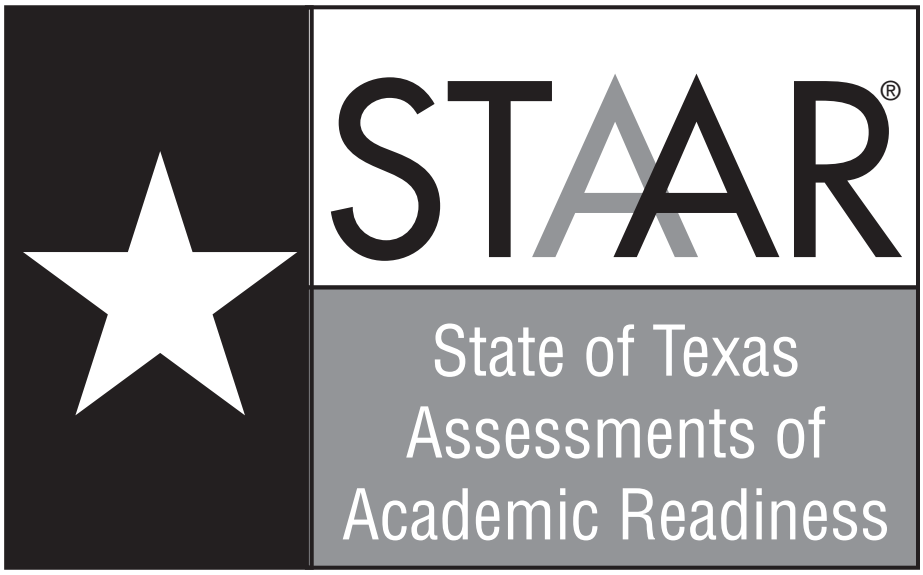


GRADE 8

Mathematics

Administered April 2018

RELEASED

STAAR GRADE 8 MATHEMATICS REFERENCE MATERIALS

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 A fishbowl shaped like a sphere is filled with water. The fishbowl has a diameter of 16 inches. Which measurement is closest to the volume of water in the fishbowl in cubic inches?

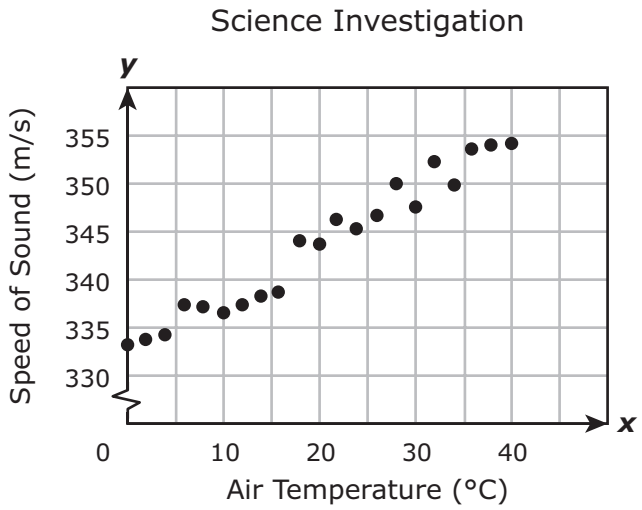
A 2,144.66 $in.^3$

B 17,157.28 $in.^3$

C 5,461.67 $in.^3$

D 6,433.98 $in.^3$

2 Students in a science class investigated how the speed of sound changes with the air temperature outside. The data are shown in the scatterplot.



Based on the scatterplot, what is the best prediction of the speed of sound when the air temperature is 50°C?

F 350 m/s

G 355 m/s

H 360 m/s

J 365 m/s

3 Four plumbers estimated the length of the radius of a cylindrical pipe. The estimates made by the plumbers are listed.

- Plumber W estimated that the radius had a length of $\frac{3}{25}$ inches.
- Plumber X estimated that the radius had a length of $\frac{\sqrt{3}}{11}$ inches.
- Plumber Y estimated that the radius had a length of $\frac{9}{100}$ inches.
- Plumber Z estimated that the radius had a length of $\frac{\pi}{24}$ inches.

Which list shows these lengths in order from greatest to least?

A $\frac{9}{100}, \frac{\pi}{24}, \frac{3}{25}, \frac{\sqrt{3}}{11}$

B $\frac{\sqrt{3}}{11}, \frac{\pi}{24}, \frac{3}{25}, \frac{9}{100}$

C $\frac{9}{100}, \frac{3}{25}, \frac{\pi}{24}, \frac{\sqrt{3}}{11}$

D $\frac{\sqrt{3}}{11}, \frac{3}{25}, \frac{\pi}{24}, \frac{9}{100}$

---

4 Jerry has a new job and earns a salary of $45,000. Victoria has a new job and earns a salary of $54,000. Jerry will receive a salary increase of $2,500 per year, and Victoria will receive a salary increase of $1,500 per year.

Which equation can be used to find x, the number of years it will take Jerry to earn the same salary as Victoria?

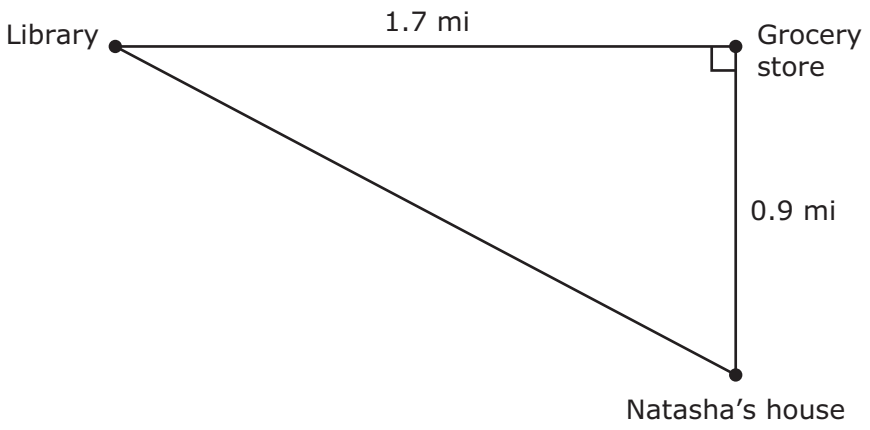
F $45{,}000x + 2{,}500x = 54{,}000x + 1{,}500x$

G $45{,}000x + 2{,}500 = 54{,}000x + 1{,}500$

H $45{,}000 + 2{,}500x = 54{,}000 + 1{,}500x$

J $45{,}000x + 2{,}500x = 54{,}000x + 1{,}500$

5 Natasha walked from the library to the grocery store and then to her house. The diagram shows the top view of the locations of these three places and their distances from each other.



Which measurement is closest to the shortest distance in miles from Natasha's house to the library?

A 2.6 mi

B 1.9 mi

C 1.4 mi

D 2.3 mi

---

6 A relation contains the points $(1, 2)$, $(2, -1)$, $(3, 0)$, $(4, 1)$, and $(5, -1)$. Which statement accurately describes this relation?

F The relation does not represent y as a function of x, because each value of x is associated with a single value of y.

G The relation represents y as a function of x, because one value of y is associated with two values of x.

H The relation does not represent y as a function of x, because each value of y is associated with two values of x.

J The relation represents y as a function of x, because each value of x is associated with a single value of y.

7 In a museum there is a sculpture in the shape of a cylinder. The cylinder has a diameter of 12 feet and a height of h feet. Which equation can be used to find V, the volume of the cylinder in cubic feet?

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

B $V = \pi(6h)^2$

C $V = \pi(12)^2h$

D $V = \pi(12h)^2$

---

8 Julie started with 20 pieces of gum and gave away x pieces. Conrad started with 35 pieces of gum and gave away twice as many pieces as Julie did.

How many pieces of gum did Julie give away if they had the same number of pieces of gum left?

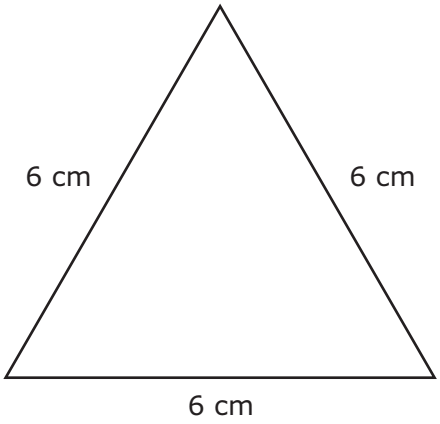
F 18

G 5

H 15

J 8

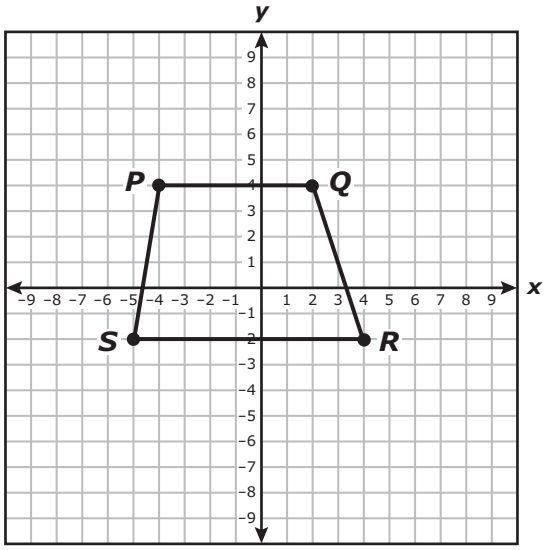
9 A container is shaped like a triangular prism. Each base of the container is an equilateral triangle with the dimensions shown.



The container has a height of 15 centimeters. What is the lateral surface area of the container in square centimeters?

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

10 Trapezoid *PQRS* is rotated 180° about the origin to form trapezoid *P′Q′R′S′*.



Which statement is true?

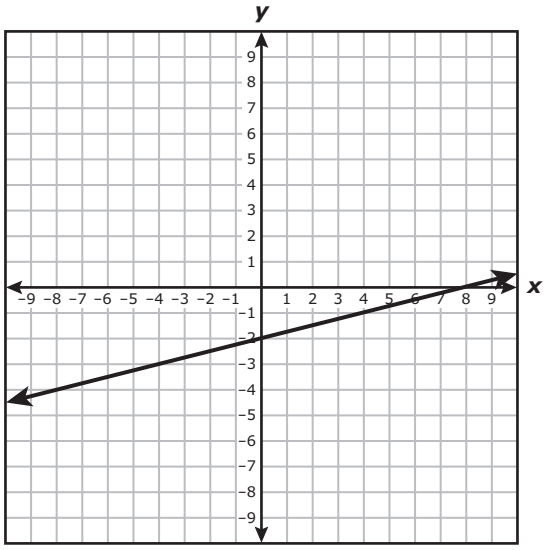
F The sum of the angle measures of trapezoid *PQRS* is 180° less than the sum of the angle measures of trapezoid *P′Q′R′S′*.

G Trapezoid *PQRS* is not congruent to trapezoid *P′Q′R′S′*.

H The area of trapezoid *PQRS* is less than the area of trapezoid *P′Q′R′S′*.

J The angle measures of trapezoid *PQRS* are equal to the corresponding angle measures of trapezoid *P′Q′R′S′*.

11 Which function is best represented by this graph?



A $y = \frac{1}{4}x + 8$

B $y = \frac{1}{4}x - 2$

C $y = 4x - 2$

D $y = 4x + 8$

---

12 An employee put $5,000.00 in a retirement account that offers 9% interest compounded annually. The employee makes no additional deposits or withdrawals. Which amount is closest to the interest the employee will have earned at the end of 5 years?

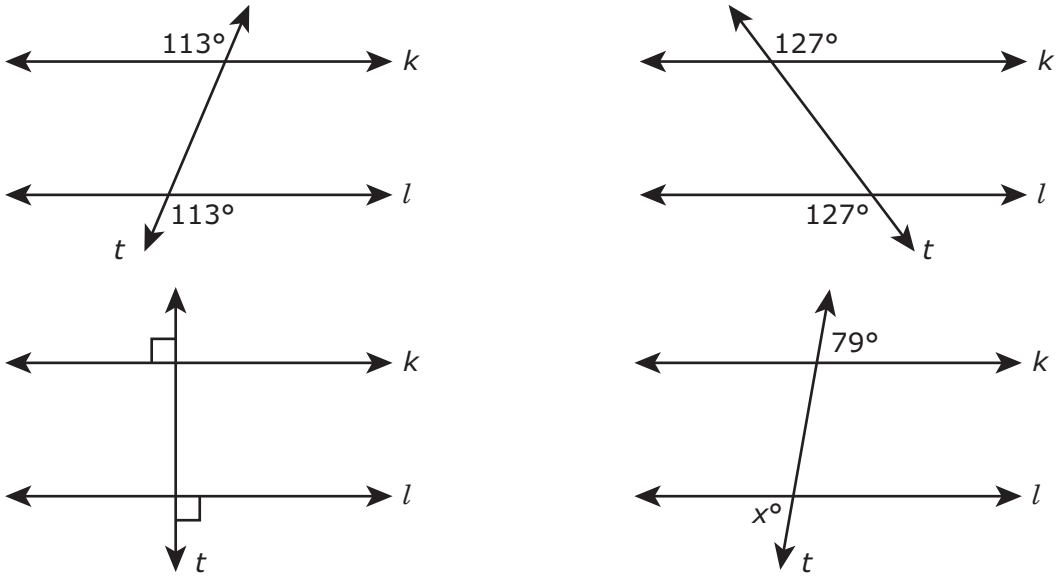
F $229.09

G $450.00

H $2,250.00

J $2,693.12

13 In each diagram, line k is parallel to line l, and line t intersects lines k and l.



Based on the diagrams, which statement is true?

A The value of x is 79, because the two angles shown in each diagram are congruent.

B The value of x is 101, because the two angles shown in each diagram are supplementary.

C The value of x is greater than 90, because the two angles shown in each diagram are obtuse angles.

D The value of x is 11, because the two angles shown in each diagram are complementary.

14 A hot-air balloon is released at ground level, and it rises into the air at a constant rate. After 5 seconds the height of the balloon is 20 feet. The balloon continues to rise at the same rate.

Which table shows the relationship between the time in seconds, x, and the height of the balloon in feet, y?

F

Balloon

Time, x (sec)	Height, y (ft)
10	2.5
20	5.0
30	7.5
40	10.0
50	12.5

H

Balloon

Time, x (sec)	Height, y (ft)
10	40
20	60
30	80
40	100
50	120

G

Balloon

Time, x (sec)	Height, y (ft)
10	25
20	35
30	45
40	55
50	65

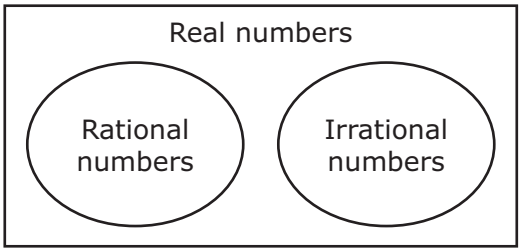
J

Balloon

Time, x (sec)	Height, y (ft)
10	40
20	80
30	120
40	160
50	200

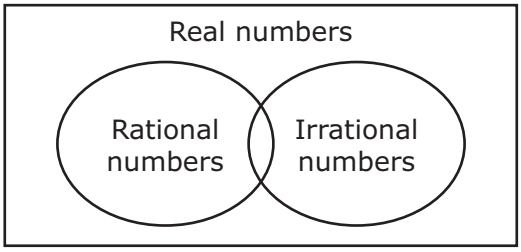
15 Which Venn diagram correctly represents the relationship between rational numbers and irrational numbers?

A



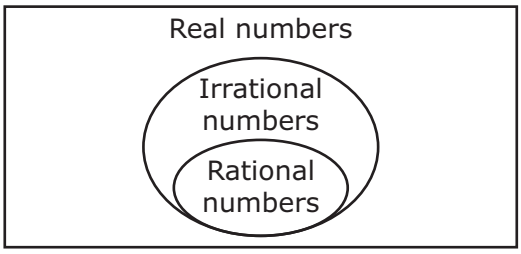
, because rational numbers and irrational numbers have no numbers in common

B



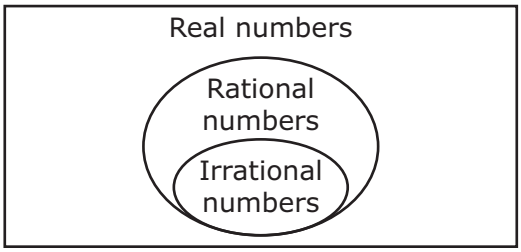
, because some irrational numbers are also rational numbers

C



, because all rational numbers are also irrational numbers

D



, because all irrational numbers are also rational numbers

16 Rudolfo has 15 toys in his toy box, and he adds 2 new toys every month. Based on this information, which representation best shows this relationship between the number of toys Rudolfo has in his toy box, y, and the number of months that have passed, x?

F

Rudolfo's Toys

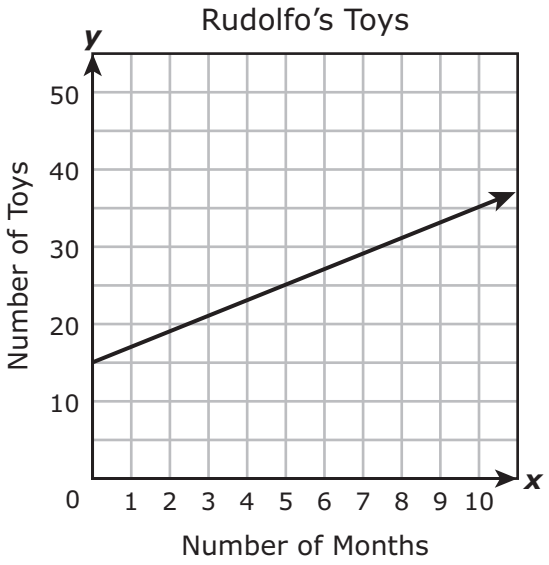
x	y
4	8
6	12
11	22
13	26

H

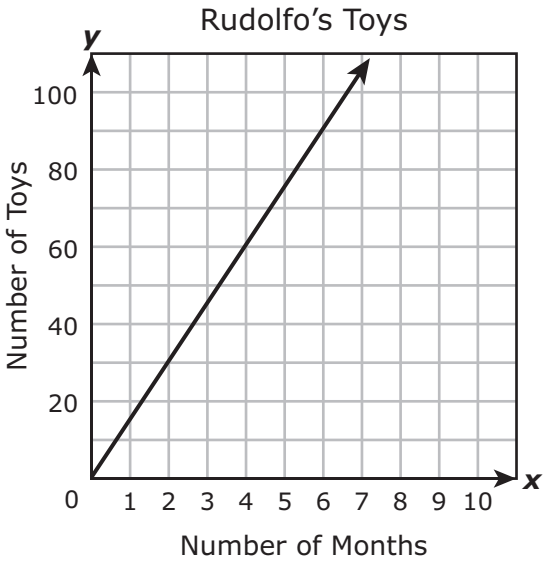
Rudolfo's Toys

x	y
1	17
4	68
7	119
11	187

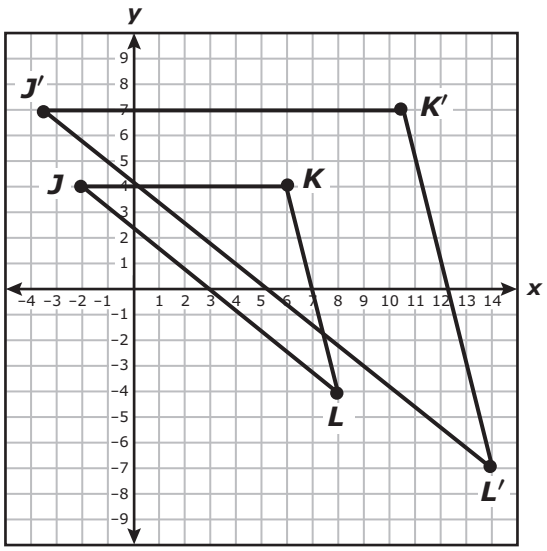
G



J



17 Triangle *JKL* is dilated with the origin as the center of dilation to create triangle *J′K′L′*.



Which rule best represents the dilation that has been applied to triangle *JKL* to create triangle *J′K′L′*?

A $(x, y) \rightarrow (x + 6, y - 3)$

B $(x, y) \rightarrow (x + 4.5, y + 3)$

C $(x, y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$

D $(x, y) \rightarrow (\frac{7}{4}x, \frac{7}{4}y)$

GO ON

18 A gym charges a membership fee plus an additional fee per yoga class. The table shows the linear relationship between the number of yoga classes taken and the total cost including the membership fee.

Yoga Classes

Number of Yoga Classes	Total Cost
6	$67.50
8	$75.00
10	$82.50
14	$97.50
20	$120.00

Which statement is true?

F The additional fee per yoga class is $3.75.

G The additional fee per yoga class is $8.25.

H The membership fee is $35.00.

J The membership fee is $42.50.

---

19 The list shows the heights of 6 students in inches.

63, 70, 68, 73, 58, 67

What is the mean absolute deviation for these numbers?

A 24

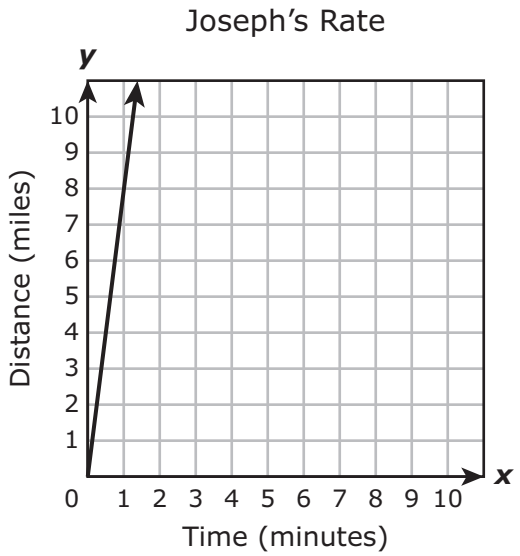
B 66.5

C 4

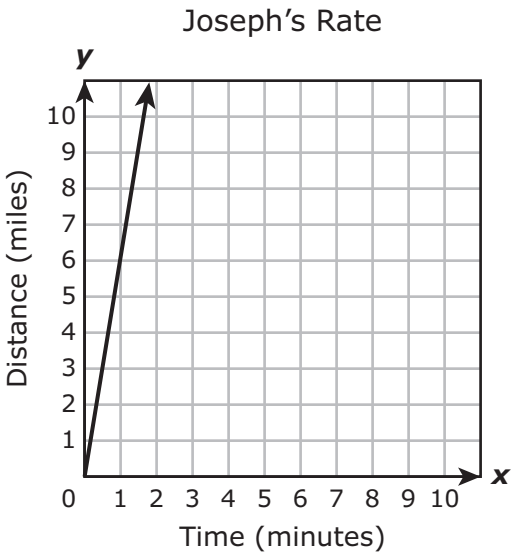
D 67.5

20 Joseph ran a 6-mile race in 48 minutes. Which graph has a slope that best represents Joseph's average rate of speed during the race?

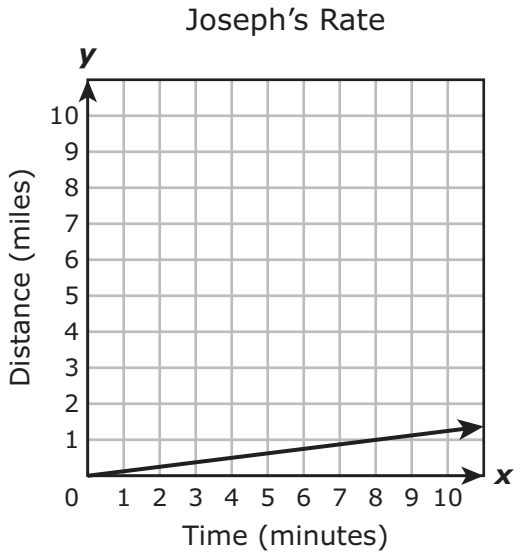
F



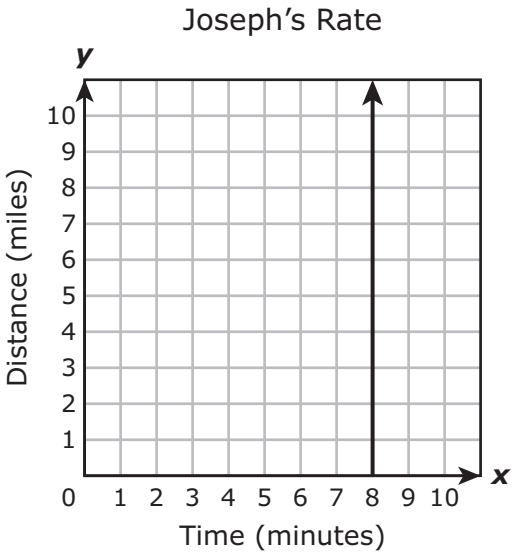
H



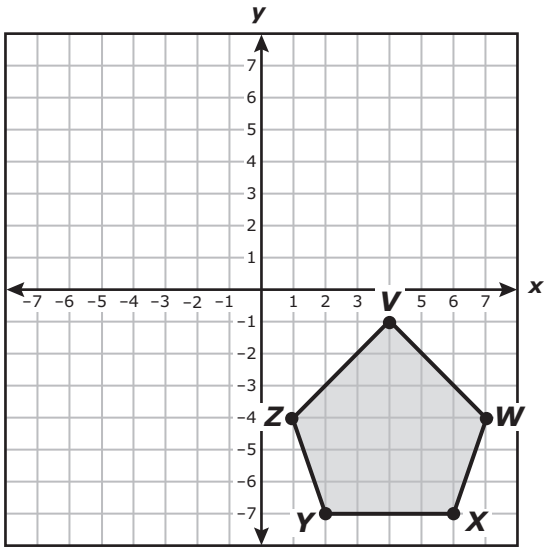
G



J



21 Pentagon *VWXYZ* is shown on the coordinate grid. A student reflected pentagon *VWXYZ* across the *x*-axis to create pentagon *V′W′X′Y′Z′*.



Which rule describes this transformation?

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

B $(x, y) \rightarrow (x, y + 8)$

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

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

---

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

$$\frac{37}{6}, \quad -5.\overline{17}, \quad \sqrt{33}, \quad -\frac{26}{5}$$

F $-\frac{26}{5}, \quad -5.\overline{17}, \quad \frac{37}{6}, \quad \sqrt{33}$

G $-5.\overline{17}, \quad -\frac{26}{5}, \quad \frac{37}{6}, \quad \sqrt{33}$

H $-\frac{26}{5}, \quad -5.\overline{17}, \quad \sqrt{33}, \quad \frac{37}{6}$

J $-5.\overline{17}, \quad -\frac{26}{5}, \quad \sqrt{33}, \quad \frac{37}{6}$

23 What is the solution to this equation?

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

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

---

24 An investor puts $2,500 into a life insurance policy that pays 8.5% simple annual interest. If no additional investment is made into the policy, how much accumulated interest should the investor expect at the end of 10 years?

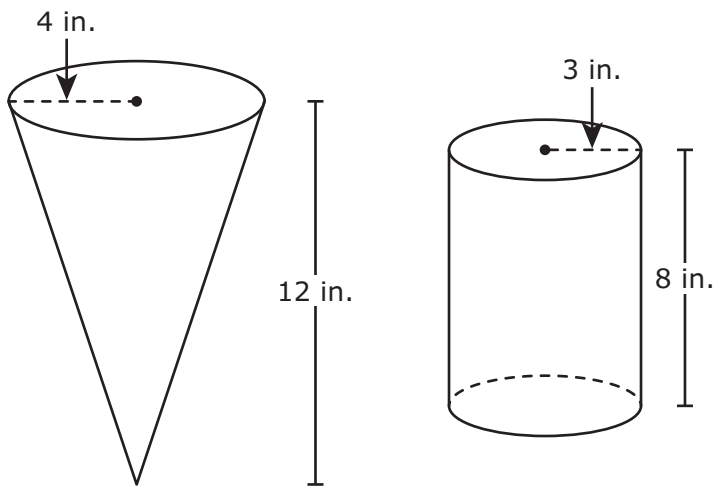
F $21,250.00

G $2,125.00

H $212.50

J $21.25

25 Snacks at a county fair are sold in containers shaped like a cone or a cylinder. The dimensions of each container are shown in the drawing.



Which statement about the volumes of the cone and the cylinder is true?

A The volume of the cylinder is about 377 cubic inches greater than the volume of the cone.

B The volume of the cylinder is about 377 cubic inches less than the volume of the cone.

C The volume of the cylinder is about 25 cubic inches greater than the volume of the cone.

D The volume of the cylinder is about 25 cubic inches less than the volume of the cone.

26 Which situation can be represented by this equation?

$$7x + 1 = 10x$$

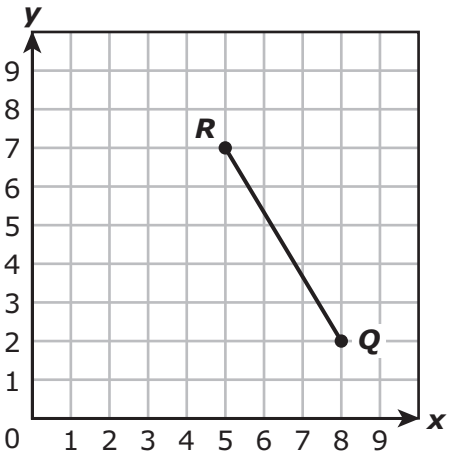
F Brody ran at a constant rate of 7 miles per hour in a race. Candice ran at a constant rate of 10 miles per hour in a race and started 1 mile in front of the starting point. What is x, the number of hours that Brody and Candice would have to run in order for their distance to be the same?

G Brody played a game where he scored 8 points per hour. Candice played the game and scored 10 points per hour. What is x, the number of hours that Brody and Candice would each have to play the game in order for their scores to be the same?

H Brody went to two different amusement parks. The first park charged $7 per hour and gave a 1% discount for showing a student ID. The other park charged $10 per hour. What is x, the number of hours that Brody would have to stay at each park to have to pay the same amount?

J Brody rode his bicycle on two different days. The first day he rode 7 miles per hour and started 1 mile from his house. The second day he started from his house and rode 10 miles per hour. What is x, the number of hours that Brody would have to ride his bicycle to travel the same distance on both days?

27 The coordinates of the endpoints of $\overline{QR}$ are $Q\,(8, 2)$ and $R\,(5, 7)$.



Which measurement is closest to the length of $\overline{QR}$ in units?

A 5.8 units

B 5 units

C 4 units

D 3.9 units

GO ON

28 The ticket sales for a concert started at 4:00 P.M. The table shows the linear relationship between the number of tickets remaining and the number of hours since 4:00 P.M.

Ticket Sales

Hours Since 4 P.M.	Number of Tickets Remaining
1	12,000
2	9,000
3	6,000
4	3,000
5	0

Which function can be used to find y, the number of tickets remaining x hours since 4:00 P.M.?

F $y = 3{,}000x + 12{,}000$

G $y = 3{,}000x + 15{,}000$

H $y = -3{,}000x + 12{,}000$

J $y = -3{,}000x + 15{,}000$

---

29 A square with a perimeter of 20 units is graphed on a coordinate grid. The square is dilated by a scale factor of 0.4 with the origin as the center of dilation.

If (x, y) represents the location of any point on the original square, which ordered pair represents the coordinates of the corresponding point on the resulting square?

A $(20x, 20y)$

B $(0.4x, 0.4y)$

C $(x + 20, y + 20)$

D $(x + 0.4, y + 0.4)$

30 Which situation could NOT represent a proportional relationship?

F The number of gallons of water in x barrels with 42 gallons of water in each barrel

G The amount an employee who makes \$8.50 per hour earns in h hours

H The weight in x weeks of a puppy that gains 2 pounds per week if its starting weight is 8 pounds

J The cost of purchasing p pounds of bananas for \$0.55 per pound

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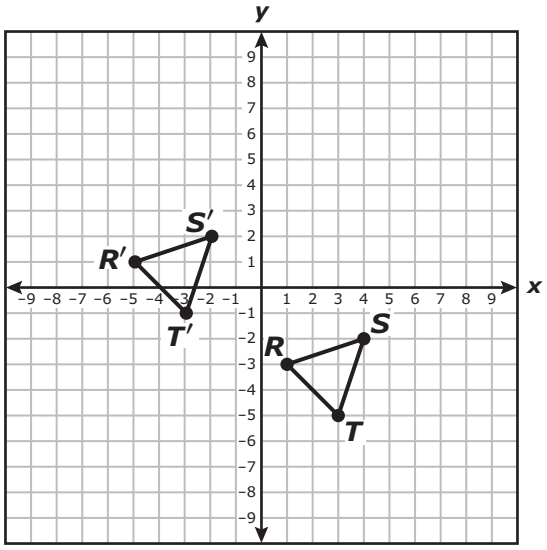
31 Triangle RST is translated 6 units to the left and 4 units up to create triangle $R'S'T'$.



Which rule best describes this transformation?

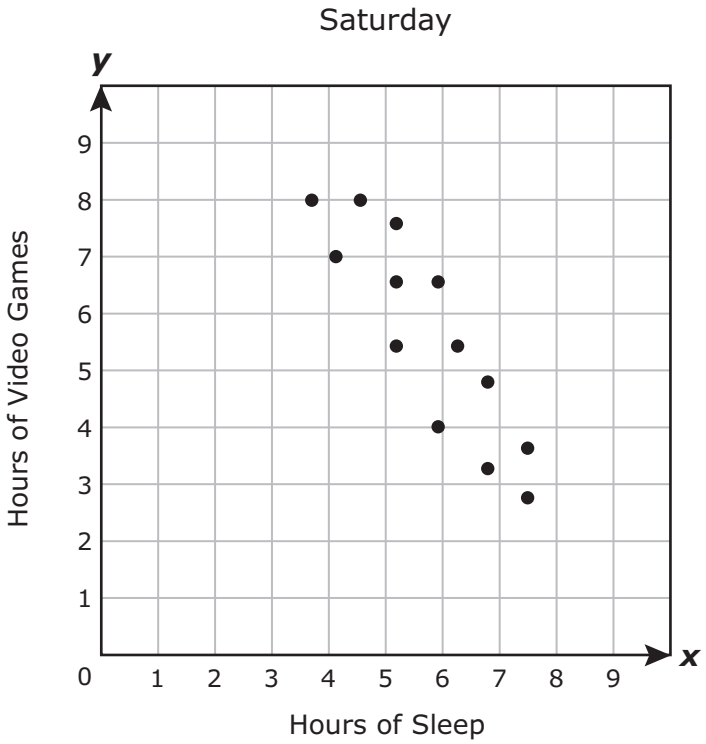
A $(x, y) \rightarrow (6x, -4y)$

B $(x, y) \rightarrow (-6x, 4y)$

C $(x, y) \rightarrow (x + 6, y - 4)$

D $(x, y) \rightarrow (x - 6, y + 4)$

32 Phil collected data from several of his friends about the number of hours they spent sleeping and the number of hours they spent playing video games on Saturday. He recorded the data in the scatterplot.



Based on the scatterplot, what is the best prediction of the number of hours one of Phil's friends spends sleeping when the friend spends 1 hour playing video games?

F 9 hours

G 8 hours

H 10 hours

J 7 hours

---

33 The dimensions of a rectangular piece of paper are 8.5 inches and 11 inches. Veronica folded the piece of paper along its diagonal. Which measurement is closest to the length of the diagonal in inches?

A 6.24 in.

B 19.5 in.

C 6.98 in.

D 13.9 in.

34 The amount of water an electric dishwasher uses to wash dishes varies directly with the number of loads of dishes. The dishwasher uses 32 gallons of water to wash 4 loads of dishes.

How many gallons of water will the dishwasher use to wash 10 loads of dishes?

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

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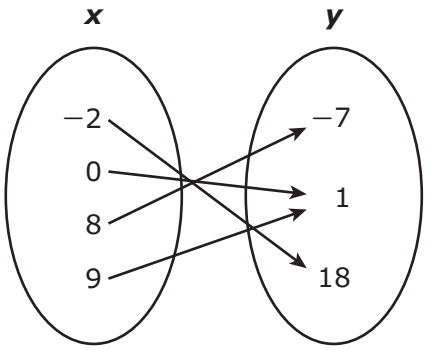
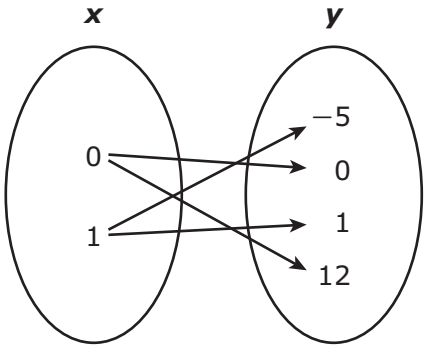
35 Which representation shows y as a function of x?

A



B



C

x	y
−1	0
−1	5
−1	10
−1	15

D

x	y
−4	−8
0	3
1	2
−4	10

36 Figure I and Figure II are similar quadrilaterals.

Figure I

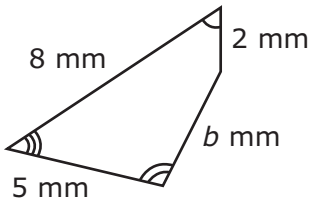
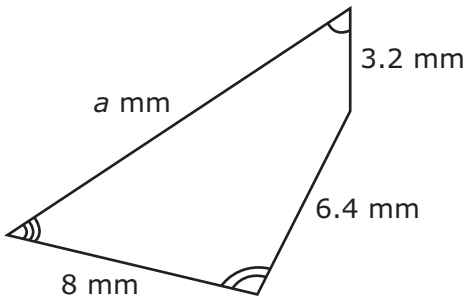


Figure II



Which proportion must be true?

F $\frac{a}{b} = \frac{8}{2}$

G $\frac{3.2}{2} = \frac{a}{8}$

H $\frac{b}{6.4} = \frac{8}{5}$

J $\frac{2}{3.2} = \frac{b}{a}$

---

37 The total cost of attending a state university is $19,700 for the first year.

- A student's grandparents will pay half of this cost.
- An athletic scholarship will pay another $5,000.

Which amount is closest to the minimum that the student will need to save every month in order to pay off the remaining cost at the end of 12 months?

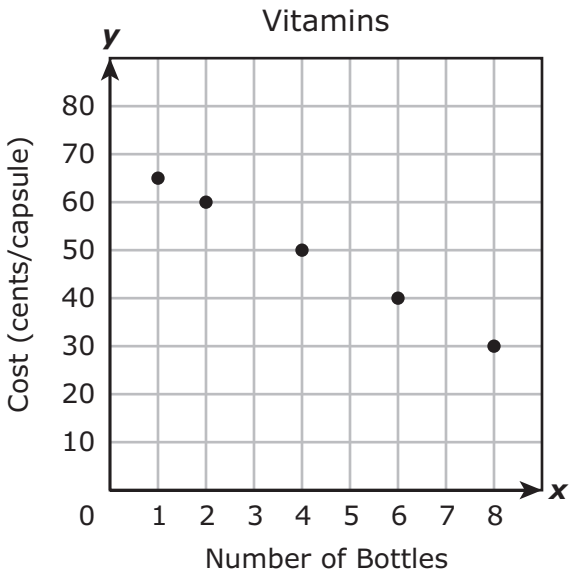
A $404.17

B $612.50

C $820.83

D $1,029.17

38 A company sells bottles of vitamin capsules. The graph and table show the linear relationship between the cost per capsule in cents and the number of bottles ordered.



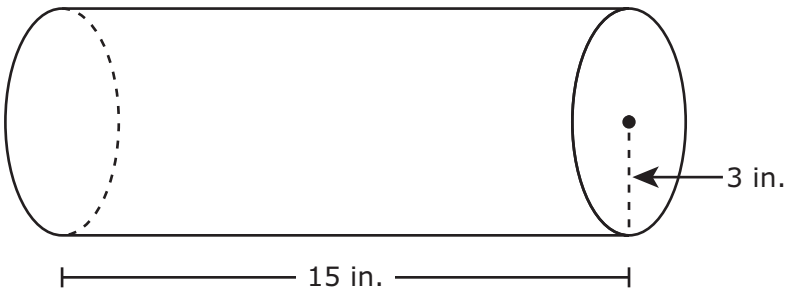
Vitamins

Number of Bottles, x	Cost, y (cents/capsule)
1	65
2	60
4	50
6	40
8	30

What is the slope of the line that models this situation?

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

39 An architect uses a cylindrical container to protect her blueprints. The dimensions of the cylinder are shown in the diagram.



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

A 424.12 $in.^2$

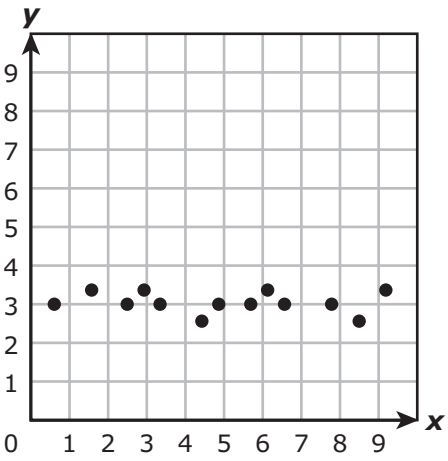
B 791.68 $in.^2$

C 339.29 $in.^2$

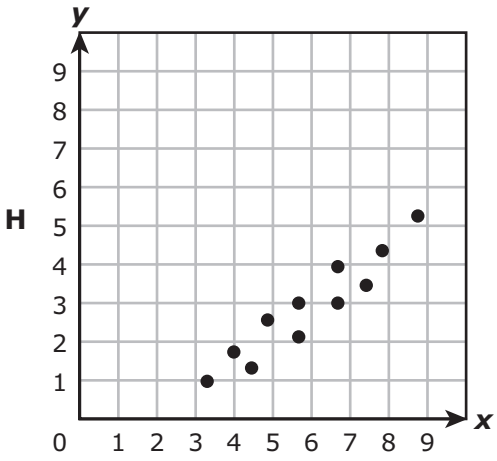
D 282.74 $in.^2$

40 Which scatterplot does NOT suggest a linear relationship between x and y?

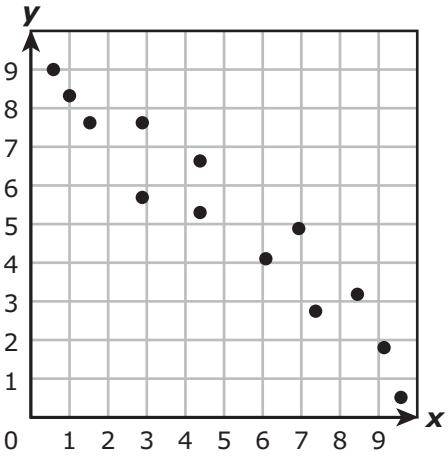
F



H



G



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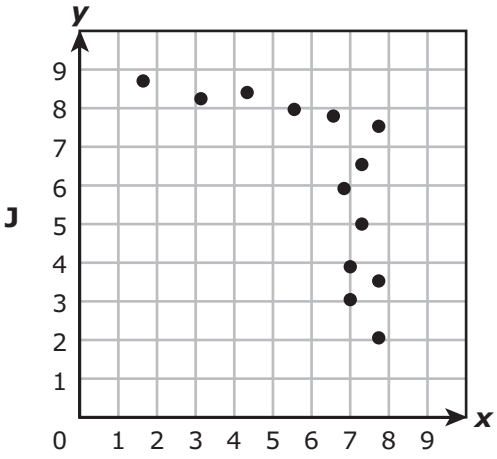


GO ON

41 Point Q is shown on the number line.

Which value is best represented by point Q?

A $\sqrt{5.4}$

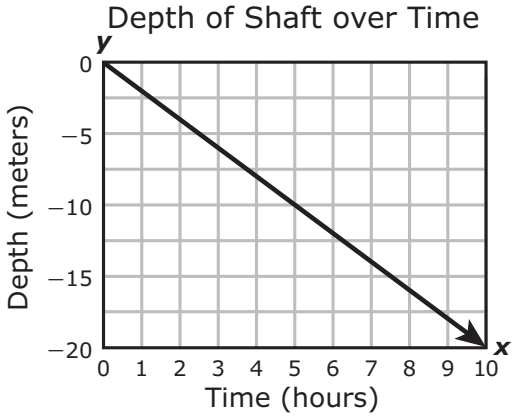
B $\sqrt{29.5}$

C $\sqrt{35.5}$

D $\sqrt{5.9}$

42 An oil-well contractor drills a shaft 7 meters deeper into the ground every 2 hours. Which graph has a slope that best represents this rate?

F



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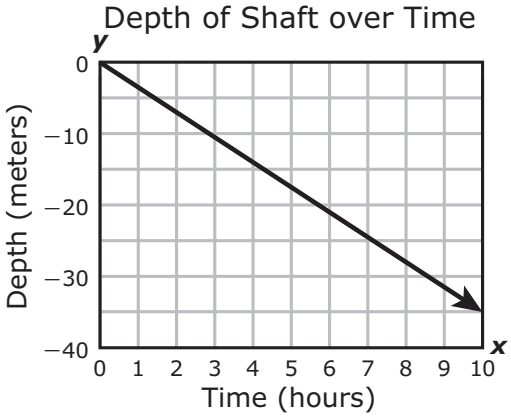

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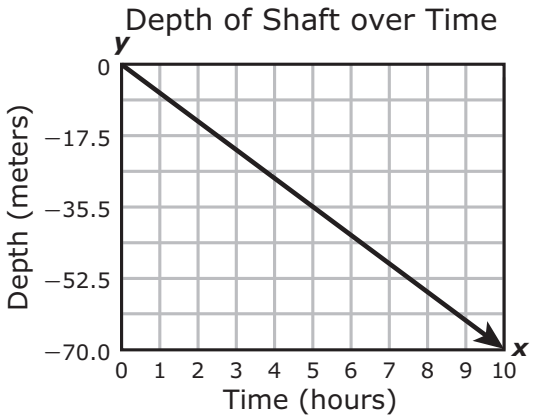

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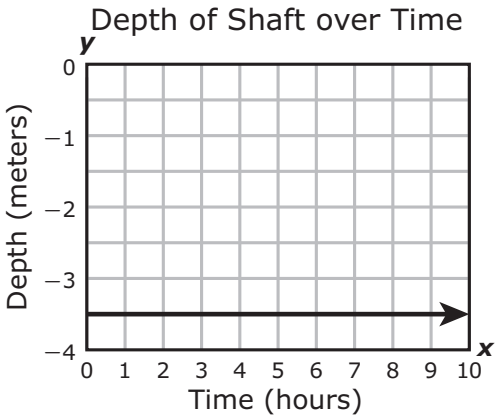

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS ON THE ANSWER DOCUMENT.

STOP

STAAR
GRADE 8
Mathematics
April 2018

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