MATHEMATICS

Mathematics Chart

LENGTH

Metric	Customary
1 kilometer = 1000 meters	1 mile = 1760 yards
1 meter = 100 centimeters	1 mile = 5280 feet
1 centimeter = 10 millimeters	1 yard = 3 feet
	1 foot = 12 inches

CAPACITY AND VOLUME

Metric	Customary
1 liter = 1000 milliliters	1 gallon = 4 quarts
	1 gallon = 128 ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 ounces

MASS AND WEIGHT

Metric	Customary
1 kilogram = 1000 grams	1 ton = 2000 pounds
1 gram = 1000 milligrams	1 pound = 16 ounces

TIME

1 year = 365 days

1 year = 12 months

1 year = 52 weeks

1 week = 7 days

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

Metric and customary rulers can be found on the separate Mathematics Chart.

Continued on the next page

Mathematics Chart

Perimeter	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
Circumference	circle	$C = 2\pi r$ or $C = \pi d$
Area	rectangle	$A = lw$ or $A = bh$
	triangle	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$
	trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$ or $A = \frac{(b_1 + b_2)h}{2}$
	circle	$A = \pi r^2$
Surface Area	cube	$S = 6s^2$
	cylinder (lateral)	$S = 2\pi rh$
	cylinder (total)	$S = 2\pi rh + 2\pi r^2$ or $S = 2\pi r(h + r)$
	cone (lateral)	$S = \pi rl$
	cone (total)	$S = \pi rl + \pi r^2$ or $S = \pi r(l + r)$
	sphere	$S = 4\pi r^2$
Volume	prism or cylinder	$V = Bh$*
	pyramid or cone	$V = \frac{1}{3}Bh$*
	sphere	$V = \frac{4}{3}\pi r^3$
*B represents the area of the Base of a solid figure.		
Pi	π	$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$
Pythagorean Theorem		$a^2 + b^2 = c^2$
Distance Formula		$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Slope of a Line		$m = \frac{y_2 - y_1}{x_2 - x_1}$
Midpoint Formula		$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
Quadratic Formula		$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Slope-Intercept Form of an Equation		$y = mx + b$
Point-Slope Form of an Equation		$y - y_1 = m(x - x_1)$
Standard Form of an Equation		$Ax + By = C$
Simple Interest Formula		$I = prt$

Continued from the previous page

DIRECTIONS

Read each question. Then fill in the correct answer on your answer document. If a correct answer is not here, mark the letter for "Not Here."

SAMPLE A

Find the slope of the line $2y = 8x - 3$.

A $-\frac{3}{2}$

B 4

C 8

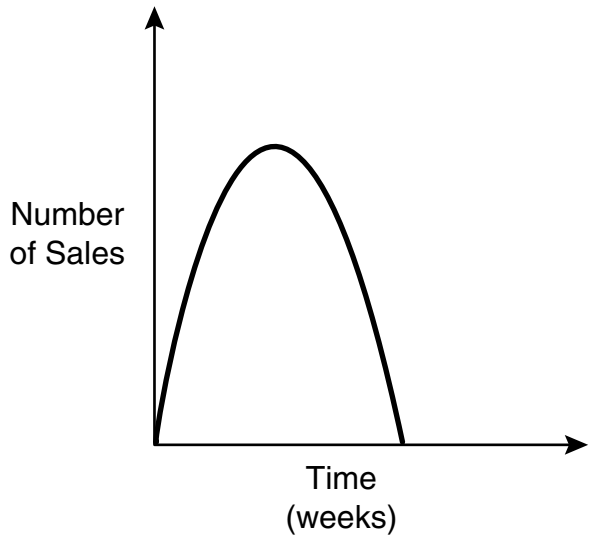
D Not Here

SAMPLE B

Janice uses a rectangular box to store her art supplies. The dimensions of the rectangular box are 22.5 inches by 14 inches by 11.5 inches. What is the volume of this box in cubic inches?

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

1 The sales record for a recent hit CD at Tony's Music Store is shown on the graph below.



Which statement best describes the sales of this CD?

A Sales rapidly increased, reached a peak, and then gradually decreased.

B Sales gradually increased, reached a peak, and then leveled off.

C Sales rapidly increased, reached a peak, and then rapidly decreased.

D Sales remained constant throughout the time period.

2 Rinaldo's school sold all of the tickets to a band concert. The tickets cost $8 each. The auditorium where the concert was held had 39 rows, with 56 seats in each row. Which of the following is a correct method for Rinaldo to calculate the total amount of ticket sales?

F Rinaldo can multiply 56 by $8 and then add 39.

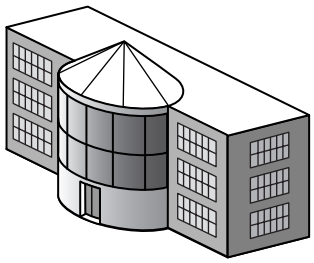
G Rinaldo can add 39 and 56 and then multiply by $8.

H Rinaldo can multiply 39 and 56 and then multiply by $8.

J Rinaldo can add 56 and $8 and then multiply by 39.

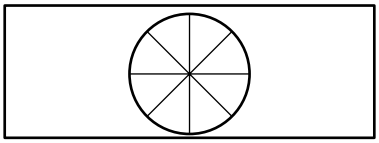
GO ON

3 The drawing shows a view of a building.

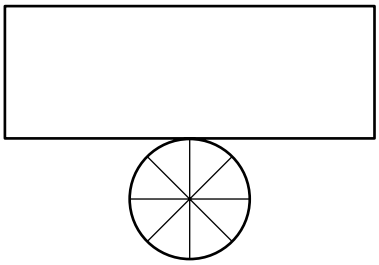


Which drawing best represents the top view of this building?

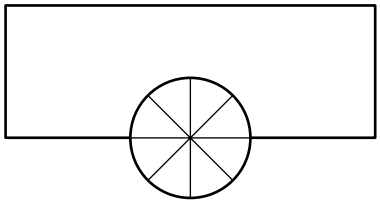
A



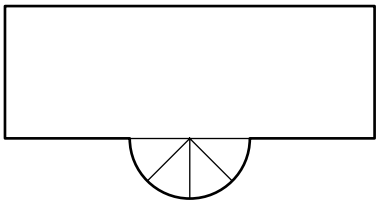
C



B



D



GO ON

4 At Northwest Electronics audiotapes cost \$5.00 per package, and videotapes cost \$10.00 per package. Which inequality best describes the number of packages of audiotapes, a, and the number of packages of videotapes, v, that can be purchased for \$45.00 or less?

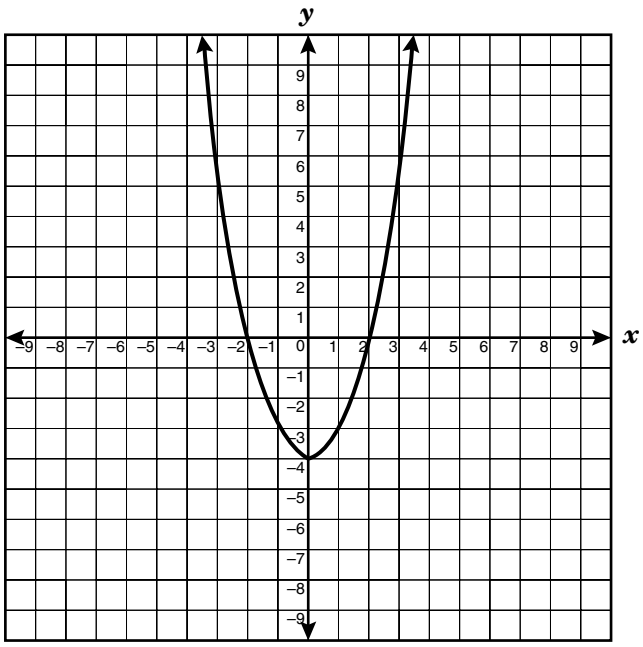
F $5a + 10v < 45$

G $10a + 5v \leq 45$

H $5a + 10v \leq 45$

J $10a + 5v < 45$

5 Jake studied the parabola shown below.



Which is an accurate conclusion that Jake could make about this parabola?

A The vertex is at $(-2, 0)$.

B The minimum value is at $(0, -4)$.

C The maximum value is at $(2, 0)$.

D The axis of symmetry is the x-axis.

6 The world's fastest flying insect is the dragonfly. It can fly 36 miles per hour. If a dragonfly flew in a straight path at this rate, what distance would it fly in 15 minutes?

F 2 mi

G 9 mi

H 25 mi

J 540 mi

7 Vicki works as a salesclerk in a clothing store. She earns \$10 per hour plus a commission of 6% of her total sales. Which equation represents e, her total earnings when she works h hours and sells a total of d dollars in merchandise?

A $e = 10h + 0.06d$

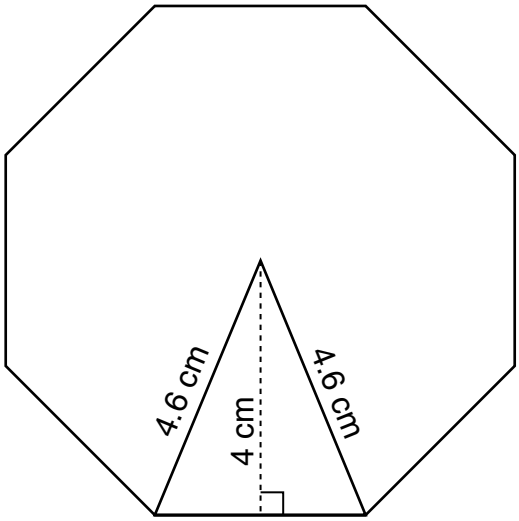
B $e = 10h + 0.6d$

C $e = 6h + 10d$

D $e = 0.06h + 10d$

GO ON

8 What is the perimeter to the nearest centimeter of the regular octagon drawn below?



F 41 cm

G 36 cm

H 27 cm

J 18 cm

9 Which of the following describes the line containing the points (0, 4) and (3, −2)?

A $y = -2x + 4$

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

C $y = 2x + 4$

D $y = -\frac{1}{2}x + 6$

10 Simplify the expression $3(x + 1) - 2(3x + 7)$.

F $-3x - 11$

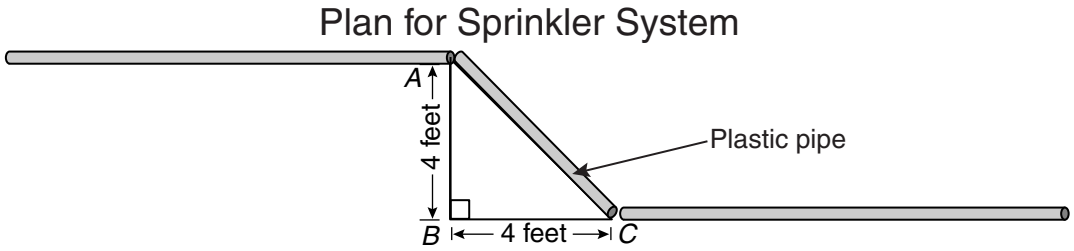
G $-3x - 10$

H $-3x - 8$

J $-3x + 17$

GO ON

11 The drawing shows part of the plan for a new underground lawn-sprinkler system.



Which is closest to the length of the section of plastic pipe from point A to point C?

A 4.7 ft

B 5.7 ft

C 6.7 ft

D 7.7 ft

12 A blueprint of a house plan uses a scale in which $\frac{1}{4}$ inch equals 1 foot. If the length of one side of the house is 65 feet, how many inches will the length be on the blueprint?

F 4 in.

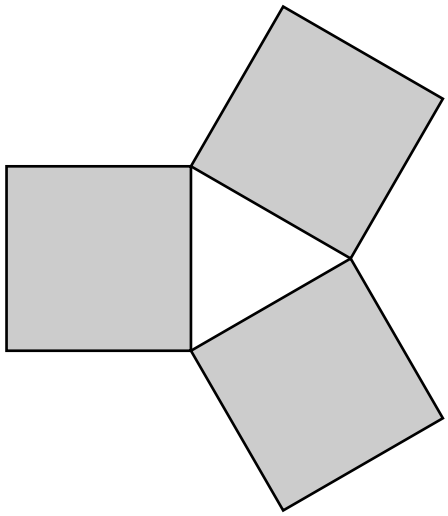
G $16\frac{1}{4}$ in.

H $65\frac{1}{4}$ in.

J 260 in.

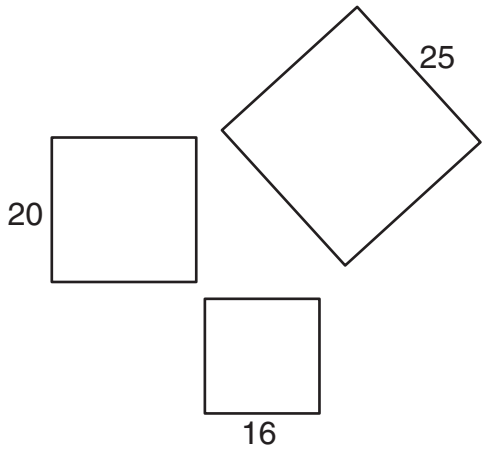
GO ON

13 The sides of squares can be used to form triangles. The areas of the squares that form right triangles have a special relationship.

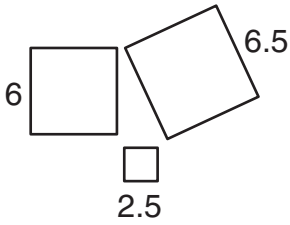


Using the dimensions of the squares shown below, determine which set of squares will form a right triangle.

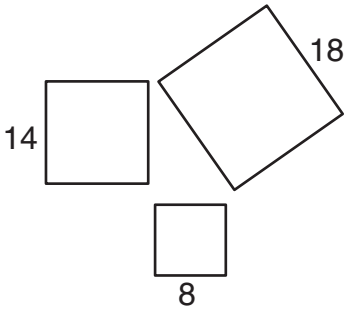
A



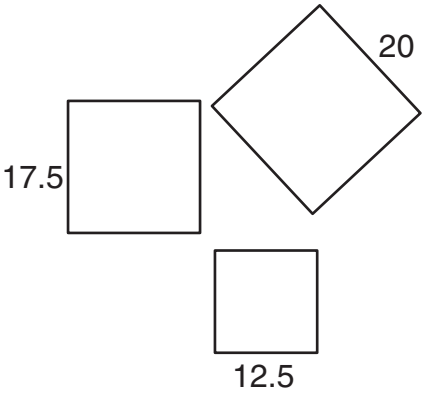
C



B

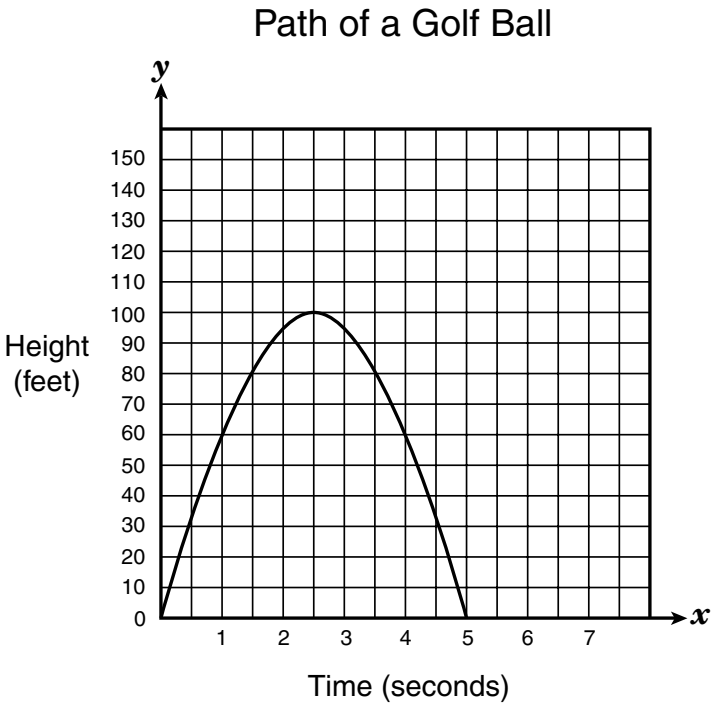


D



GO ON

14 The graph shows the path of a golf ball.



What is the range of this function?

F $0 < y < 100$

G $0 \leq y \leq 100$

H $0 \leq x \leq 5$

J $0 < x < 5$

GO ON

15 Jared has a white cube and a red cube. The surfaces of each cube are numbered with a unique number from 1 to 6. If Jared tosses the cubes, what is the probability he will get a 4 on the white cube and an odd number on the red cube?

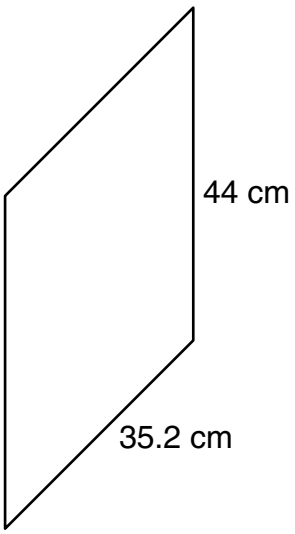
A $\frac{1}{12}$

B $\frac{1}{3}$

C $\frac{1}{2}$

D $\frac{2}{3}$

16 A certain parallelogram has the dimensions shown.



Which set of dimensions would produce a similar figure?

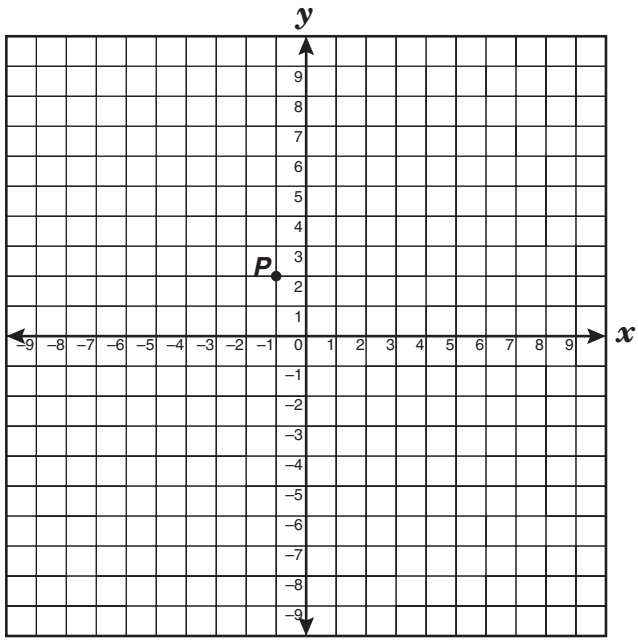
F 17.6 cm, 88 cm

G 70.4 cm, 176 cm

H 105.6 cm, 132 cm

J 140.8 cm, 220 cm

17 Identify the location of point P under translation $(x + 3, y - 2)$.



A $(3, -2)$

B $(2, 3)$

C $(-1, 0)$

D $(2, 0)$

GO ON

18 Given the set of data $\{20, 15, 10, 20, 15, 10, 20, 20, 50\}$, which statement best interprets the data?

F Only the mean is 20.

G The range of the set of data is 20.

H The mean, median, and mode are all 20.

J The mode and median are not the same.

19 A function is described by the equation $f(x) = x^2 + 5$. The replacement set for the independent variable is $\{1, 5, 7, 12\}$. Which of the following is contained in the corresponding set for the dependent variable?

A 0

B 6

C 7

D 15

20 The length of a rectangle is equal to triple the width. Which system of equations can be used to find the dimensions of the rectangle if the perimeter is 85 centimeters?

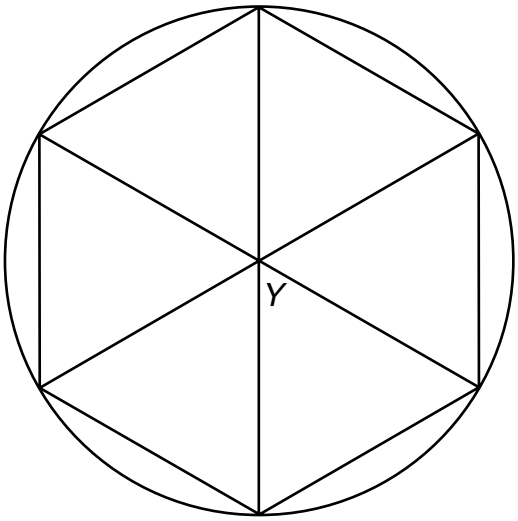
F $l = w + 3$
$2(l + w) = 85$

G $l = 3w$
$2l + 6w = 85$

H $l = 3w$
$2(l + w) = 85$

J $l = w + 3$
$2l + 6w = 85$

21 A regular hexagon is drawn in a circle as a design on a window. Opposite vertices are connected by line segments.

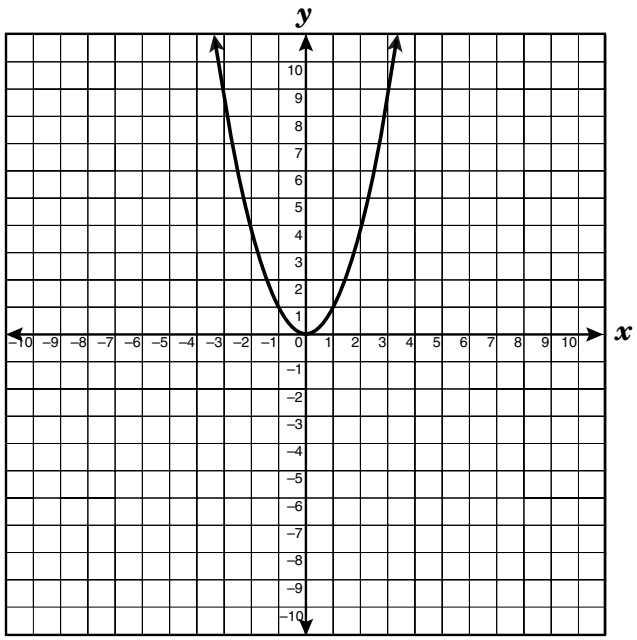


What is the measure of angle Y in degrees?

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

GO ON

22 The graph of the function $y = x^2$ is given below.



How will the graph be affected if the coefficient of x^2 is decreased to $\frac{1}{4}$?

F The parabola will be wider.

G The parabola will be narrower.

H The parabola will be translated up.

J The parabola will be translated down.

23 A pattern exists among the digits in the ones place when 2 is raised to different powers, as shown in the table below. For example, in $2^4 = 16$ the number in the ones place is 6.

Numbers in the Ones Place of Powers of 2

Power of 2	Number in Ones Place
2^1	2
2^2	4
2^3	8
2^4	6
2^5	2
2^6	4
2^7	8
2^8	6
2^9	2

Which digit is in the ones place in 2^{38}?

A 2

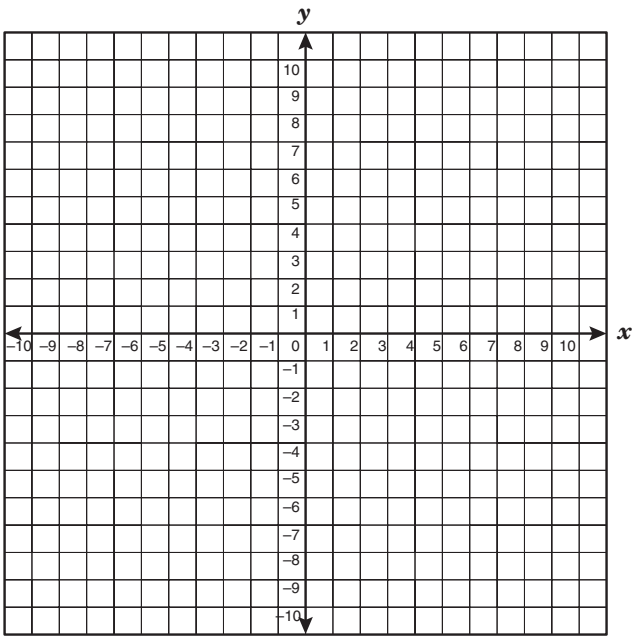
B 4

C 6

D 8

GO ON

24 Which best describes the effect on the graph of $f(x) = 4x + 8$ if the y-intercept is changed to -3?



F The slope decreases.

G The new line passes through the origin.

H The x-intercept increases.

J The y-intercept increases.

25 What are the roots of the quadratic equation $x^2 - 3x + 2 = 0$?

A -2 and -1

B -2 and 1

C 2 and -1

D 2 and 1

26 What is the y-intercept of the function $f(x) = 3(x - 2)$?

F 3

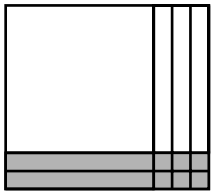
G 1

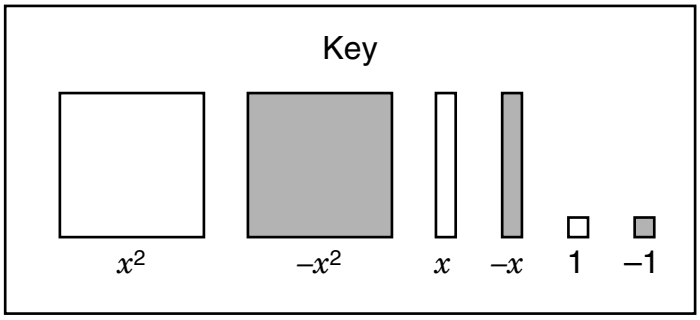
H -2

J -6

GO ON

27 The polynomial $x^2 + x - 6$ is modeled below using algebraic tiles.





What are the solutions to the equation $x^2 + x = 6$?

A $x = -3$ and $x = -2$

B $x = -3$ and $x = 2$

C $x = 3$ and $x = -2$

D $x = 3$ and $x = 2$

---

28 The edges of a large cube are 4 times longer than the edges of a small cube. How many times greater is the volume of the large cube?

F 4 times

G 12 times

H 16 times

J 64 times

GO ON

29 Bob surveyed 10 people about the average number of hours per week they spent in the library last year and the number of books they read last year. The results of the survey are shown in the table.

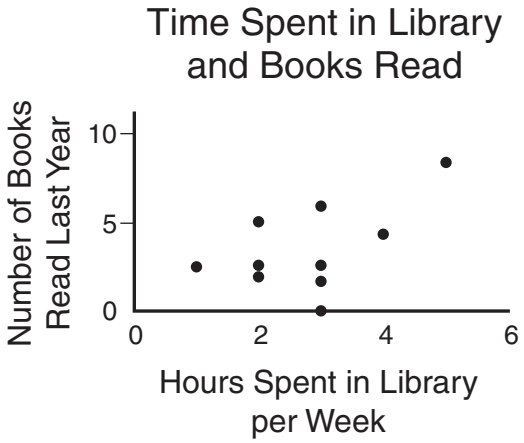
Time Spent in Library and Books Read

Person	Hours Spent in Library per Week	Number of Books Read Last Year
A	3	3
B	3	0
C	2	3
D	4	4
E	2	5
F	1	3
G	3	2
H	3	6
I	5	8
J	2	2

Which graphic display on the next page would be most helpful to determine whether there is a correlation between the number of hours spent in the library and the number of books read?

GO ON

A



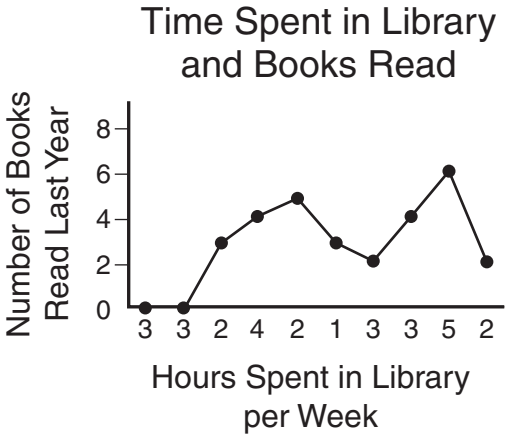
C

Time Spent in Library and Books Read

Stem	Leaf
1	1
2	3
3	4
4	1
5	1

B

D



GO ON

30 Ginny made a cylindrical clay vase for her art project. If the vase has a volume of 339 cubic inches and a diameter of 6 inches, which is closest to the height of the vase?

F 36 in.

G 18 in.

H 12 in.

J 3 in.

31 In the equation $y = 2x^2 - 5x - 18$, which is a value of x when $y = 0$?

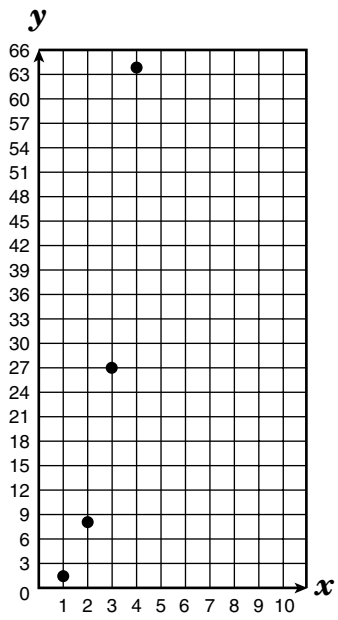
A -18

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

C 2

D $4\frac{1}{2}$

32 Which of the following is best represented by the data in the graph below?



F Comparing the length of a side of a square to the square's area

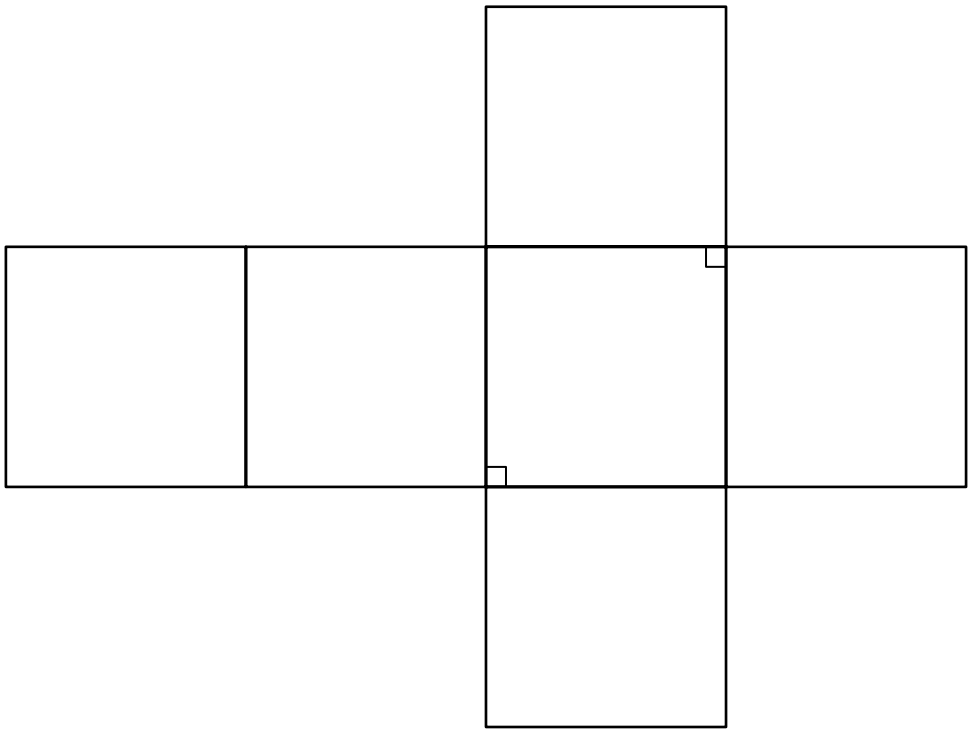
G Comparing the length of the radius of a circle to the circle's circumference

H Comparing the length of a side of a cube to the cube's volume

J Comparing the length of the diameter of a circle to the circle's area

GO ON

33 The net of a cube is shown below. Use the ruler on the Mathematics Chart to measure the dimensions of the cube to the nearest quarter inch.



Which best represents the volume of this cube to the nearest cubic inch?

A 2 in.^{3}

B 9 in.^{3}

C 12 in.^{3}

D 18 in.^{3}

34 What is the value of y if $(3, y)$ is a solution to the equation $5x - 3y = 18$?

F 3

G 1

H -1

J -11

35 Manuel has 5 more CDs than Pedro has. Bob has twice as many CDs as Manuel has. Altogether the boys have 63 CDs. Which equation can be used to find how many CDs each person has?

A $5x + 2x + x = 63$

B $x + (x + 5) + 2x = 63$

C $x + (x + 5) + 2(x + 5) = 63$

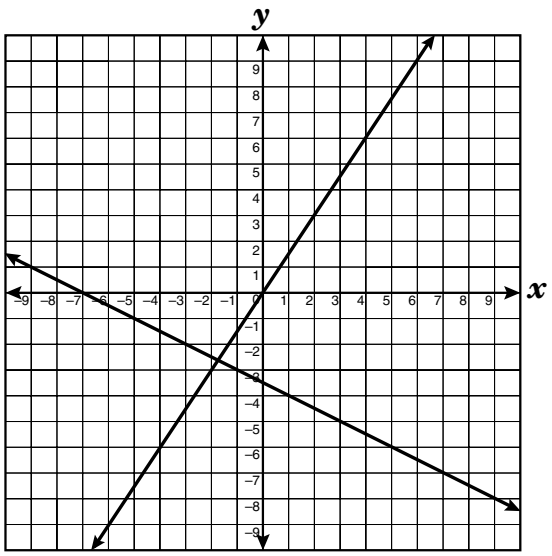
D $x + 2(5x) + 5x = 63$

GO ON

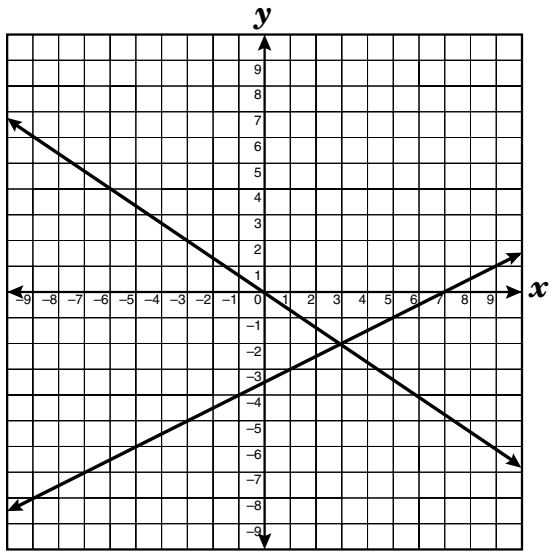
36 Which graph best represents a solution to this system of equations?

$$2x - 3y = 0$$
$$x + 2y = -7$$

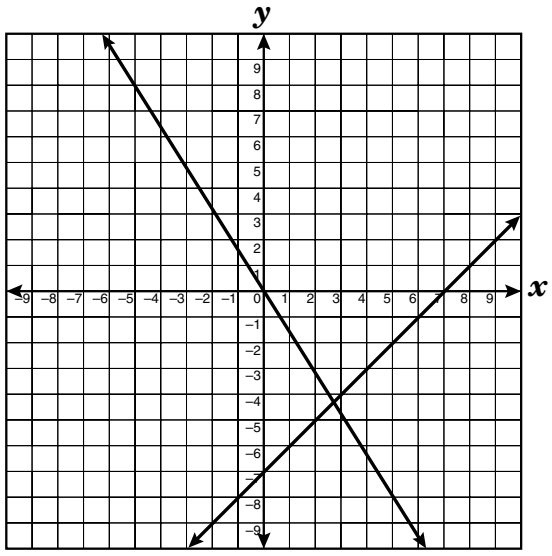
F



H



G



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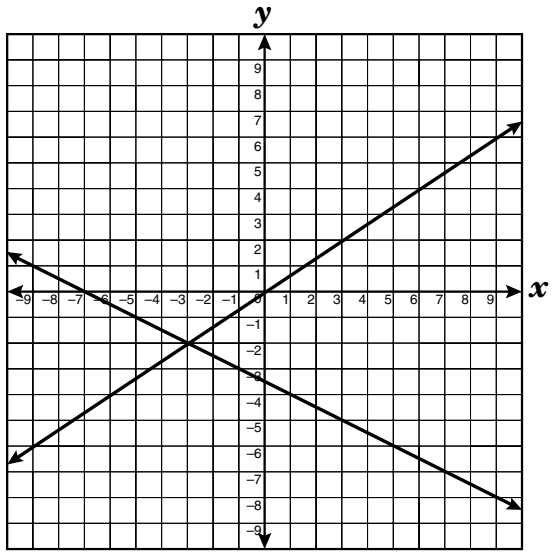


GO ON

37 After a ball is dropped, the rebound height of each bounce decreases. The equation $y = 5(0.8)^x$ shows the relationship between x, the number of bounces, and y, the height of the bounce, for a certain ball. What is the approximate height of the fifth bounce of this ball to the nearest tenth of a unit?

A 20.0 units

B 4.0 units

C 1.6 units

D 1.3 units

38 Mitch wants to use 40 feet of fencing to enclose a flower garden. Which of these shapes would use all the fencing and enclose the largest area?

F A rectangle with a length of 8 feet and a width of 12 feet

G An isosceles right triangle with a side length of about 12 feet

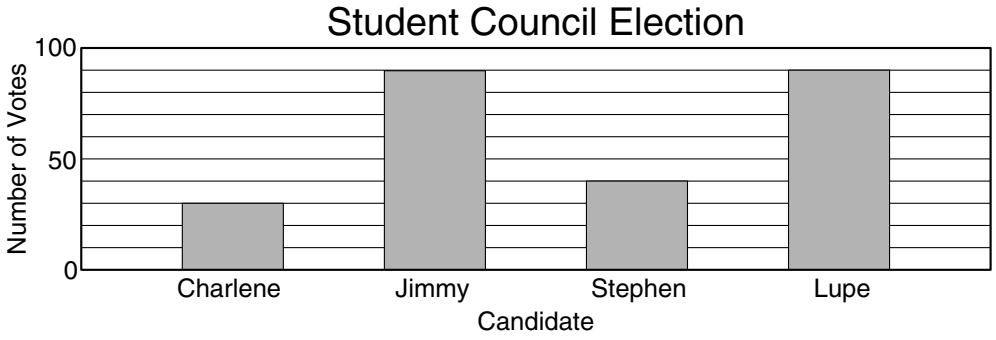
H A circle with a radius of about 5.6 feet

J A square with a side length of 10 feet

GO ON

39 The student election committee at Chesterfield High School recorded the number of votes that each of 4 presidential candidates received in the student council election. A total of 240 students voted. Charlene received 12.5% of the votes, Jimmy received 33.3%, Stephen received 16.7%, and Lupe received 37.5%. Which bar graph best represents the number of votes each presidential candidate received in the student council election?

A



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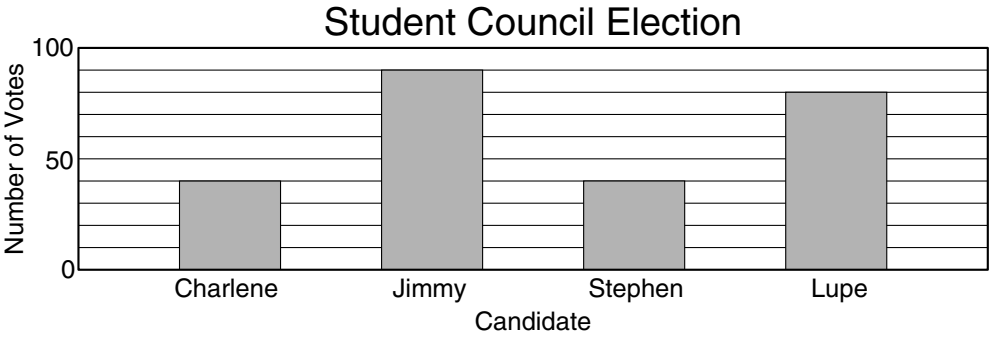

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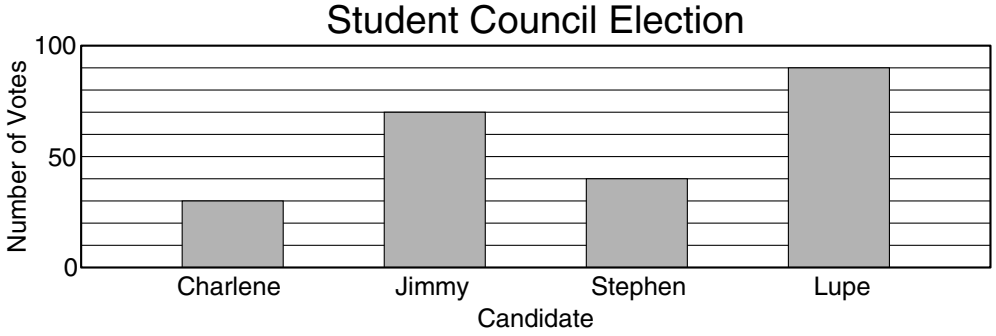

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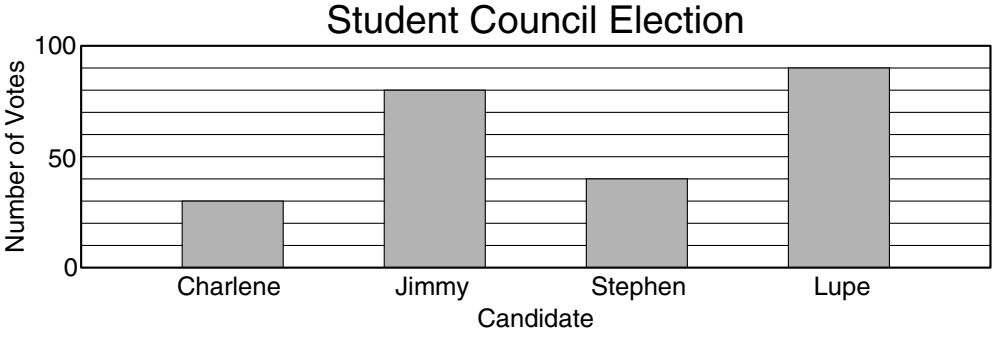
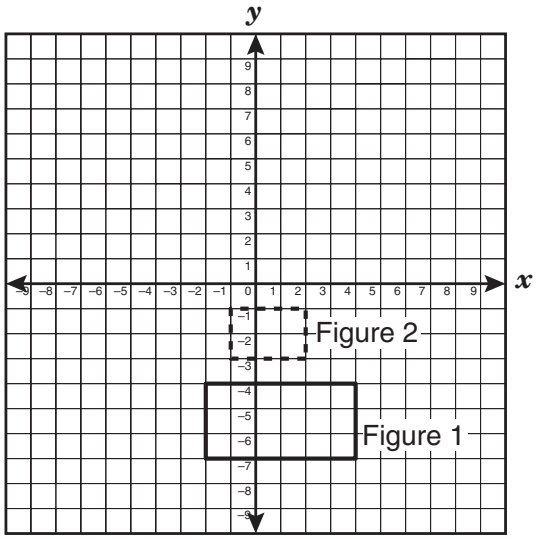


GO ON

40 Identify the drawing that shows Figure 1 under dilation to produce Figure 2, using center of dilation (0, 0) and a scale factor of $\frac{1}{2}$.

F



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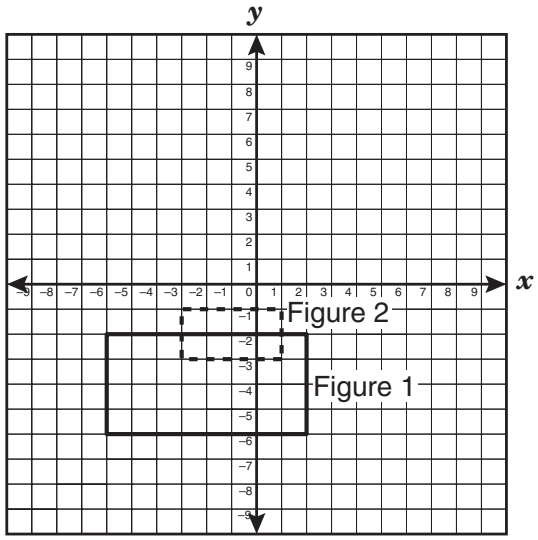

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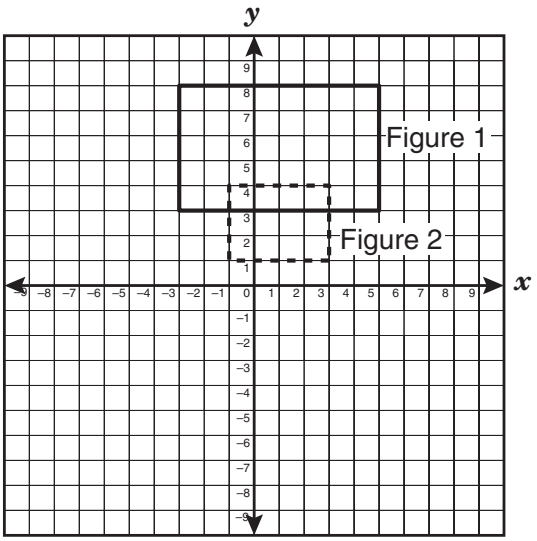

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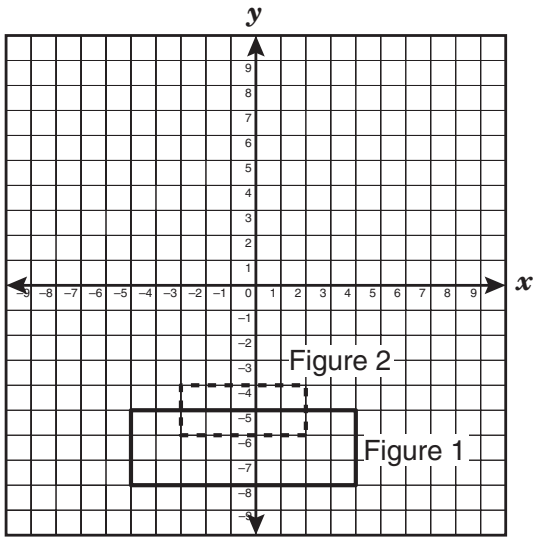


41 The area of a rectangle is $144a^{8}b^{4}$ square units. If the width of the rectangle is $8a^{2}b^{2}$ units, what is the length in units?

A $18a^{6}b^{2}$ units

B $136a^{6}b^{2}$ units

C $152a^{10}b^{6}$ units

D $1152a^{10}b^{6}$ units

42 Mr. Salinas, a real estate agent, received a 5% commission on the selling price of a house. If his commission was \$6,975, what was the selling price of the house?

F \$7,342

G \$34,875

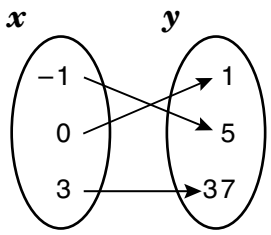
H \$139,500

J \$662,625

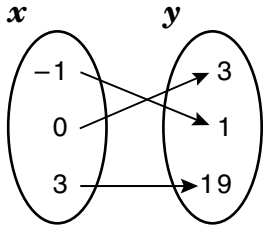
GO ON

43 Which mapping best represents the function $y = 2x^2 + 1$ when the replacement set for x is $\{-1, 0, 3\}$?

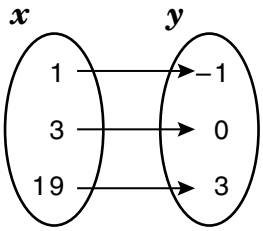
A



C



B



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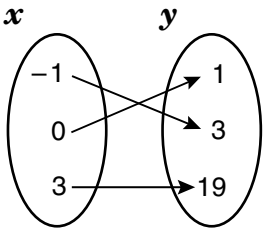
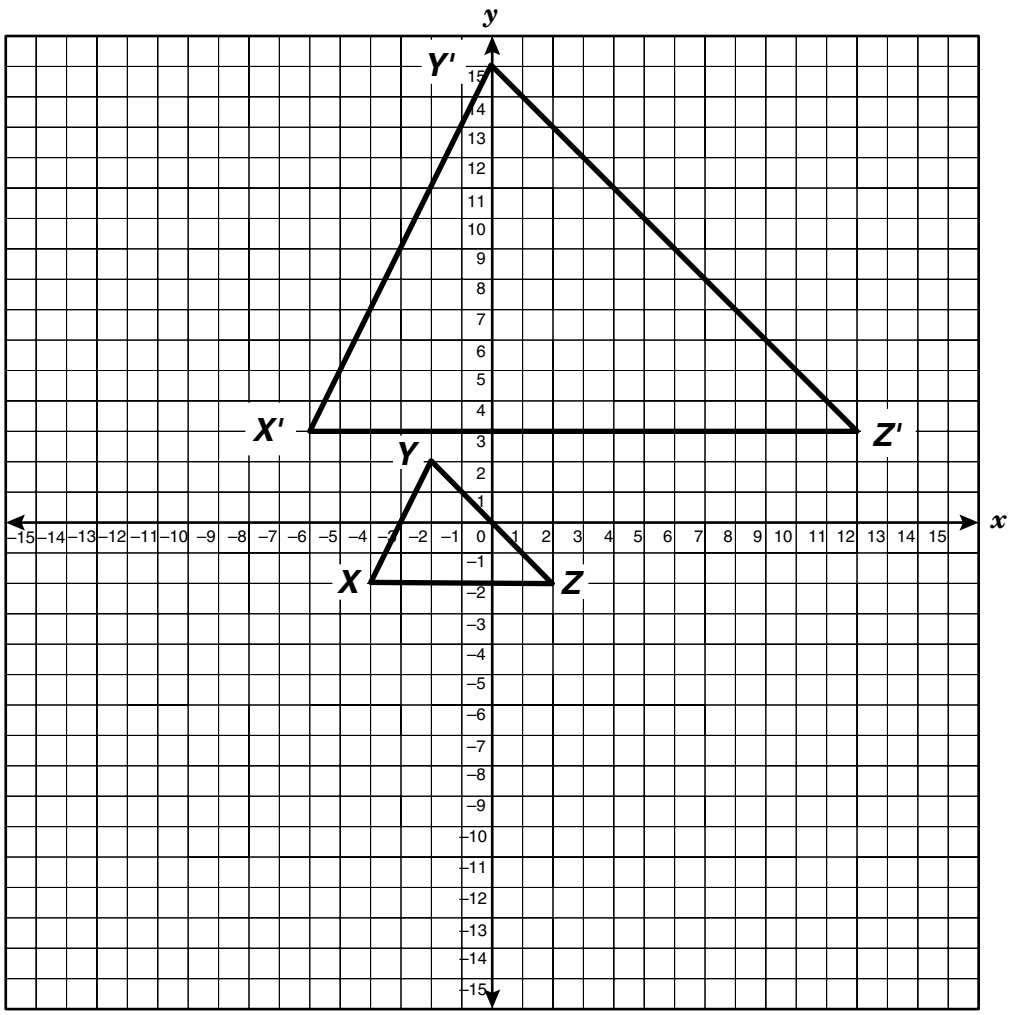


GO ON

44 The graph below shows ΔXYZ and similar $\Delta X'Y'Z'$.



Which statement is true when transforming ΔXYZ to $\Delta X'Y'Z'$?

F All the corresponding angles will increase by a multiple of 3.

G All the corresponding angles will increase by a scale factor of $\frac{1}{3}$.

H All the corresponding sides are proportional, with a scale factor of 3.

J All the corresponding sides are proportional, with a scale factor of $\frac{1}{3}$.

GO ON

45 Which equation best describes the relationship between x and y in this table?

x	y
−4	−11
−1	−2
2	7
5	16

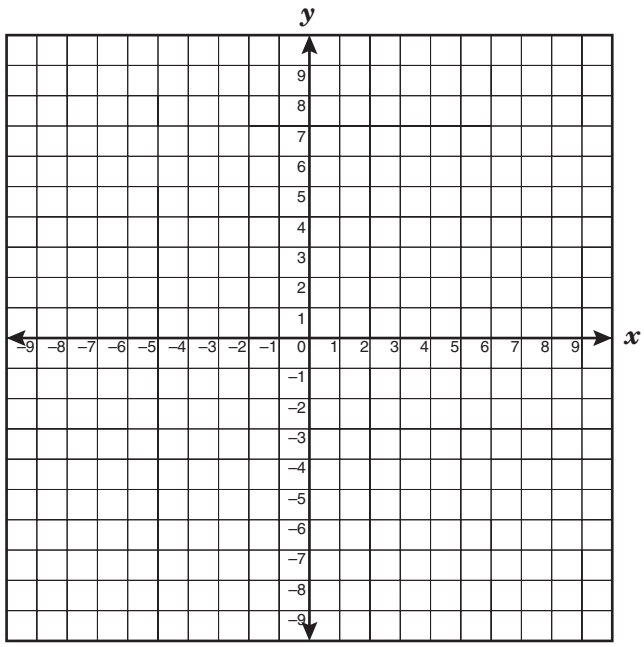
A $y = \frac{1}{3}x + 1$

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

C $y = 3x - 1$

D $y = 3x + 1$

46 What is m, the slope of the line that contains the points (2, 0), (0, 3), and (4, −3)?



F $m = \frac{3}{2}$

G $m = \frac{2}{3}$

H $m = -\frac{2}{3}$

J $m = -\frac{3}{2}$

GO ON

47 Marcos had 15 coins in nickels and quarters. He had 3 more quarters than nickels. He wrote a system of equations to represent this situation, letting x represent the number of nickels and y represent the number of quarters. Then he solved the system by graphing. What is the solution?

A (6, 9)

B (5, 10)

C (9, 6)

D (10, 5)

48 Jerry and Dan are recycling newspaper for a school project. Together they made 21 stacks of newspaper. Each stack is 4 feet tall. Dan can load a stack in 15 minutes, and Jerry can load a stack in 10 minutes. What information is NOT needed to find whether they can load all the newspaper in 2 hours if they work together?

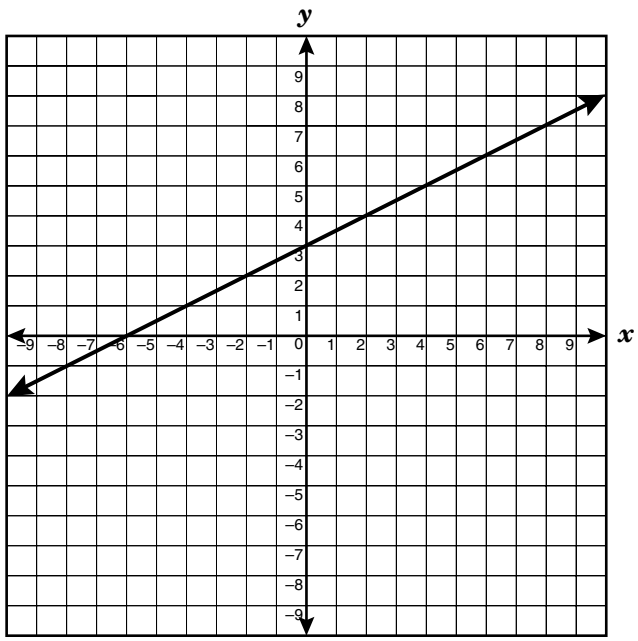
F The time it takes to load the newspaper

G The rate at which each boy loads the newspaper

H The height of each stack of newspaper

J The number of stacks of newspaper

49 Which linear function best describes the graph shown below?



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

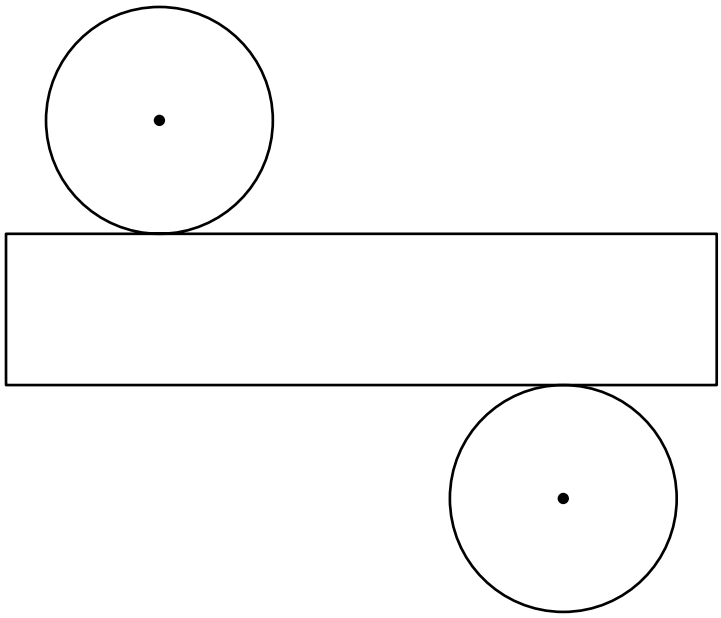
B $y = \frac{1}{2}x + 3$

C $y = -3x - \frac{1}{2}$

D $y = \frac{1}{2}x - 3$

GO ON

50 The net of a cylinder is shown below. Use the ruler on the Mathematics Chart to measure the dimensions of the cylinder to the nearest tenth of a centimeter.



Find the total surface area of this cylinder to the nearest square centimeter.

F 6 cm^2

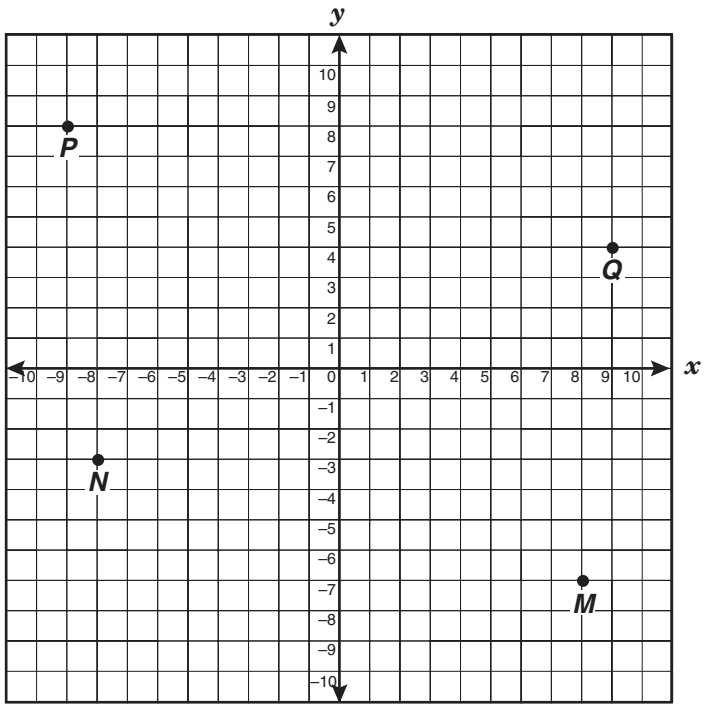
G 14 cm^2

H 19 cm^2

J 33 cm^2

GO ON

51 For which point is $x < -\frac{15}{2}$ and $y < -\frac{3}{2}$?



A M

B N

C P

D Q

GO ON

52 Greta and her friends are having lunch at Joe's Diner. The total cost of their lunch, including tax, is \$54.63. Greta and her friends have \$65.00 altogether and want to leave a tip equal to 15% of the total bill. Is \$65.00 enough to cover the cost of their lunch and the 15% tip for the server?

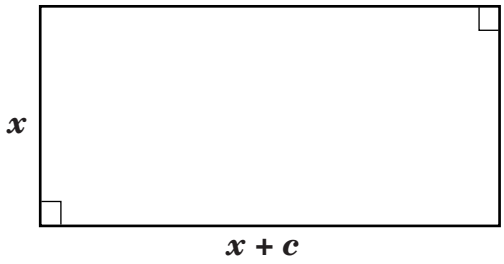
F No, they need \$0.56 more.

G No, they need \$3.29 more.

H Yes, and they have \$2.18 left over.

J Yes, they have the exact amount.

53 Which equation best represents the area, A, of the rectangle below?



A $A = 2x + 2(x + c)$

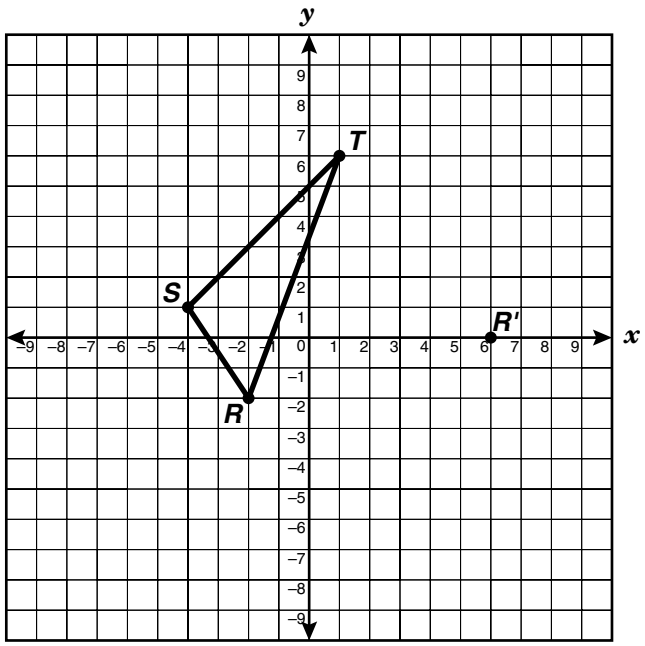
B $A = x^2 + (x + c)^2$

C $A = x(x + c)$

D $A = 2x(x + c)$

GO ON

54 ΔRST is translated so that R is mapped to R'.



Which set of ordered pairs best identifies points S' and T'?

F $S'(8, 3), T'(3, 8)$

G $S'(4, 3), T'(9, 8)$

H $S'(10, -1), T'(12, -9)$

J $S'(10, 3), T'(5, 4)$

55 The scale of two similar quadrilaterals is 1:2. The perimeter of the smaller quadrilateral is 80 centimeters. What is the perimeter of the larger quadrilateral?

A 40 cm

B 80 cm

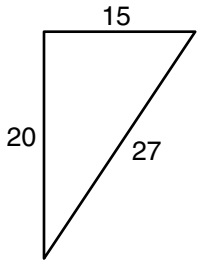
C 160 cm

D 320 cm

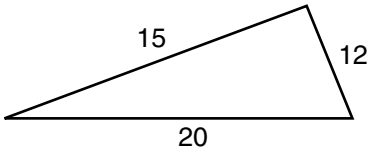
GO ON

56 Use the Pythagorean theorem to find the figure that is a right triangle.

F



H



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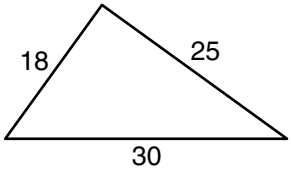

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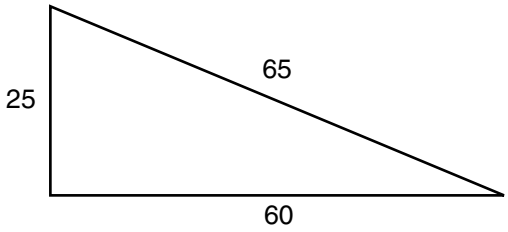

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS ON THE ANSWER DOCUMENT.

STOP