

J 7

29 Quadrilateral *PQRS* is dilated with the origin as the center of dilation to create quadrilateral *P′Q′R′S′*. The coordinates of each vertex are integers.



Which statement is true?

A Each side length of quadrilateral *PQRS* is $\frac{1}{2}$ the corresponding side length of quadrilateral *P′Q′R′S′*.

B Quadrilateral *P′Q′R′S′* is congruent to quadrilateral *PQRS*.

C Each angle measure of quadrilateral *PQRS* is $\frac{1}{2}$ the corresponding angle measure of quadrilateral *P′Q′R′S′*.

D Quadrilateral *P′Q′R′S′* is similar to quadrilateral *PQRS*.

30 The list shows the weight in pounds of 6 puppies at birth.

3, 1.6, 2.8, 2.5, 1.7, 2.8

What is the mean absolute deviation of these numbers?

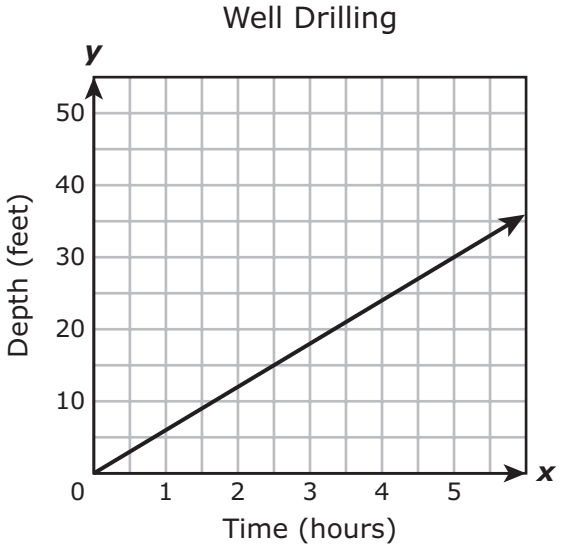
F 0.5

G 2.4

H 1.9

J 14.4

31 A company is drilling a water well. The graph models the linear relationship between the depth of the well and the time spent drilling.



Which function best represents the relationship between y and x?

A $y = 6x$

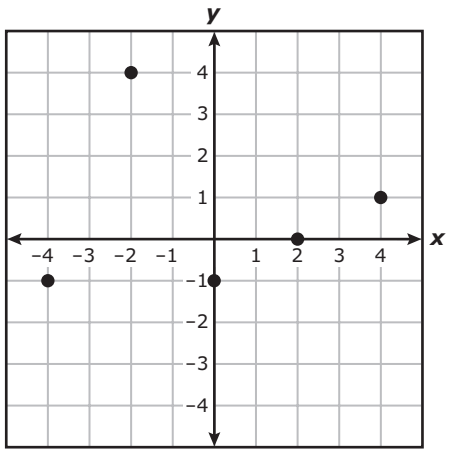
B $y = 30x$

C $y = 5x + 30$

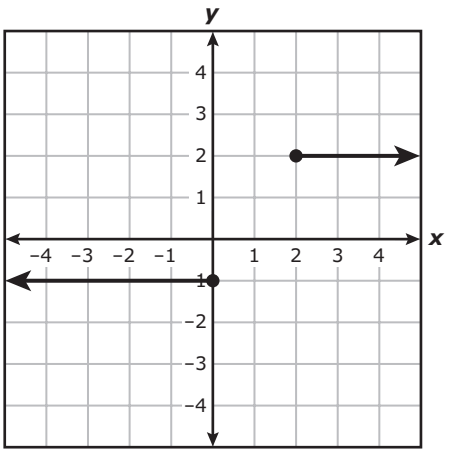
D $y = 6x + 30$

32 Which graph does NOT represent y as a function of x?

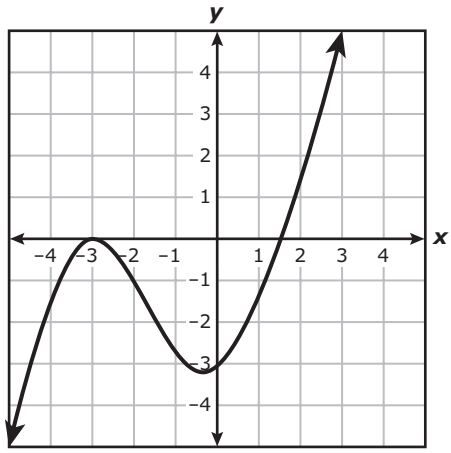
F



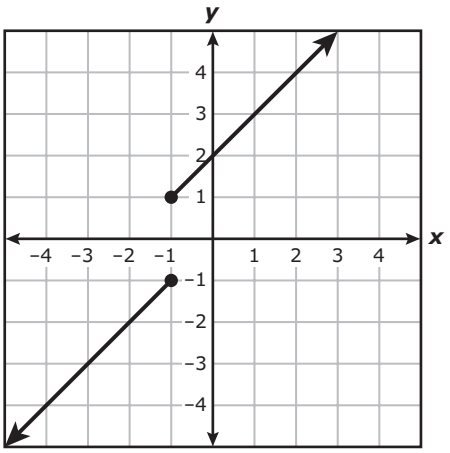
H



G



J



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33 Mount Fuji in Japan can be modeled as a cone with a diameter of 25 miles and a height of 2.35 miles. Which measurement is closest to the volume of Mount Fuji in cubic miles?

A 1,154 mi^3

B 385 mi^3

C 1,538 mi^3

D 72 mi^3

34 A new refrigerator comes packaged in a box shaped like a rectangular prism. The base of the box measures 4 feet by 5 feet. The total surface area of the box is 148 square feet.

What is the height of the box in feet?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

---

35 Two student groups went to an amusement park on the same day.

- Group 1 bought 9 tickets and received a $120 discount.
- Group 2 bought 3 tickets and received a $30 discount.
- Both groups spent the same total amount of money on tickets.
- The price of each ticket was the same.

What was the cost of each ticket?

A $25

B $12.50

C $15

D $7.50

36 Which set of ordered pairs represents y as a function of x?

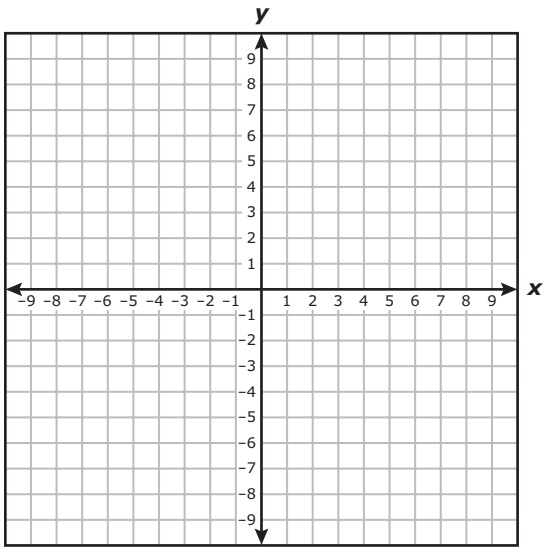
F $\{(4, \sqrt{17}), (2, \sqrt{6}), (1, \sqrt{3}), (1, \sqrt{10})\}$

G $\{(-7, 2.9), (-15, 5.9), (-15, 8.9), (-7, 11.9)\}$

H $\{(11.1, 7), (5.1, 4), (12.1, 5), (6.1, 7)\}$

J $\{(\sqrt{1}, -3), (\sqrt{2}, -4), (\sqrt{1}, -5), (\sqrt{6}, -7)\}$

37 The coordinates of the vertices of triangle XYZ are $X(-2, -1)$, $Y(6, 8)$ and $Z(8, 4)$. Triangle XYZ is dilated by a scale factor of $\frac{3}{2}$ with the origin as the center of dilation to create triangle $X'Y'Z'$.



If (x, y) represents the location of any point on triangle XYZ, which ordered pair represents the location of the corresponding point on triangle $X'Y'Z'$?

A $(\frac{3}{2}x, \frac{3}{2}y)$

B $(x+\frac{3}{2}, y+\frac{3}{2})$

C $(\frac{2}{3}x, \frac{2}{3}y)$

D $(x+\frac{2}{3}, y+\frac{2}{3})$

38 Larry put $1,287 into a savings account 8 years ago.

- The account earned 4% simple annual interest.
- He made no additional deposits or withdrawals.

Based on this information, what is the balance in dollars and cents in Larry's savings account at the end of these 8 years?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

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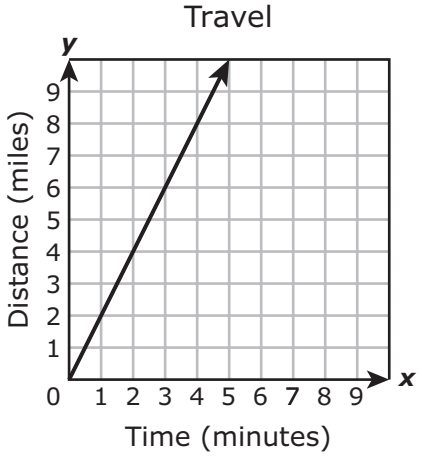
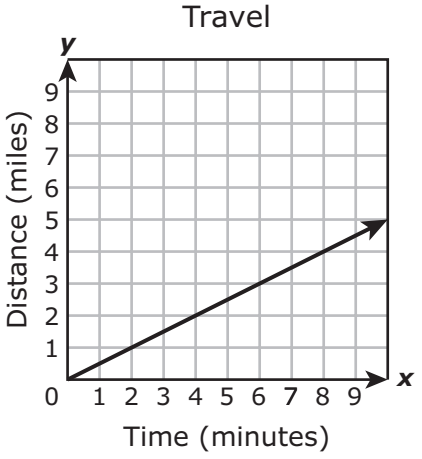
39 A student traveled a distance of 68 miles in 136 minutes. Which graph has a slope that best represents this rate?

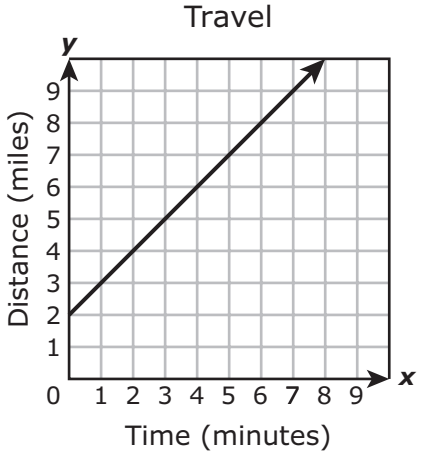
A



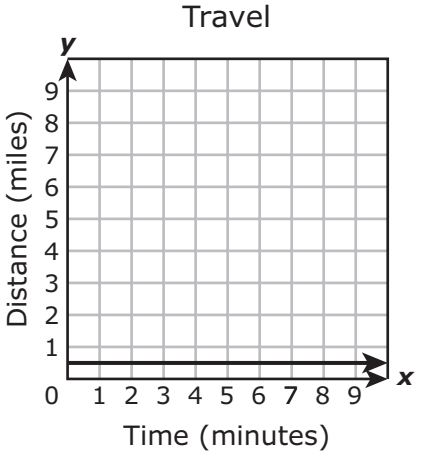
C



B



D



40 The cost for electricity varies directly with the amount of kilowatt-hours of electricity used. The cost for using 1,079 kilowatt-hours of electricity was $129.48.

What was the cost for using 908 kilowatt-hours of electricity?

F $41.52

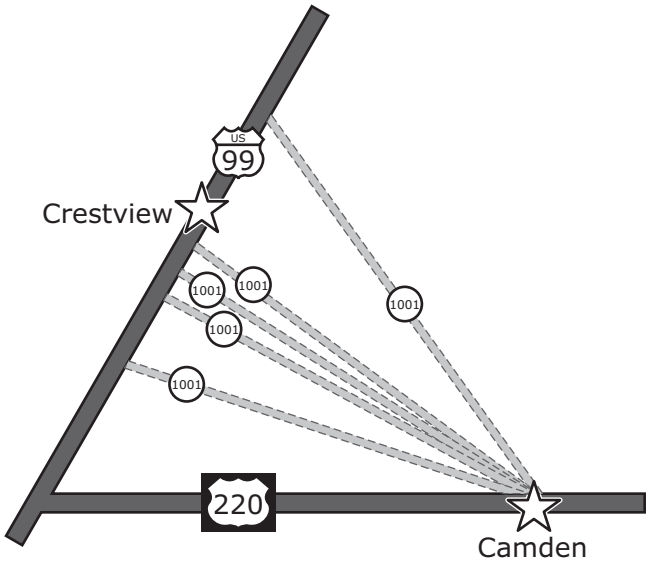
G $153.86

H $75.67

J $108.96

41 The map shows five proposed routes and distances for a new state highway between Camden and U.S. Highway 99.

Proposed Routes for State Highway 1001



Distances for Different Proposed Routes (km)
$\frac{675}{16}$
40
$\sqrt{2,111}$
$\frac{586}{13}$
$10\sqrt{17}$

Which list shows these distances from least to greatest?

A $10\sqrt{17}, 40, \frac{586}{13}, \frac{675}{16}, \sqrt{2,111}$

B $40, 10\sqrt{17}, \frac{675}{16}, \frac{586}{13}, \sqrt{2,111}$

C $\frac{586}{13}, \frac{675}{16}, 10\sqrt{17}, \sqrt{2,111}, 40$

D $40, \frac{675}{16}, \frac{586}{13}, \sqrt{2,111}, 10\sqrt{17}$

42 Which situation can be represented by this equation?

$$18x = 19 + 12x$$

F Krystal reads 12 pages per hour. Jondo reads 18 pages per hour. How many hours, x, would it take for Krystal and Jondo to read the same number of pages?

G Krystal paid a deposit of $19 plus $18 per hour to rent a dining room at a restaurant. Jondo paid $12 per hour to rent a dining room at a restaurant. How many hours, x, would it take for Krystal and Jondo to pay the same amount of money?

H Krystal installs 12 tiles per hour. Jondo installs 19 tiles per hour and started with 18 tiles already installed. How many hours, x, would it take for Krystal and Jondo to install the same number of tiles?

J Krystal can make $18 per hour by tutoring. Jondo can make $12 per hour by tutoring. Jondo already has $19. How many hours, x, would Krystal and Jondo need to tutor for them to have the same amount of money?

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS ON THE ANSWER DOCUMENT.

STOP

STAAR
GRADE 8
Mathematics
May 2022