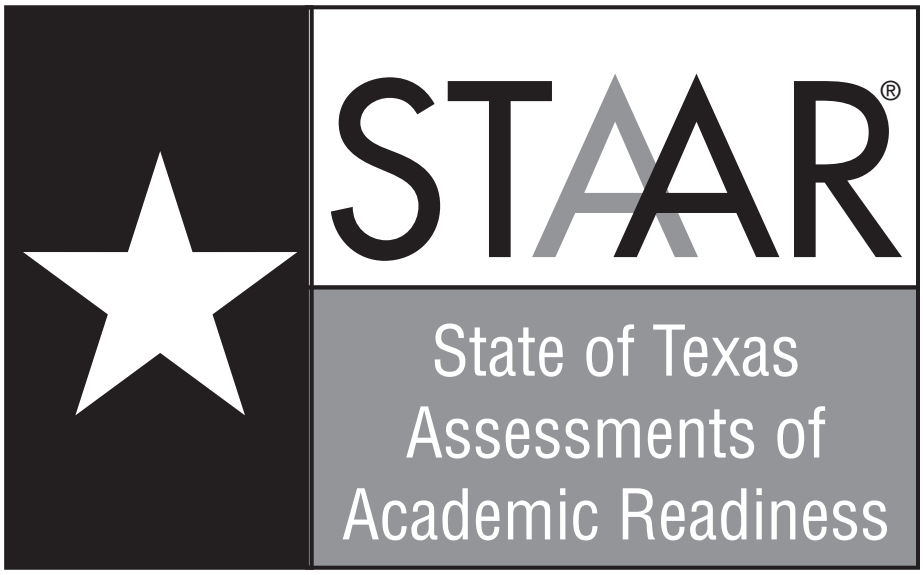


# GRADE 8

## Mathematics

## Administered March 2016

# 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** Four students are each trying to raise the same amount of money for a class trip. The table below shows how much of each student's goal has been met.

Fund-Raiser Progress

| Student | Part of Goal Met |
|---|---|
| Chelsea | 0.7 |
| Devon | $\frac{2}{3}$ |
| Huang | $\frac{5}{8}$ |
| Marcela | 65% |

Which list shows the numbers in the table in order from least to greatest?

**A** 0.7, 65%, $\frac{5}{8}$, $\frac{2}{3}$

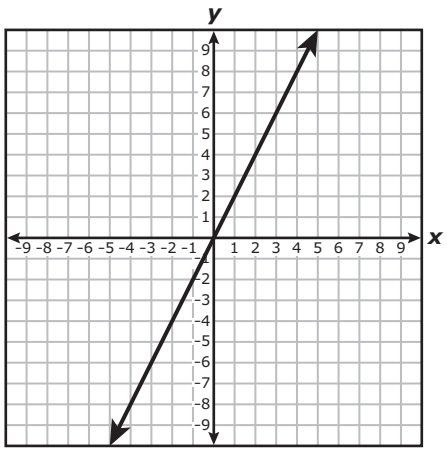
**B** 0.7, $\frac{5}{8}$, 65%, $\frac{2}{3}$

**C** $\frac{5}{8}$, 65%, $\frac{2}{3}$, 0.7

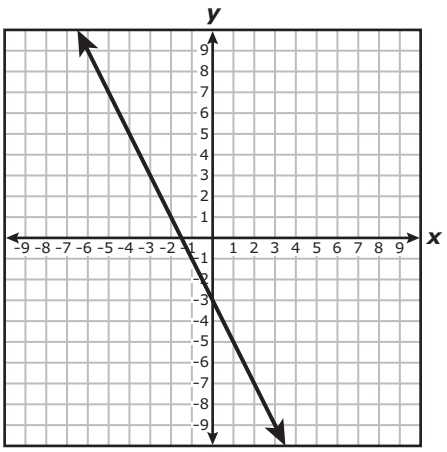
**D** $\frac{5}{8}$, $\frac{2}{3}$, 65%, 0.7

**2** Which graph shows a proportional relationship between $x$ and $y$?

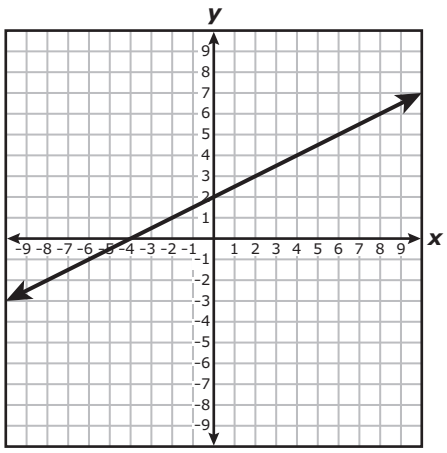
**F**



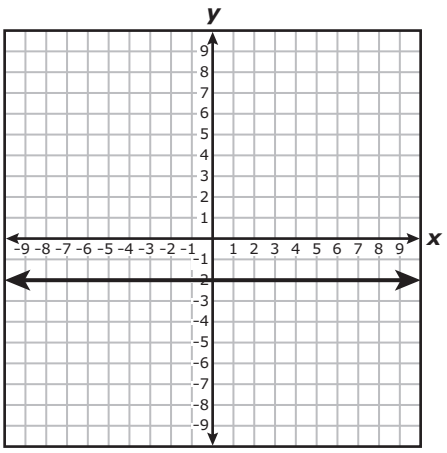

**H**




**G**



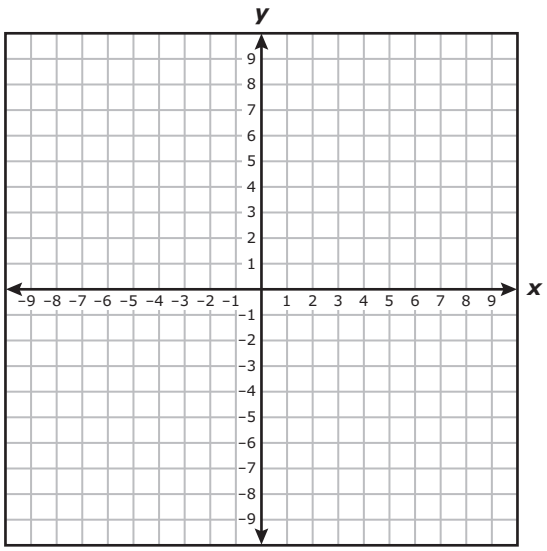

**J**






GO ON

**3** Point *M* is located at (4, 6) on a coordinate grid. Point *M* is translated 8 units to the left and 9 units down to create point *M′*.




Which measurement is closest to the distance between point *M* and point *M′* in units?

**A** 4 units

**B** 17 units

**C** 9 units

**D** 12 units

---

**4** Tamara invested $15,000 in an account that pays 4% annual simple interest. Tamara will not make any additional deposits or withdrawals. How much interest will Tamara earn on her investment at the end of 3 years?

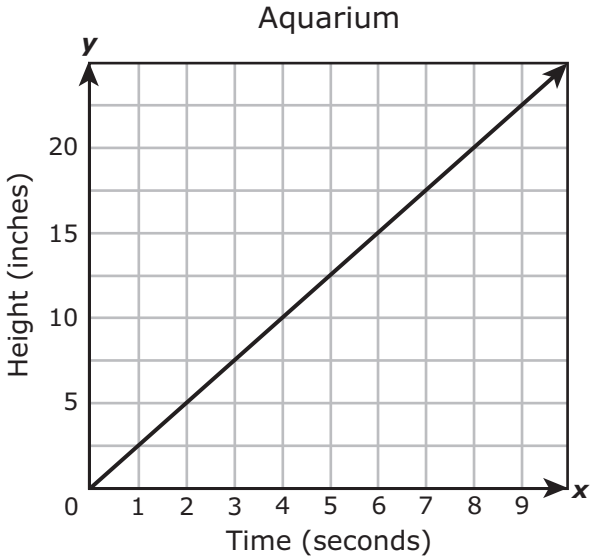
**F** $1,800

**G** $600

**H** $450

**J** $1,873

**5** An aquarium is being filled with water. The graph shows the height of the water over time as the aquarium is being filled.




Which statement best describes the rate of change for this situation?

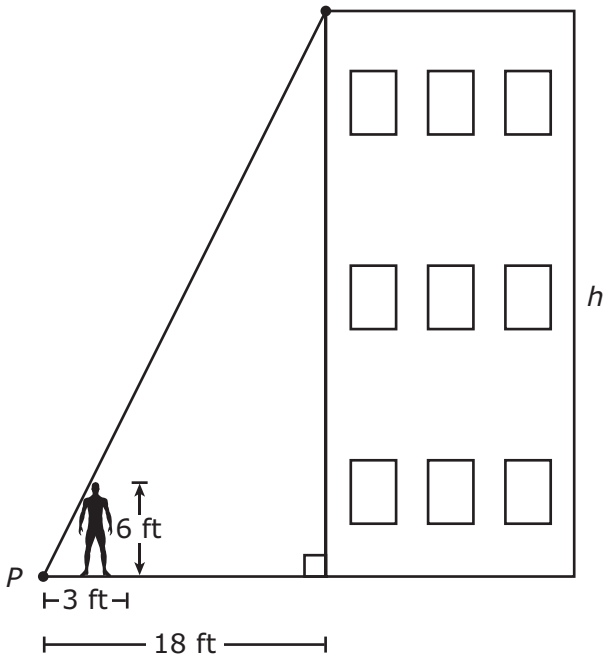
**A** The height of the water increases 20 inches per second.

**B** The height of the water increases 1 inch per second.

**C** The height of the water increases 5 inches per second.

**D** The height of the water increases 2.5 inches per second.

**6** In the diagram a person who is 6 ft tall is standing on the ground 3 ft away from point *P*. A line segment drawn from the top corner of the building to point *P* creates two similar triangles.




Not drawn to scale

Which proportion can be used to find *h*, the height of the building in feet?

**F** $\frac{3}{h} = \frac{18}{6}$

**G** $\frac{6}{3} = \frac{h}{18}$

**H** $\frac{3}{15} = \frac{h}{6}$

**J** $\frac{6}{3} = \frac{18}{h}$

**7** Carnival M charges an entrance fee of $5.00 and $0.65 per ticket for the rides. Carnival P charges an entrance fee of $10.00 and $0.45 per ticket for the rides. How many tickets must be purchased in order for the total cost at Carnival M and Carnival P to be the same?

**A** 25

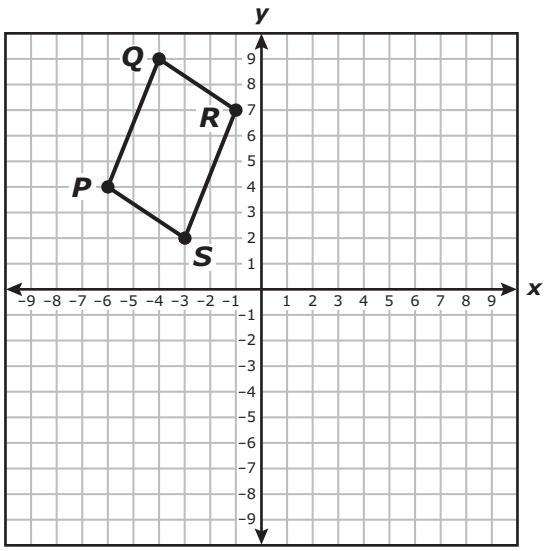
**B** 10

**C** 50

**D** 75

---

**8** The coordinate grid shows parallelogram *PQRS*.




Parallelogram *PQRS* is rotated 90° clockwise about the origin to create parallelogram *P′Q′R′S′*. Which rule describes this transformation?

**F** $(x, y) \rightarrow (x, -y)$

**G** $(x, y) \rightarrow (-x, y)$

**H** $(x, y) \rightarrow (y, x)$

**J** $(x, y) \rightarrow (y, -x)$

**9** The value of $y$ varies directly with $x$. When $y = 75, x = \frac{1}{2}$. What is the value of $y$ when $x$ is $2\frac{1}{4}$?

**A** $84\frac{3}{8}$

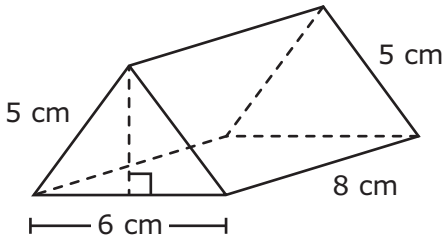
**B** $337\frac{1}{2}$

**C** $16\frac{2}{3}$

**D** $168\frac{3}{4}$

---

**10** A triangular prism and its dimensions are shown in the diagram.




What is the lateral surface area of this triangular prism in square centimeters?

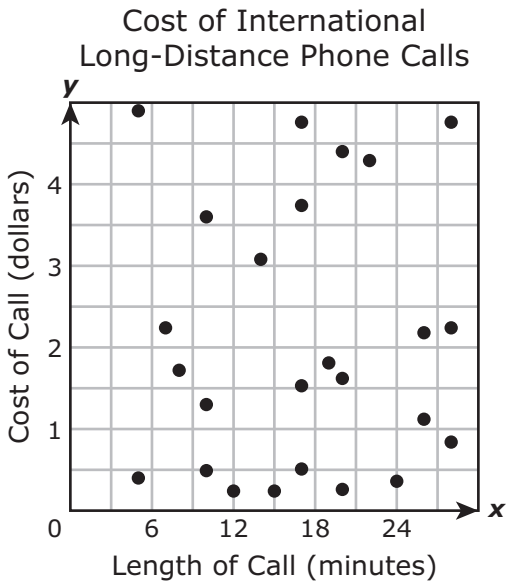
**F** 192 $cm^2$

**G** 128 $cm^2$

**H** 152 $cm^2$

**J** 144 $cm^2$

**11** Julie made 25 international long-distance phone calls to London last month. The scatterplot below shows the length and cost of each phone call she made.




Which conclusion is best supported by the scatterplot?

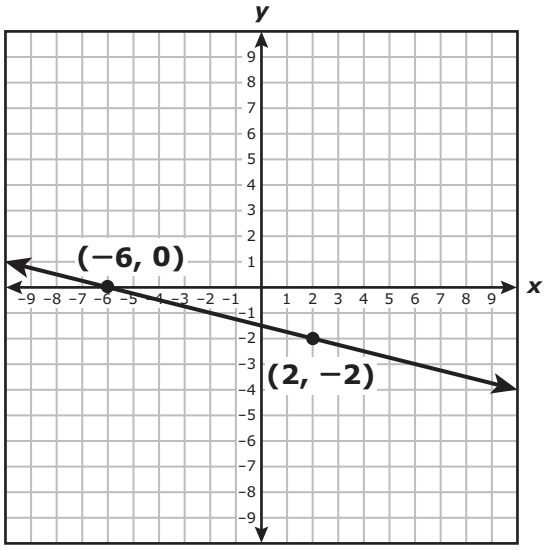
**A** As the length of a call increases, the cost of the call increases.

**B** As the length of a call increases, the cost of the call remains the same.

**C** As the length of a call increases, the cost of the call decreases.

**D** There is no relationship between the length of a call and the cost of a call.

**12** What are the slope and the *y*-intercept of the graph of the linear function shown on the grid?




**F** Slope = 4, *y*-intercept = –6

**G** Slope = –4, *y*-intercept = –1.5

**H** Slope = $-\frac{1}{4}$, *y*-intercept = –1.5

**J** Slope = $\frac{1}{4}$, *y*-intercept = –6

---

**13** A preschool has a rectangular field and a rectangular playground that are similar in shape. Each dimension of the field is 3.2 times the corresponding dimension of the playground. Which statement is true?

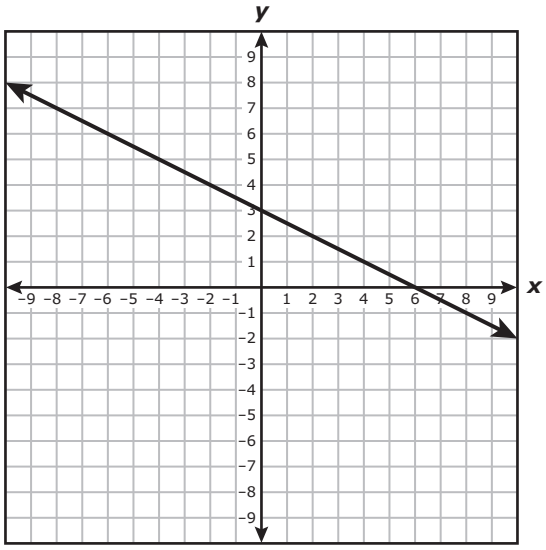
**A** The area of the field is 6.4 times the area of the playground.

**B** The area of the field is 10.24 times the area of the playground.

**C** The perimeter of the field is 6.4 times the perimeter of the playground.

**D** The perimeter of the field is 10.24 times the perimeter of the playground.

**14** Which function is best represented by this graph?



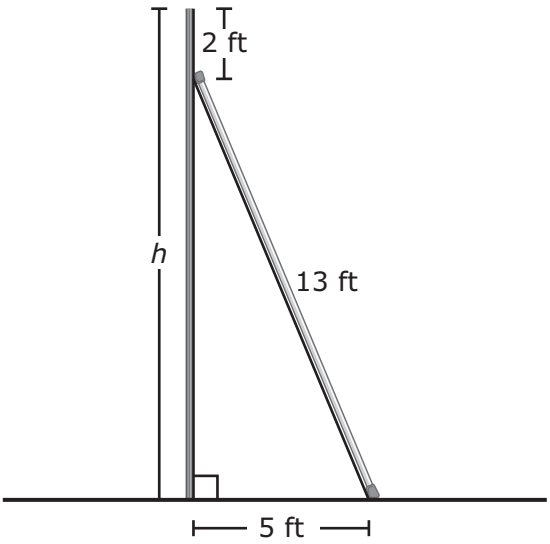

**F** $y = \frac{1}{2}x + 6$

**G** $y = -2x + 3$

**H** $y = 2x + 6$

**J** $y = -\frac{1}{2}x + 3$

**15** The set designer for a play painted some background scenery on a large piece of plywood. He used a 13-foot-long pole to hold the piece of plywood upright, as shown in the diagram below.




What is $h$, the total height in feet of the piece of plywood?

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

**16** Which table contains only corresponding $x$-values and $y$-values where the value of $y$ is 3 more than the quotient of $x$ and 2?

**F**

| *x* | *y* |
|---|---|
| 7 | 5 |
| 10 | 6.5 |
| 14 | 8.5 |
| 17 | 10 |

**H**

| *x* | *y* |
|---|---|
| 7 | 3.5 |
| 10 | 5 |
| 14 | 7 |
| 17 | 8.5 |

**G**

| *x* | *y* |
|---|---|
| 7 | 6.5 |
| 10 | 8 |
| 14 | 10 |
| 17 | 11.5 |

**J**

| *x* | *y* |
|---|---|
| 7 | 0.5 |
| 10 | 2 |
| 14 | 4 |
| 17 | 5.5 |

**17** A ball shaped like a sphere has a radius of 2.7 centimeters. Which measurement is closest to the volume of the ball in cubic centimeters?

**A** 46.38 $cm^3$

**B** 33.93 $cm^3$

**C** 122.15 $cm^3$

**D** 82.45 $cm^3$

---

**18** Alejandra and her family are discussing how to pay for her college education. The cost of tuition at the college that Alejandra wants to attend is $9,000 per year. Alejandra's parents will pay 85% of the tuition cost every year, and she will pay the rest. Alejandra has one year to save enough money to attend her first year of college. What is the minimum amount of money she should save every month in order to reach her goal?

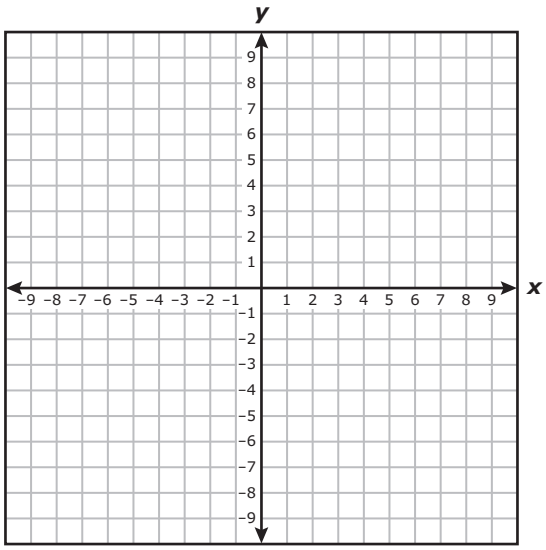
**F** $637.50

**G** $1,350.00

**H** $112.50

**J** $28.12

**19** The coordinates of the vertices of a quadrilateral are $P$ (1, 2), $R$ (1, 4), $S$ (3, 4), and $T$ (4, 2).




Quadrilateral $PRST$ is reflected across the $y$-axis to create quadrilateral $P'R'S'T'$. Which rule describes this transformation?

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

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

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

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

---

**20** Which situation represents a proportional relationship?

**F** The cost of purchasing a basket of oranges for \$1.30 per pound plus \$5.00 for the basket

**G** The cost of purchasing peaches for \$7.00 per box of peaches with a delivery charge of \$3.00

**H** The cost of purchasing grapefruit for \$1.80 per pound with a coupon for \$1.00 off the total cost

**J** The cost of purchasing apples for \$1.75 per pound plus a shipping fee of \$0.16 per pound

**21** Jamie used a microscope to measure the diameter of a hair. She found that the diameter of the hair was 0.000072 meter. How is this number written in scientific notation?

**A** $7.2 \times 10^{-5}$

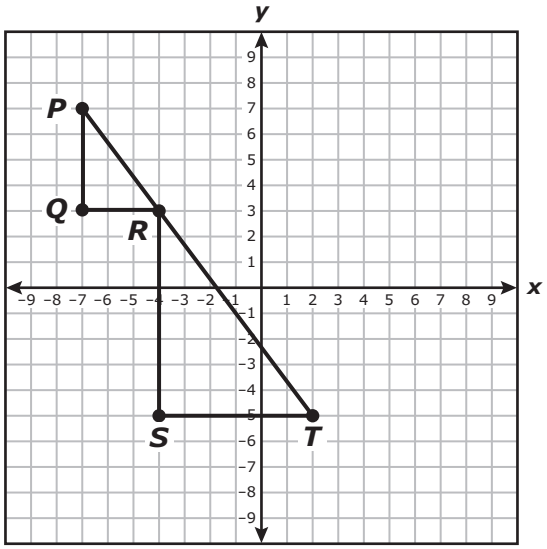
**B** $7.2 \times 10^{6}$

**C** $7.2 \times 10^{5}$

**D** $7.2 \times 10^{-6}$

---

**22** Triangles *PQR* and *RST* are similar right triangles.




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

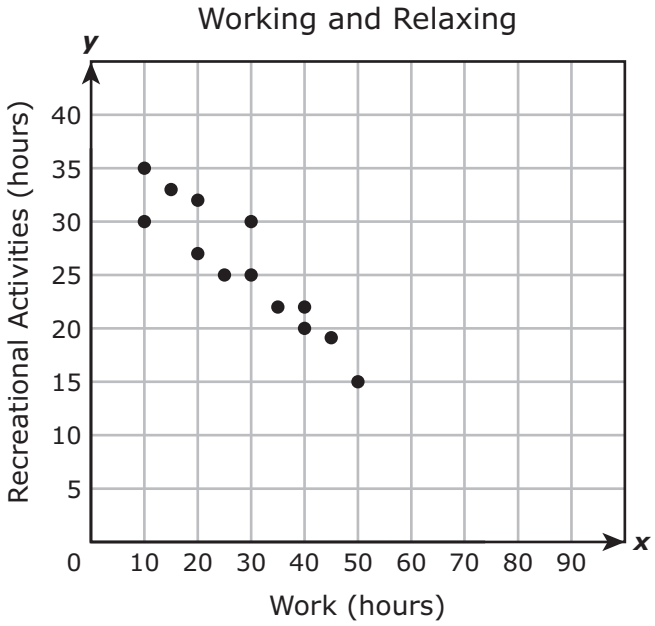
**F** $\dfrac{3-7}{-4-(-7)} = \dfrac{-5-3}{2-(-4)}$

**G** $\dfrac{3-(-4)}{7-(-7)} = \dfrac{-5-2}{3-(-4)}$

**H** $\dfrac{-4-(-7)}{3-7} = \dfrac{2-(-4)}{-5-3}$

**J** $\dfrac{-4-(-3)}{-7-7} = \dfrac{2-(-5)}{-4-3}$

**23** The scatterplot shows the average number of hours each of 13 people spends at work every week and the average number of hours each of them spends on recreational activities every week.




Based on the scatterplot, what is the best prediction of the average number of hours a person spends at work every week if that person spends an average of 10 hours on recreational activities every week?

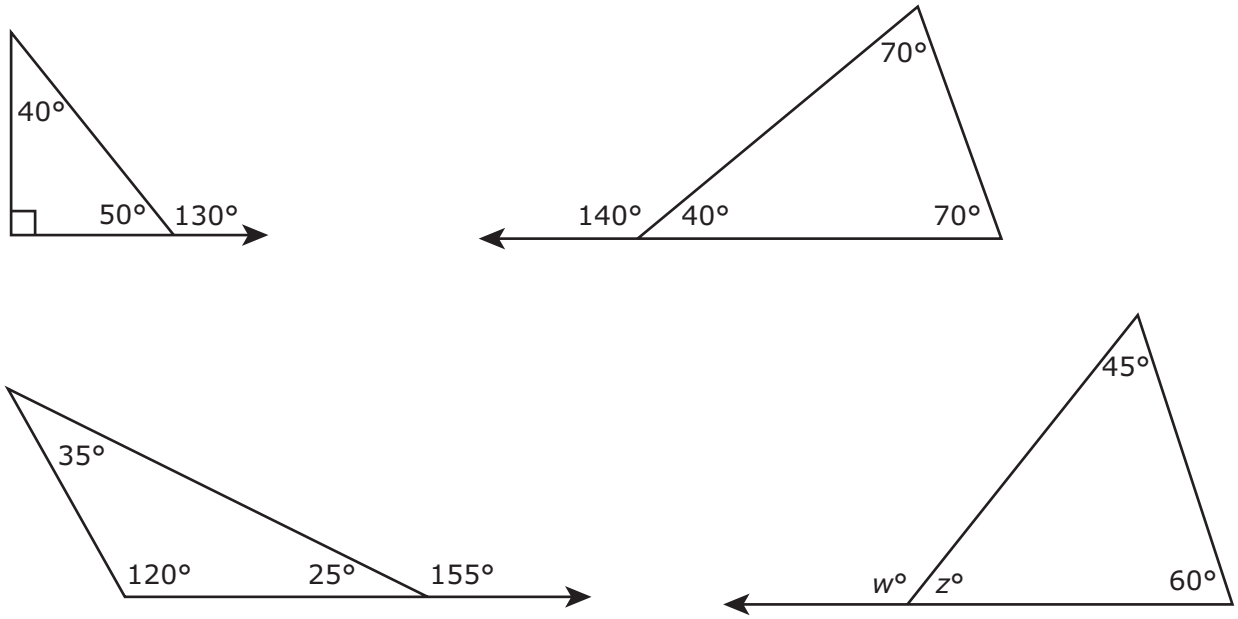
**A** 33 h

**B** 85 h

**C** 50 h

**D** 65 h

**24** Four triangles are shown.




Based on these triangles, which statement is true?

**F** $w = 75°$, because $45 + 60 = 105$ and $180 - 105 = 75$

**G** $w = 105°$, because $180 - (45 + 60) = 75$ and $180 - 75 = 105$

**H** $w = 285°$, because $45 + 60 = 105$ and $105 + 180 = 285$

**J** $w = 165°$, because $180 - 60 = 120$ and $120 + 45 = 165$

---

**25** Which set of ordered pairs represents $y$ as a function of $x$?

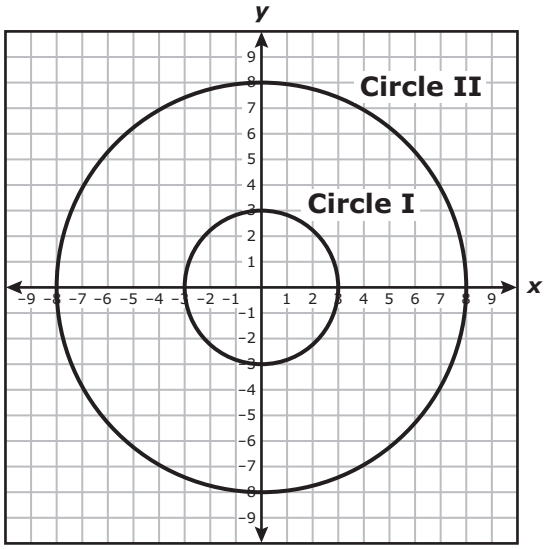
**A** $\{(2, -1), (4, -2), (6, -3), (8, -4)\}$

**B** $\{(0, 0), (1, 1), (1, 0), (2, 1)\}$

**C** $\{(3, 3), (3, 4), (4, 3), (4, 4)\}$

**D** $\{(1, -5), (1, 5), (2, -10), (2, -15)\}$

**26** Circle I was dilated with the origin as the center of dilation to create Circle II.




Which rule best represents the dilation applied to Circle I to create Circle II?

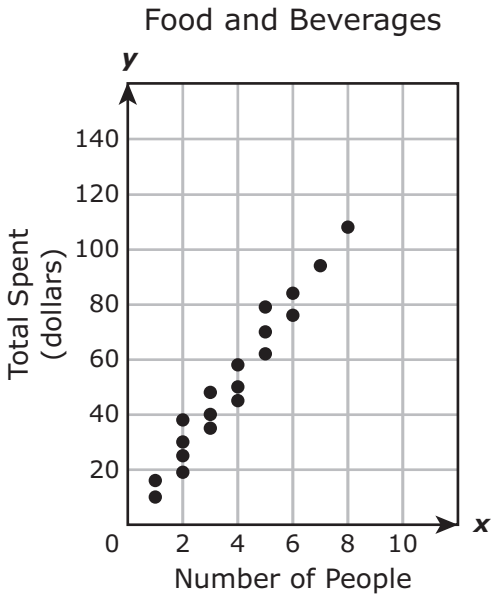
**F** $(x, y) \rightarrow (\frac{3}{8}x, \frac{3}{8}y)$

**G** $(x, y) \rightarrow (\frac{8}{3}x, \frac{8}{3}y)$

**H** $(x, y) \rightarrow (x + 5, y + 5)$

**J** $(x, y) \rightarrow (x - 5, y - 5)$

**27** The manager of a restaurant recorded how many people were in different groups of customers and how much those groups spent on food and beverages. The scatterplot below shows the data she recorded.




Based on this scatterplot, about how much money would a group of 10 people be expected to spend on food and beverages at this restaurant?

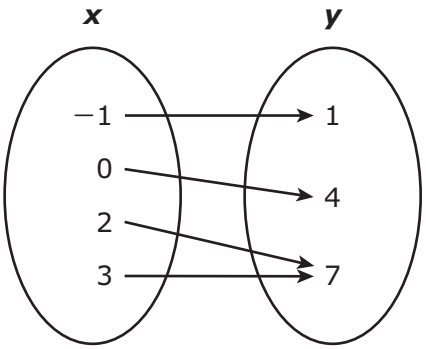
**A** $135

**B** $115

**C** $105

**D** $150

**28** Which statement describes the mapping?



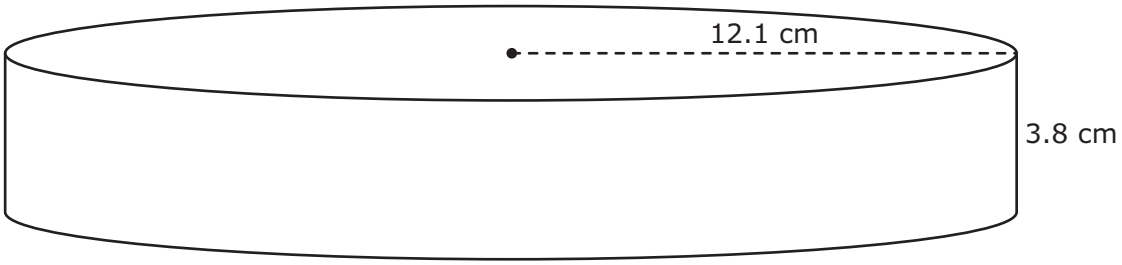

**F** The mapping represents $y$ as a function of $x$, because each $y$-value corresponds to exactly one $x$-value.

**G** The mapping does not represent $y$ as a function of $x$, because two of the $x$-values correspond to the same $y$-value.

**H** The mapping represents $y$ as a function of $x$, because each $x$-value corresponds to exactly one $y$-value.

**J** The mapping does not represent $y$ as a function of $x$, because there are more $x$-values than different corresponding $y$-values.

**29** A cylinder and its dimensions are shown below.




One equation for calculating the volume of a cylinder is $V = Bh$, where $B$ represents the area of the base of the cylinder. Which expression can be used to find the value of $B$, in square centimeters, for this cylinder?

**A** $\pi(12.1)^2$

**B** $2\pi(12.1)$

**C** $\pi(3.8)^2$

**D** None of these

**30** Three groups of students used different methods to estimate the diagonal length of a patio in feet. Their results were:

- $4\sqrt{13}$ ft
- $14\frac{2}{5}$ ft
- 14.33 ft

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

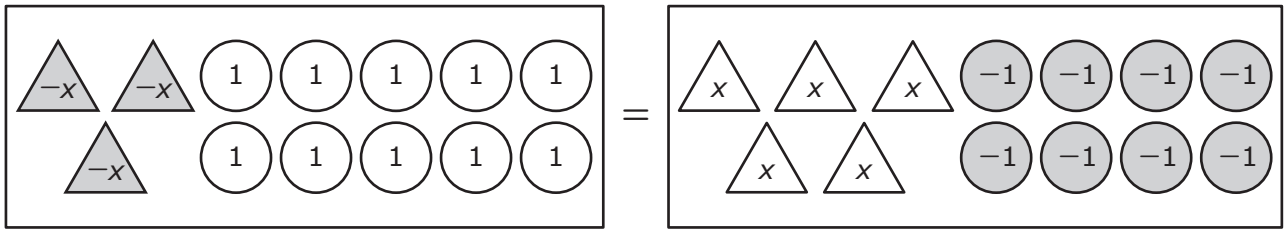
**F** $14.33, 14\frac{2}{5}, 4\sqrt{13}$

**G** $14.33, 4\sqrt{13}, 14\frac{2}{5}$

**H** $14\frac{2}{5}, 14.33, 4\sqrt{13}$

**J** $4\sqrt{13}, 14\frac{2}{5}, 14.33$

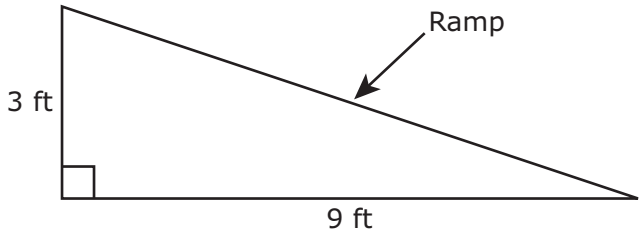
**31** The model represents an equation.




What value of $x$ makes the equation true?

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

**32** The diagram below shows the side view of a ramp used to help load and unload a moving van.




Which measurement is closest to the length of the ramp in feet?

**F** 8.5 ft

**G** 10.5 ft

**H** 9.5 ft

**J** 13.5 ft

---

**33** Which representation of a transformation on a coordinate grid does **not** preserve congruence?

**A** $(x, y) \rightarrow (\frac{1}{7}x, \frac{1}{7}y)$

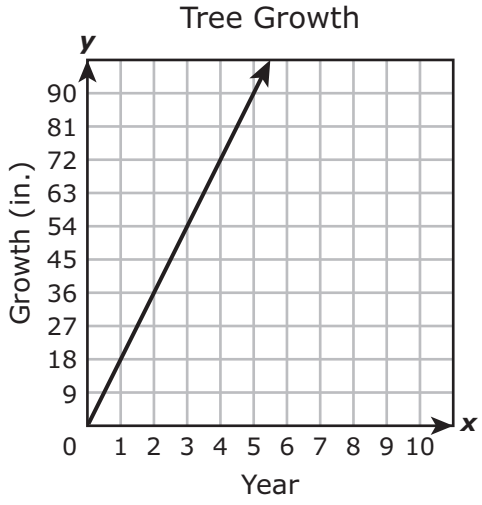
**B** $(x, y) \rightarrow (x + 7, y + 7)$

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

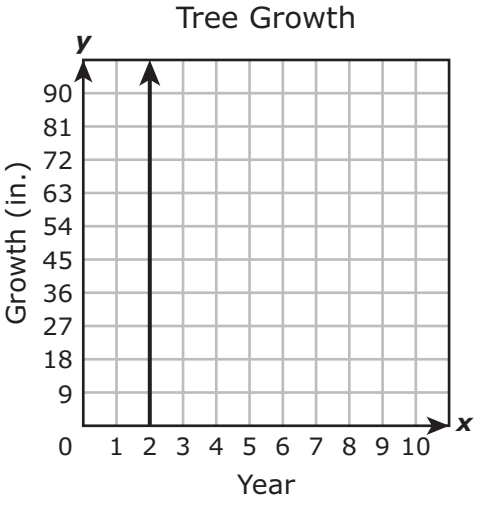
**D** $(x, y) \rightarrow (y, -x)$

**34** A tree in Dante's neighborhood grew 18 inches in the first 2 years after it was planted. If the tree continues to grow at this same rate, which graph best represents the growth rate of the tree in inches per year?

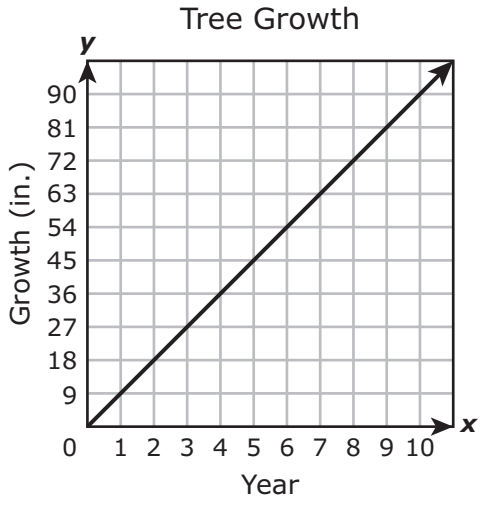
**F**



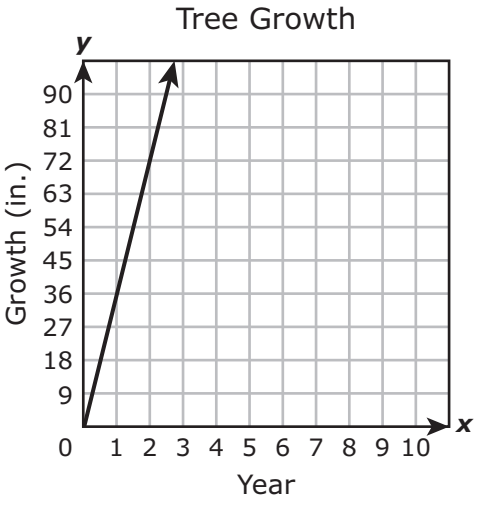

**H**



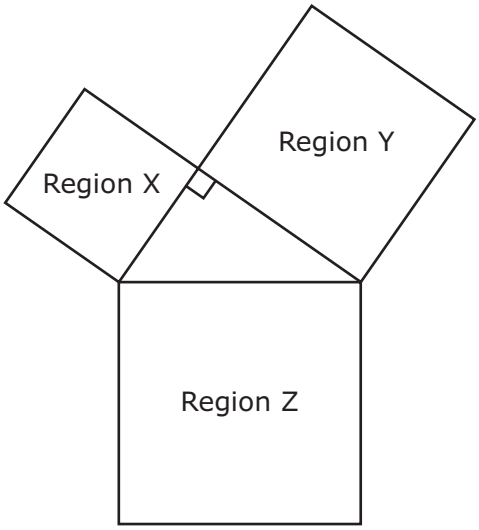

**G**




**J**



**35** An artist joined three square regions at their vertices to create the figure shown in the diagram.




The artist will use small congruent square tiles to cover each region without any gaps or overlaps. Based on the information, which statement is true?

**A** The number of tiles needed to cover Region X is the same as the number of tiles needed to cover both Region Y and Region Z.

**B** The number of tiles needed to cover Region Y is the same as the number of tiles needed to cover both Region X and Region Z.

**C** The number of tiles needed to cover Region Z is the same as the number of tiles needed to cover both Region X and Region Y.

**D** None of these

**36** Mr. Leonard is renting a car for one day. The table below shows the total amount he will be charged for the car based on the number of miles he drives.

Car Rental

| Number of Miles, $m$ | Total Amount Charged, $c$ |
|---|---|
| 5 | \$30.50 |
| 10 | \$31.00 |
| 15 | \$31.50 |
| 20 | \$32.00 |

Which equation best represents $c$, the number of dollars Mr. Leonard should be charged for driving $m$ miles?

**F** $c = 0.10m + 30$

**G** $c = 30m + 0.10$

**H** $c = 0.50m + 30$

**J** $c = 30m + 0.50$

**37** Which list shows the numbers below in order from least to greatest?

$$5.78,\ -5.9,\ 58\%,\ -\frac{23}{4}$$

**A** $-5.9,\ -\frac{23}{4},\ 5.78,\ 58\%$

**B** $-\frac{23}{4},\ -5.9,\ 58\%,\ 5.78$

**C** $-5.9,\ -\frac{23}{4},\ 58\%,\ 5.78$

**D** $58\%,\ -\frac{23}{4},\ 5.78,\ -5.9$

---

**38** A storage container for oil is in the shape of a cylinder with a diameter of 10 ft and a height of 17 ft. Which measurement is closest to the volume of the storage container in cubic feet?

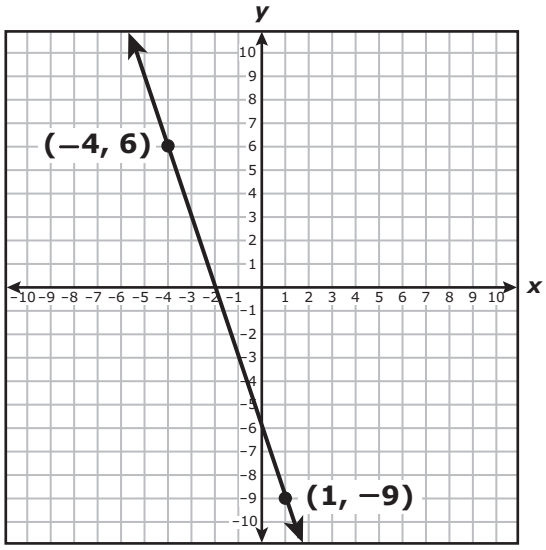
**F** $534\ ft^3$

**G** $1{,}335\ ft^3$

**H** $691\ ft^3$

**J** $1{,}696\ ft^3$

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




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

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

**40** Triangle *ABC* was translated 2 units to the right and 3 units down. Which rule describes the translation that was applied to triangle *ABC* to create triangle *A′B′C′*?

**F** $(x, y) \rightarrow (x - 3, y + 2)$

**G** $(x, y) \rightarrow (x + 2, y - 3)$

**H** $(x, y) \rightarrow (2x, -3y)$

**J** $(x, y) \rightarrow (-3x, 2y)$

---

**41** Nicolas has $650 to deposit into two different savings accounts.

- Nicolas will deposit $400 into Account I, which earns 3.5% annual simple interest.
- He will deposit $250 into Account II, which earns $3\frac{1}{4}$% interest compounded annually.

Nicolas will not make any additional deposits or withdrawals. Which amount is closest to the total balance of these two accounts at the end of 2 years?

**A** $672.13

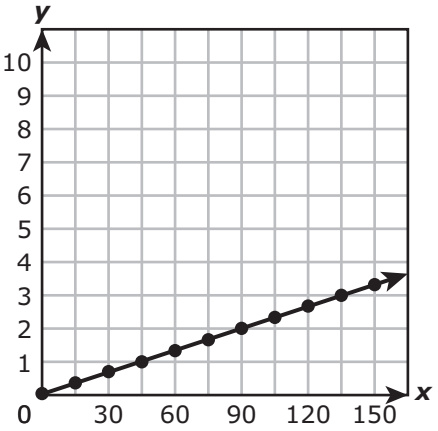
**B** $695.00

**C** $694.25

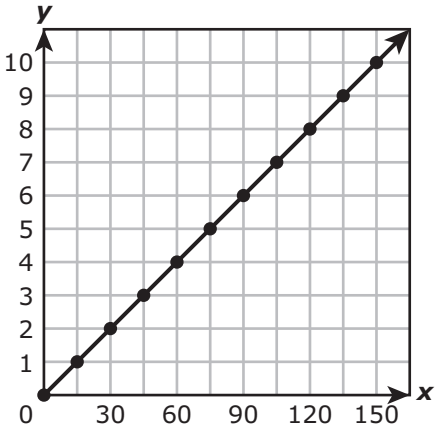
**D** $694.51

**42** On a field trip, there are 3 adults for every 45 students. Which graph models a relationship with the same unit rate?

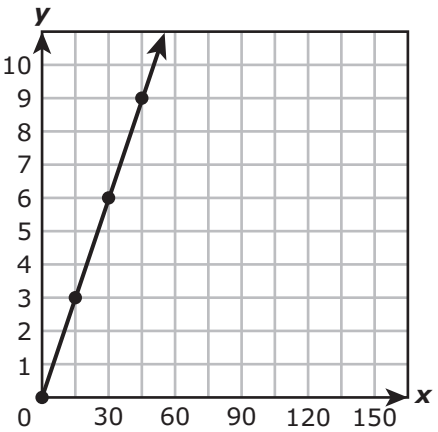
**F**



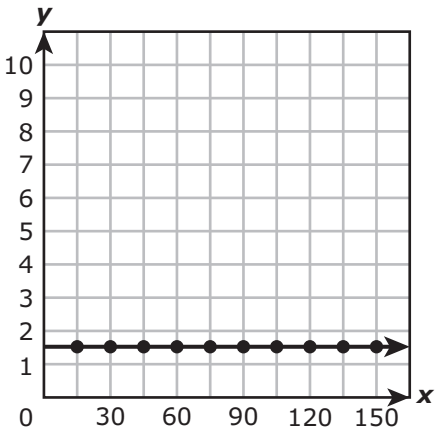

**H**



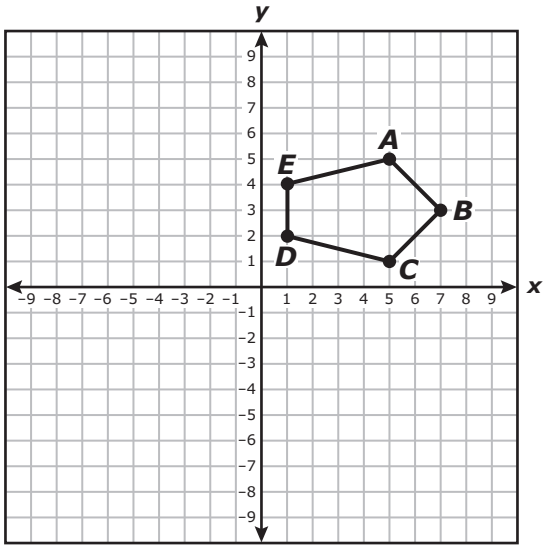

**G**




**J**



**43** Pentagon *ABCDE* is rotated 180° clockwise about the origin to form pentagon *A′B′C′D′E′*.




Which statement is true?

**A** Pentagon *ABCDE* is congruent to pentagon *A′B′C′D′E′*.

**B** The sum of the angle measures of pentagon *A′B′C′D′E′* is 180° more than the sum of the angle measures of pentagon *ABCDE*.

**C** Each side length of pentagon *A′B′C′D′E′* is 2 times the corresponding side length of pentagon *ABCDE*.

**D** Each side length of pentagon *A′B′C′D′E′* is $\frac{1}{2}$ the corresponding side length of pentagon *ABCDE*.

---

**44** The measures of two angles are $(5x + 24)°$ and $(9x - 17)°$. What is the value of $x$ if these angles are congruent?

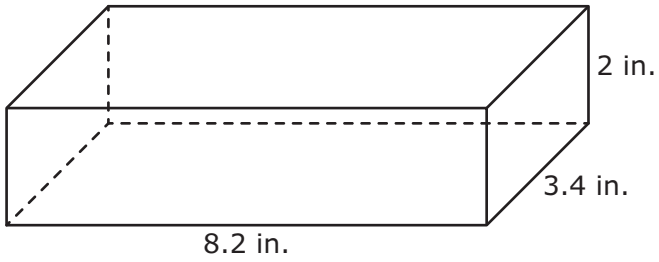
**F** 1.75

**G** 13.2

**H** 0.5

**J** 10.25

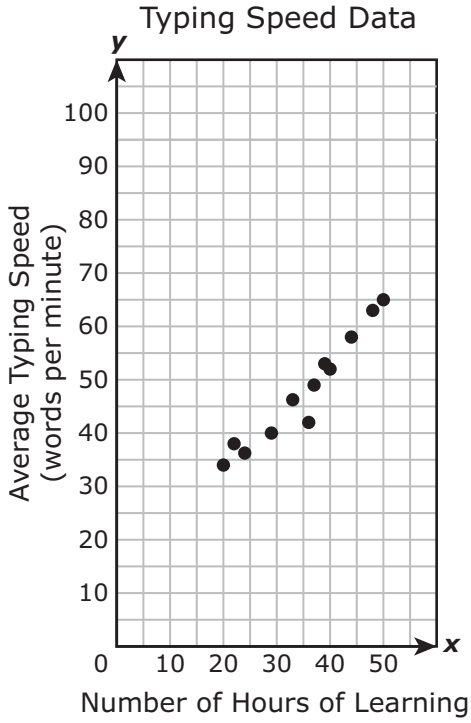
**45** A rectangular prism and its dimensions are shown in the diagram.




What is the total surface area of this rectangular prism in square inches?

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

**46** The scatterplot shows the number of hours that 12 people spent learning to type on a keyboard and each person's average typing speed.




Based on the scatterplot, what is the best prediction of a person's average typing speed in words per minute (wpm) if the person has spent 70 hours learning to type?

**F** 100 wpm

**G** 55 wpm

**H** 85 wpm

**J** 70 wpm

**47** Carolyn will buy the same number of stamps every month to add to a stamp collection her grandfather gave her. The table shows the number of stamps Carolyn will have at the end of $x$ months.

Carolyn's Stamp Collection

| Number of Months, $x$ | 1 | 3 | 6 | 10 |
|---|---|---|---|---|
| Number of Stamps, $y$ | 250 | 350 | 500 | 700 |

How many stamps was Carolyn given, and how many stamps will she buy every month?

**A** Carolyn was given 200 stamps, and she will buy 50 stamps every month.

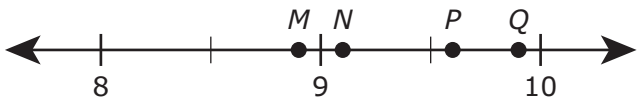
**B** Carolyn was given 180 stamps, and she will buy 70 stamps every month.

**C** Carolyn was given 180 stamps, and she will buy 50 stamps every month.

**D** Carolyn was given 200 stamps, and she will buy 70 stamps every month.

---

**48** Which point on the number line best represents the location of $\sqrt{92}$?




**F** Point $M$

**G** Point $N$

**H** Point $P$

**J** Point $Q$

**49** The list shows the number of songs that five students each downloaded last week.

32, 43, 38, 28, 51

What is the mean absolute deviation of the numbers in the list?

**A** 34.4

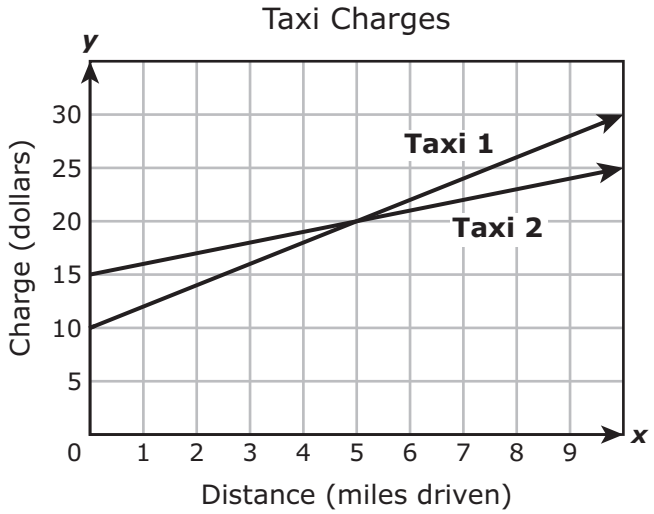
**B** 6.88

**C** 38.4

**D** 7.68

---

**50** The graph models the linear relationship between the charge for a trip and the number of miles driven for two taxis.




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

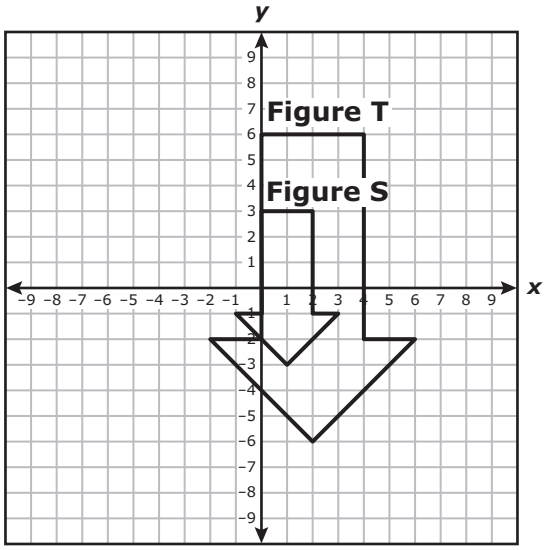
**F** The charge for a trip with a distance of 5 miles is $5 greater for Taxi 1 than for Taxi 2.

**G** The charge for a trip with a distance of 5 miles is $5 less for Taxi 1 than for Taxi 2.

**H** The charge for a trip with a distance of 5 miles is $20 for both Taxi 1 and Taxi 2.

**J** The charge for a trip with a distance of 5 miles cannot be determined for either Taxi 1 or Taxi 2.

**51** Figure S, the small arrow, was dilated with the origin as the center of dilation to create Figure T, the large arrow.




Which rule best represents the dilation that was applied to Figure S to create Figure T?

**A** $(x, y) \rightarrow (2x, 2y)$

**B** $(x, y) \rightarrow (4x, 4y)$

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

**D** $(x, y) \rightarrow (\frac{1}{4}x, \frac{1}{4}y)$

---

**52** Veronica is ordering trophies for her school. Company P charges $3.50 for each trophy and a one-time engraving fee of $25. Company R charges $7.50 for each trophy and a one-time engraving fee of $17. Which inequality can be used to find $x$, the minimum number of trophies that can be ordered so that the total charge at Company P is less than the total charge at Company R?

**F** $3.5 + 25x < 7.5 + 17x$

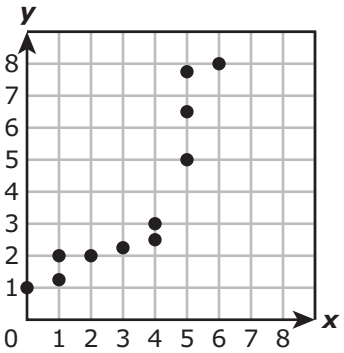
**G** $3.5 + 25x > 7.5 + 17x$

**H** $3.5x + 25 < 7.5x + 17$

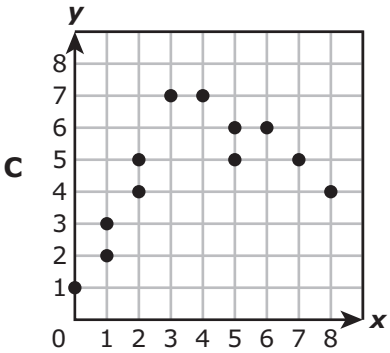
**J** $3.5x + 25 > 7.5x + 17$

**53** Which scatterplot suggests a linear relationship between $x$ and $y$?

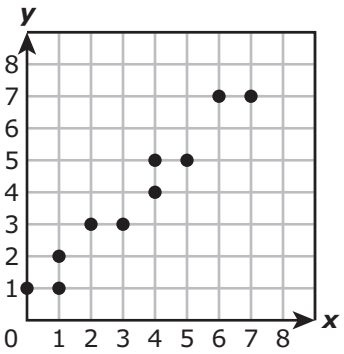
**A**



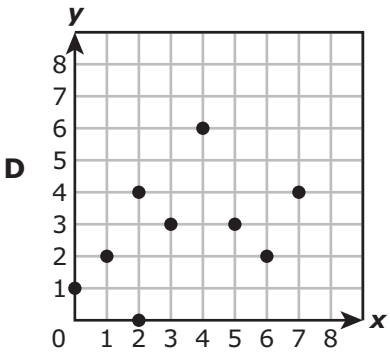

**C**




**B**




**D**

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**54** Frankie bought a new computer. He made an initial payment of $50 to the store, and he will pay $30 each month until the computer is paid off. Which equation represents the relationship between $m$, the number of monthly payments Frankie has made, and $t$, the total amount that Frankie has paid the store?

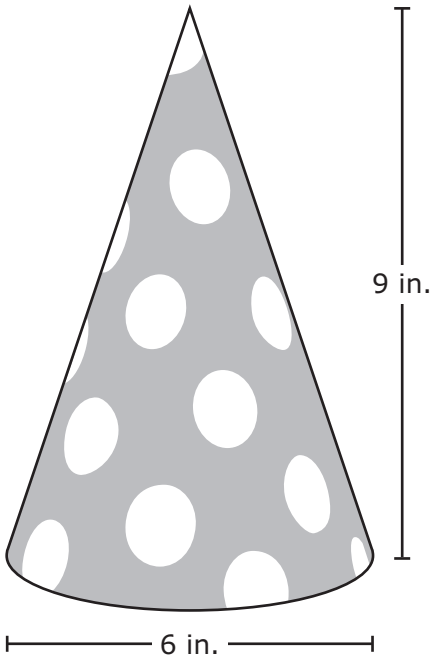
**F** $t = 50m + 30$

**G** $t = 30m - 50$

**H** $t = 50m - 30$

**J** $t = 30m + 50$

**55** A party hat is shaped like a cone. The dimensions of the party hat are shown in the diagram.




Which measurement is closest to the volume of the party hat in cubic inches?

**A** 84.82 $in.^3$

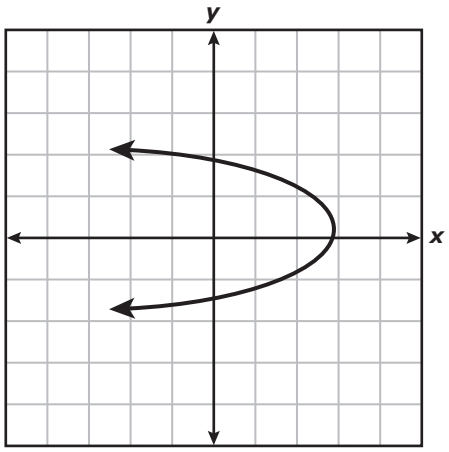
**B** 339.29 $in.^3$

**C** 254.47 $in.^3$

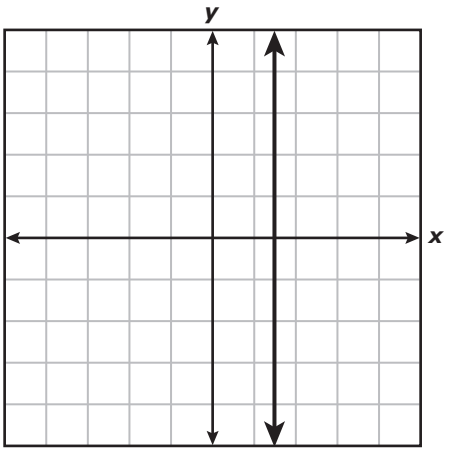
**D** 1,017.88 $in.^3$

**56** Which graph represents $y$ as a function of $x$?

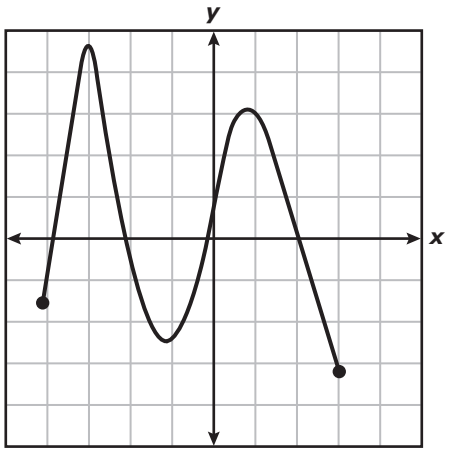
F



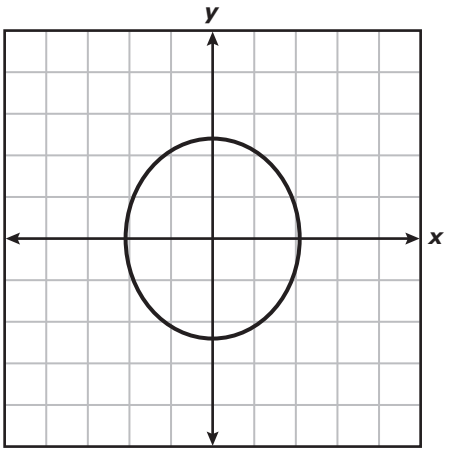

H




G




J






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

STOP

**STAAR**
**GRADE 8**
**Mathematics**
**March 2016**