

GRADE 8

Mathematics

Administered April 2021

RELEASED

STAAR GRADE 8 MATHEMATICS REFERENCE MATERIALS



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

$$V = \frac{4}{3}\pi r^3$$

Pythagorean theorem

$$a^2 + b^2 = c^2$$

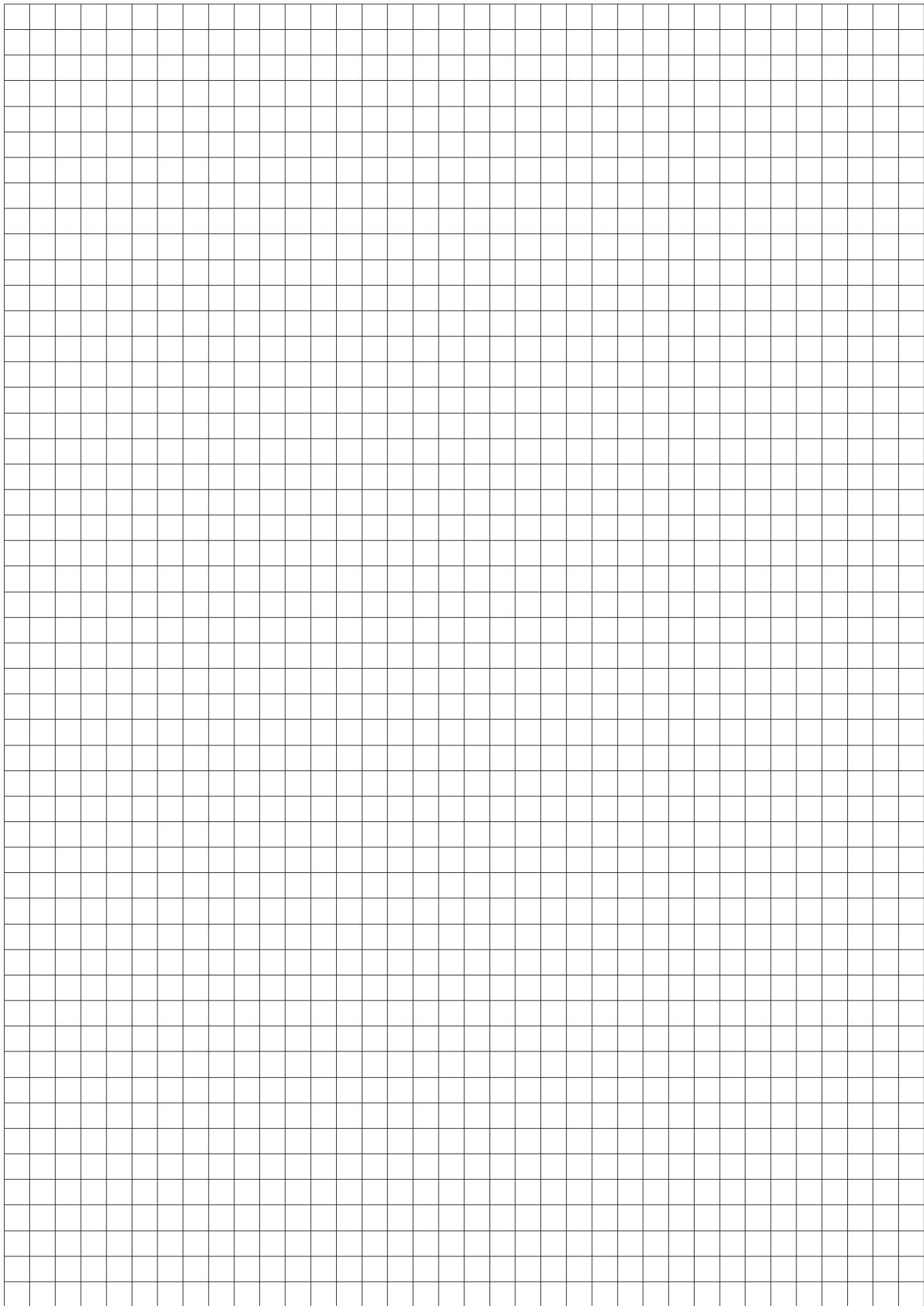
Simple interest

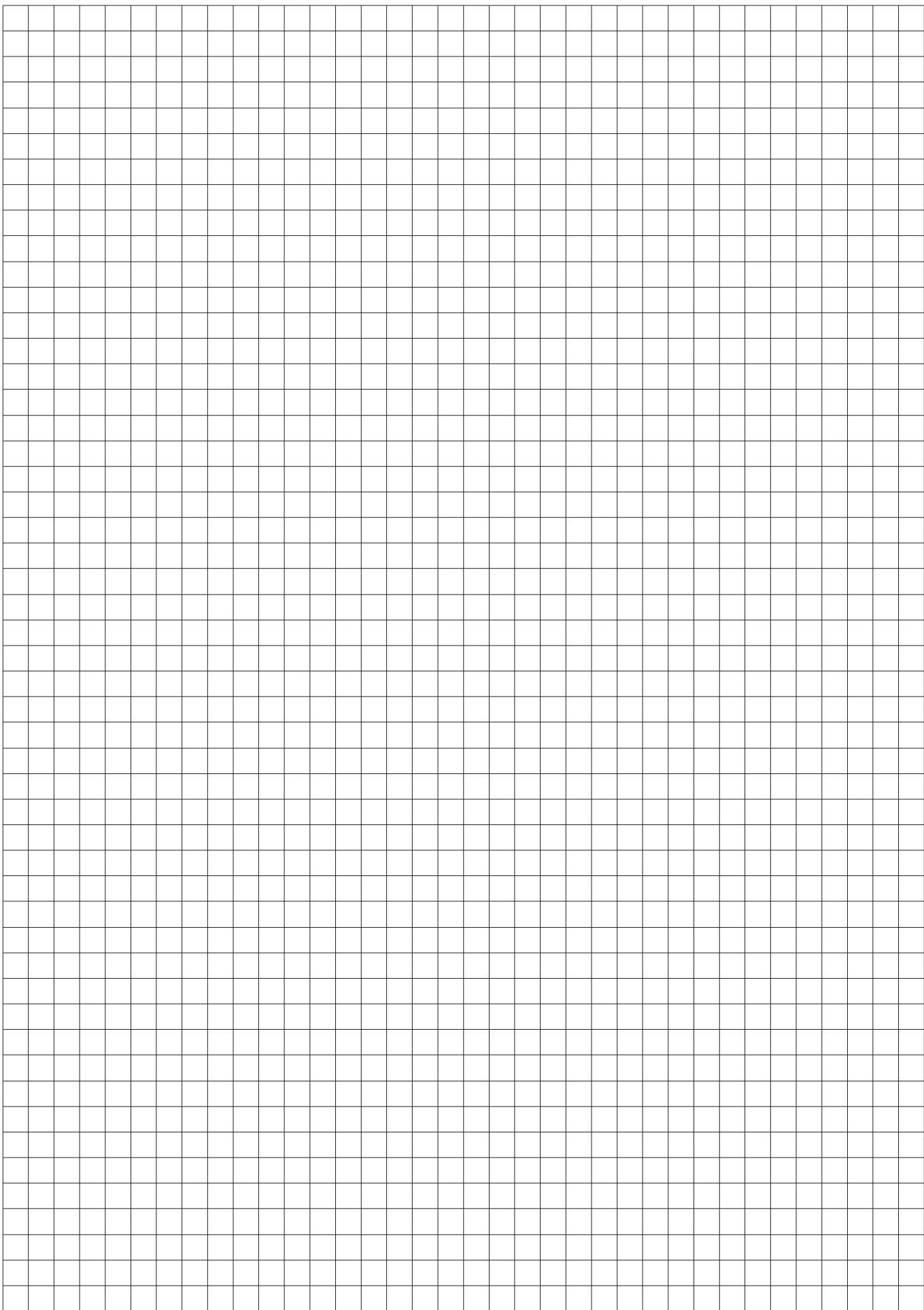
$$I = Prt$$

Compound interest

$$A = P(1 + r)^t$$







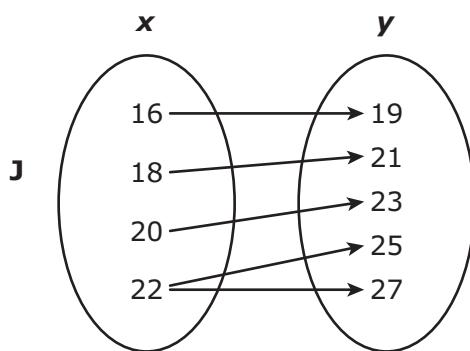
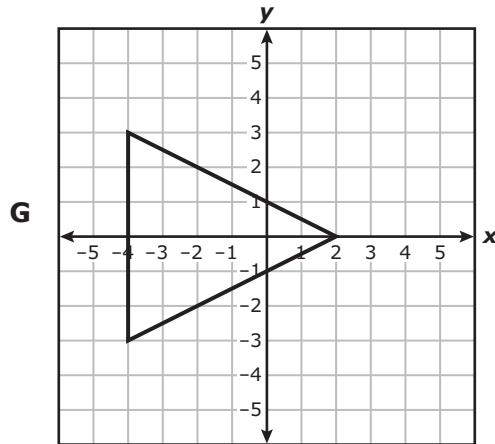
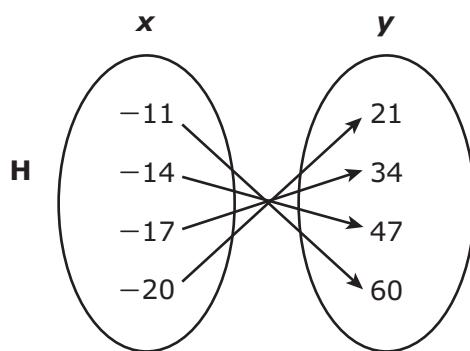
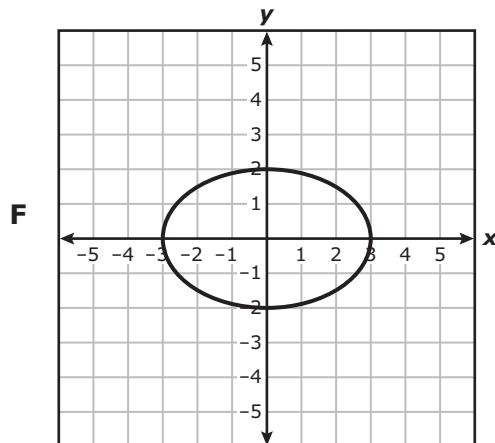
MATHEMATICS

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 Trapezoid $WKRP$ was translated 4 units to the left and 5 units up on a coordinate grid to create trapezoid $W'K'R'P'$. Which rule describes this transformation?
- A $(x, y) \rightarrow (x - 4, y + 5)$
B $(x, y) \rightarrow (x + 4, y - 5)$
C $(x, y) \rightarrow (x + 4, y + 5)$
D $(x, y) \rightarrow (x - 4, y - 5)$

- 2 Which representation shows y as a function of x ?



- 3 A bowling ball shaped like a sphere has a diameter of 21.6 centimeters. Which measurement is closest to the volume of the bowling ball in cubic centimeters?

- A 1,954.3 cm³
- B 5,276.7 cm³
- C 488.6 cm³
- D 42,213.4 cm³

- 4 A customer will borrow \$12,000 to buy a car. Which loan option would allow the customer to pay the least amount of interest?

- F A 4-year loan with a 5.2% annual simple interest rate
G A 5-year loan with a 4.2% annual simple interest rate
H A 6-year loan with a 4.7% annual simple interest rate
J A 3-year loan with an 8.4% annual simple interest rate
-

- 5 Which table represents a non-proportional relationship between x and y ?

A

x	y
1	-4
3	-12
7	-28
15	-60

C

x	y
1	7.5
4	30
7	52.5
10	75

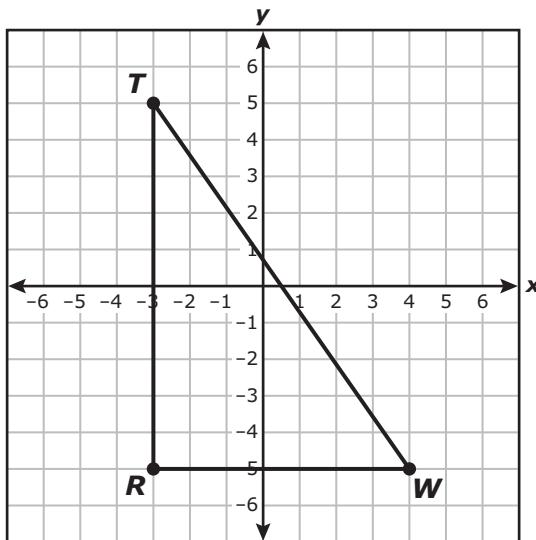
B

x	y
-17	93.5
-5	27.5
2	-11
10	-55

D

x	y
-5	11
-1	-1
1	-7
8	-28

- 6** Triangle TRW is shown on the coordinate grid.



Triangle TRW will be dilated by a scale factor of n with the origin as the center of dilation to create triangle $T'R'W'$. Which ordered pair best represents the location of point R' ?

F $(-\frac{3}{n}, -\frac{5}{n})$

G $(-3n, -5n)$

H $(-3 + n, -5 + n)$

J $(-3 - n, -5 - n)$

-
- 7** A student's parents invested \$5,000 in a college savings account that pays 4.85% annual simple interest. No additional deposits or withdrawals will be made.

Which amount is closest to the interest earned on the account at the end of 15 years?

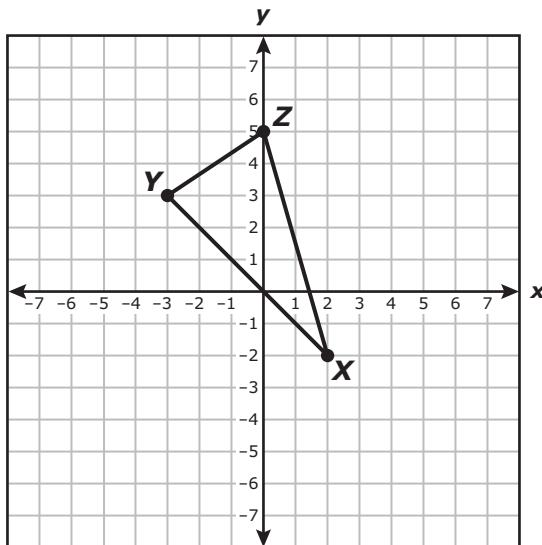
A \$5,174.11

B \$10,174.11

C \$3,637.50

D \$8,637.50

- 8 Triangle XYZ is rotated 90° clockwise about the origin to form triangle $X'Y'Z'$.



Which statement is true?

- F The sum of the angle measures of triangle XYZ is 90° less than the sum of the angle measures of triangle $X'Y'Z'$.
- G The angle measures of triangle XYZ are less than the corresponding angle measures of triangle $X'Y'Z'$.
- H Triangle XYZ is not congruent to triangle $X'Y'Z'$.
- J The area of triangle XYZ is equal to the area of triangle $X'Y'Z'$.

9 A college has two classrooms of students.

- Classroom A had 70 students.
- Classroom B had 30 students.
- Classroom A sent groups of 4 students to Classroom B until both classrooms had the same number of students.

The equation shown can be used to find the number of groups that Classroom A sent to Classroom B so each classroom had the same number of students.

$$70 - 4x = 30 + 4x$$

How many groups did Classroom A send to Classroom B?

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

- 10** A water tank currently contains 275 gallons of water. The amount of water in the tank will decrease at a constant rate of 15 gallons per week.

Which function can be used to find t , the total number of gallons of water in the tank after w weeks?

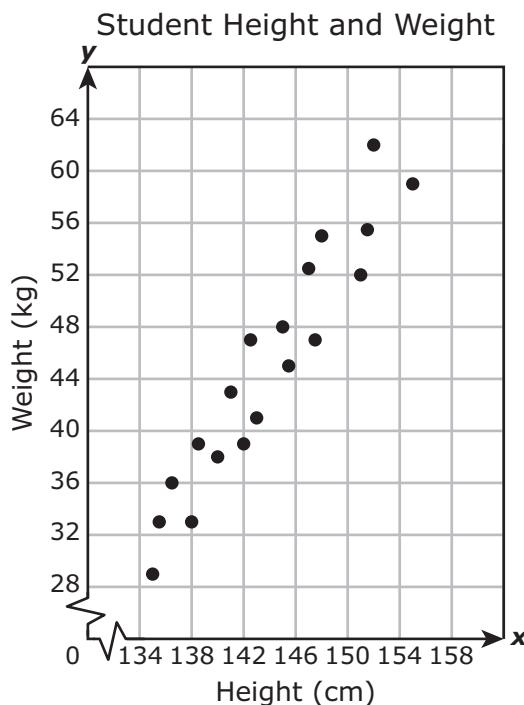
F $t = 15w - 275$

G $t = -15w + 275$

H $t = 275w - 15$

J $t = -275w + 15$

-
- 11** The scatterplot shows the height in centimeters and weight in kilograms of several students.



Based on the scatterplot, which is the best prediction of the height in centimeters of a student with a weight of 64 kilograms?

A 152 cm

B 160 cm

C 162 cm

D 156 cm

- 12** A transformation is applied to a figure to create a new figure on a coordinate grid. Which transformation does NOT preserve congruence?

- F** A rotation of 270° counterclockwise
- G** A reflection across the y -axis
- H** A dilation by a scale factor of 1.5
- J** A translation of 50 units down

-
- 13** A teacher bought markers at a cost of \$3 per set. The teacher had a \$2-off coupon to use toward the total cost of the markers bought.

Which table shows the relationship between x , the number of sets of markers bought by the teacher, and y , the total cost of the markers?

A Markers

Sets of Markers Bought, x	Total Cost, y
3	\$7
9	\$25
12	\$34
24	\$70

C Markers

Sets of Markers Bought, x	Total Cost, y
3	\$11
9	\$29
12	\$38
24	\$74

B Markers

Sets of Markers Bought, x	Total Cost, y
9	\$1
12	\$2
15	\$3
24	\$6

D Markers

Sets of Markers Bought, x	Total Cost, y
9	\$5
12	\$6
15	\$7
24	\$10

- 14** The diameter of a cylinder is 2.5 inches, and the height is 7.5 inches. Which equation can be used to find V , the volume of the cylinder in cubic inches?

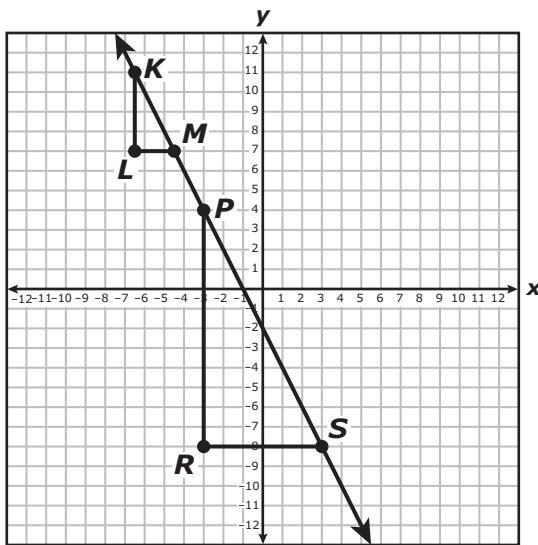
F $V = \pi(2.5)^2(7.5)$

G $V = \pi(7.5)^2(2.5)$

H $V = \pi(1.25)^2(7.5)$

J $V = \pi(3.75)^2(2.5)$

-
- 15** Triangle KLM and triangle PRS are similar right triangles.



Which proportion can be used to show that the slope of \overline{KM} is equal to the slope of \overline{PS} ?

A $\frac{KL}{LM} = \frac{PR}{RS}$

B $\frac{RS}{SP} = \frac{LM}{MK}$

C $\frac{ML}{LK} = \frac{SP}{RP}$

D $\frac{PS}{PR} = \frac{KM}{KL}$

- 16** The table shows the diagonal lengths of TV screens at a store.

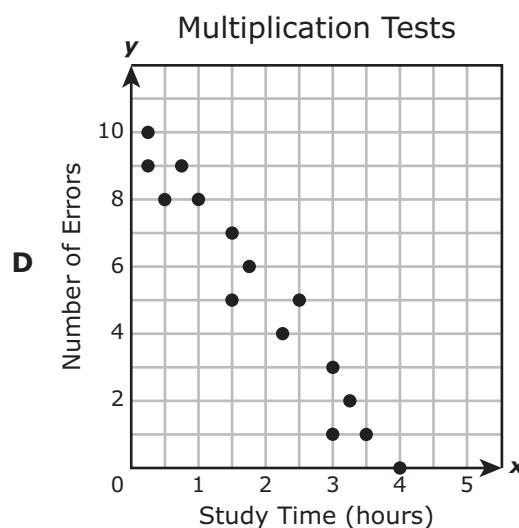
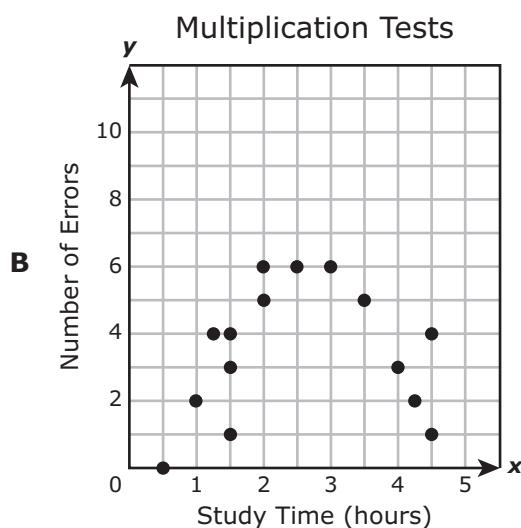
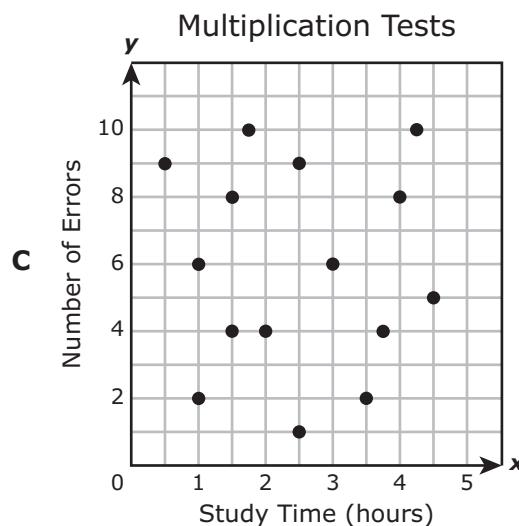
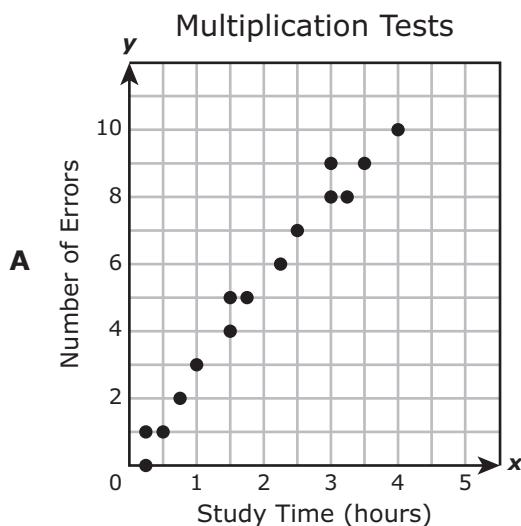
TV Screen Diagonal Lengths

Screen	Length (feet)
W	$\sqrt{12.25}$
X	$2\frac{1}{6}$
Y	$\frac{37}{\sqrt{144}}$
Z	$\frac{8}{3}$

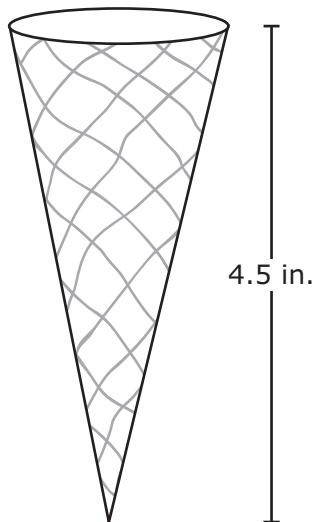
Which TV screen has the smallest diagonal length in feet?

- F** W
G X
H Y
J Z

- 17** A math teacher observed that as the number of hours students studied their multiplication facts increased, the number of errors the students made on their multiplication tests decreased. Which scatterplot could support this teacher's observation?



- 18** The diagram shows the height of a cone that holds ice cream. The cone has a volume of 1.5π cubic inches.



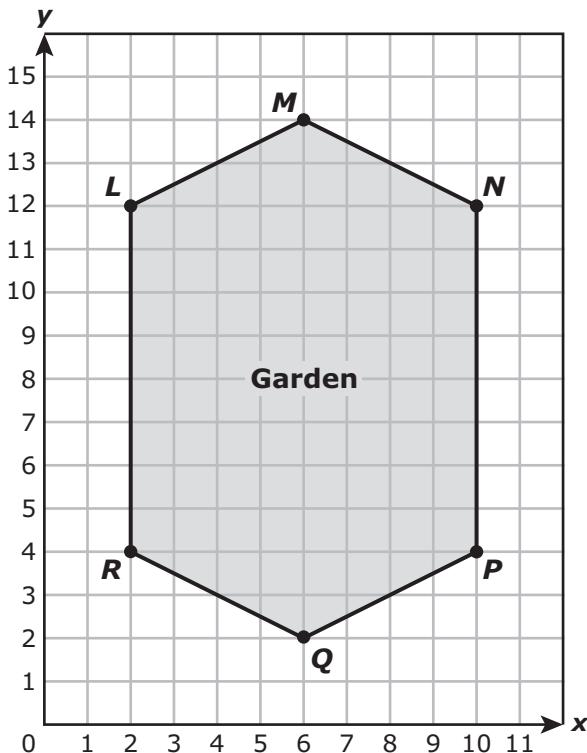
Which measurement is closest to the radius of the cone in inches?

- F** 0.6 in.
 - G** 1.4 in.
 - H** 1.0 in.
 - J** 0.5 in.
-

- 19** Which set of ordered pairs represents y as a function of x ?

- A** $\{(0, 0.5), (2, 1.5), (-5.5, 5), (-5.5, -6)\}$
- B** $\{(5, -7), (3, -7), (-9.2, -7), (9.2, -7)\}$
- C** $\{(9.3, -1), (7.3, -2), (7.3, 2), (9.3, 1)\}$
- D** $\{(8.1, 9), (9.1, 10), (10.1, 9), (9.1, 8)\}$

- 20** Polygon $LMNPQR$ is shown on the coordinate grid and models the shape of a garden in a park. Polygon $LMNPQR$ will be dilated with the origin as the center of dilation to create polygon $L'M'N'P'Q'R'$. The vertex Q' will be located at $(21, 7)$.



Which rule best represents the dilation?

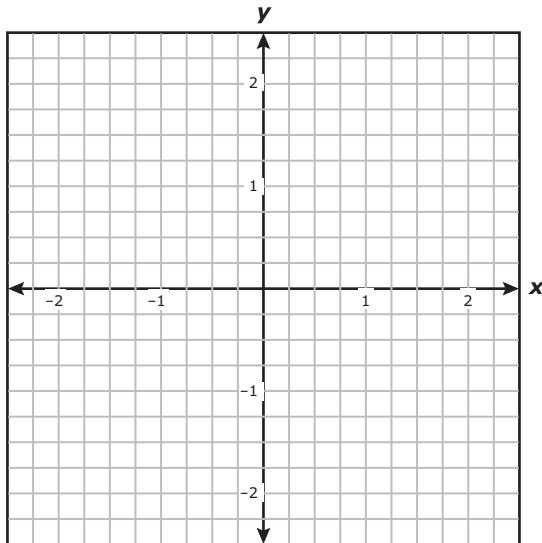
F $(x, y) \rightarrow (\frac{2}{7}x, \frac{2}{7}y)$

G $(x, y) \rightarrow (x + 15, y + 5)$

H $(x, y) \rightarrow (x - 15, y - 5)$

J $(x, y) \rightarrow (\frac{7}{2}x, \frac{7}{2}y)$

- 21** The graph of a linear function passes through the points $(-1, -\frac{1}{4})$ and $(1, -\frac{3}{4})$.



Which equation represents the function?

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

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

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

D $y = \frac{1}{4}x + \frac{1}{2}$

-
- 22** The area of a piece of land is 4,951,000 square meters. How is this number of square meters written in scientific notation?

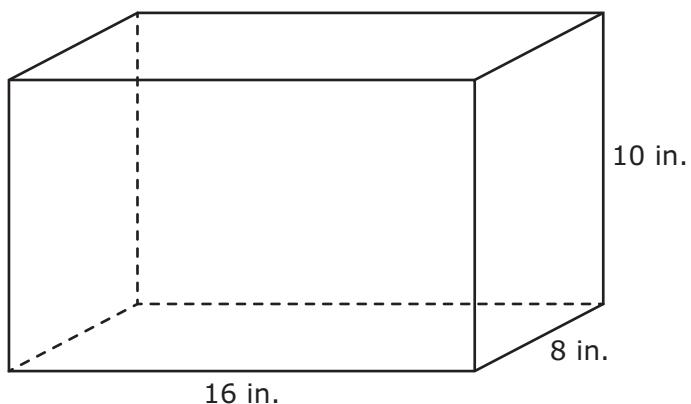
F 4.951×10^6

G 4.951×10^{-6}

H $4,951 \times 10^3$

J $4,951 \times 10^{-3}$

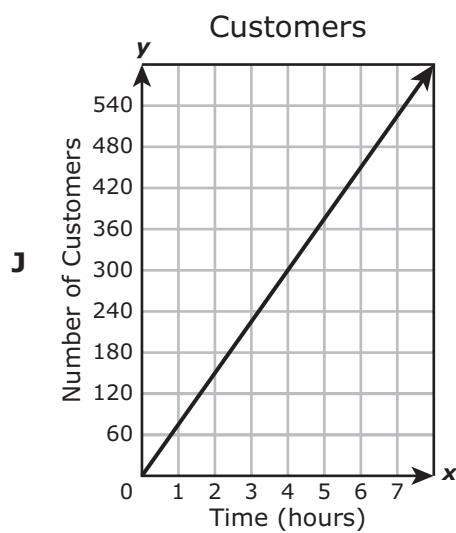
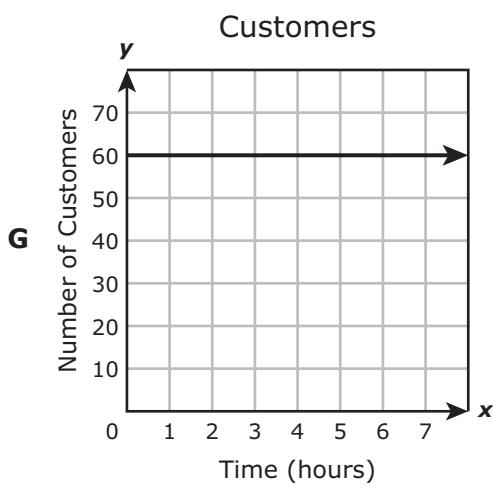
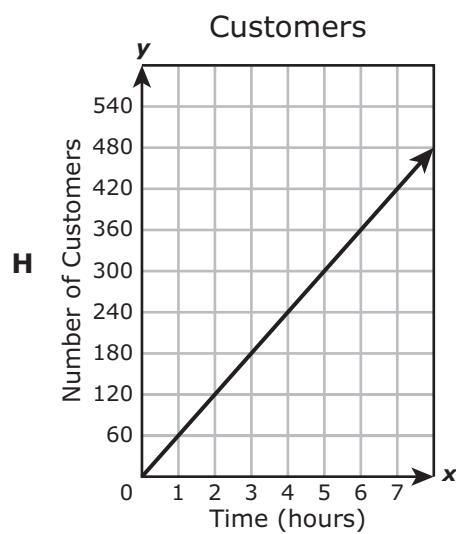
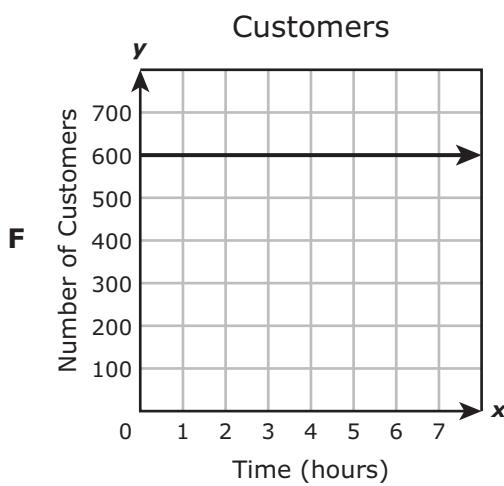
- 23** The dimensions of a rectangular prism are shown in the diagram.



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

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

- 24** At a restaurant 600 customers were served during a 10-hour period of time. Which graph has a slope that best represents the number of customers that were served per hour at this restaurant?



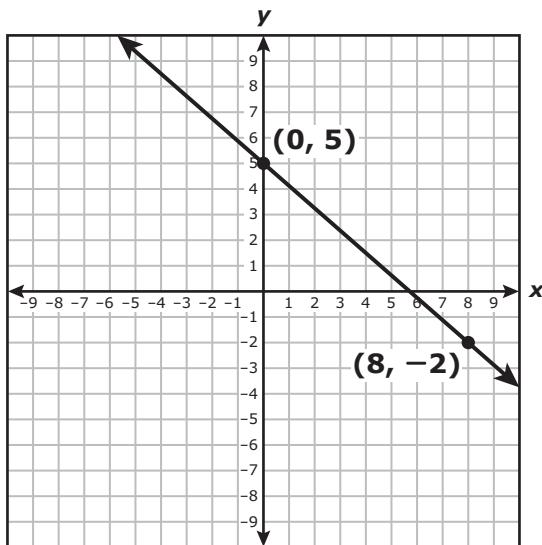
25 Ben deposits \$1,750 into each of two savings accounts.

- Account I earns 2.75% annual simple interest.
- Account II earns 2.75% interest compounded annually.

Ben does not make any additional deposits or withdrawals. Which amount is closest to the difference between the interest Ben will earn in Account I and the interest Ben will earn in Account II at the end of 2 years?

- A** \$96.25
- B** \$1.32
- C** \$97.57
- D** \$193.82

- 26** A linear function is represented on the coordinate grid.



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

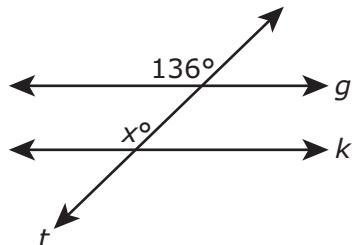
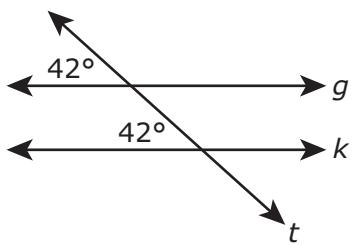
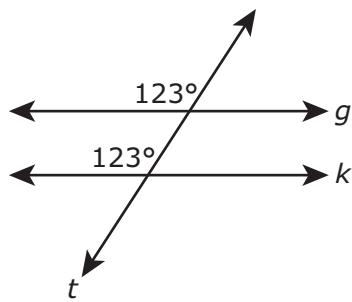
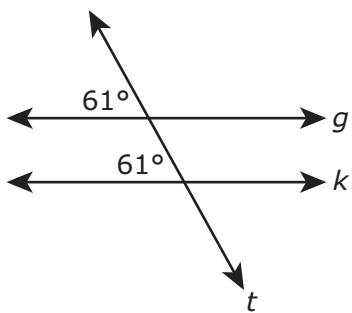
F 5

G 6

H $-\frac{7}{8}$

J $-\frac{8}{7}$

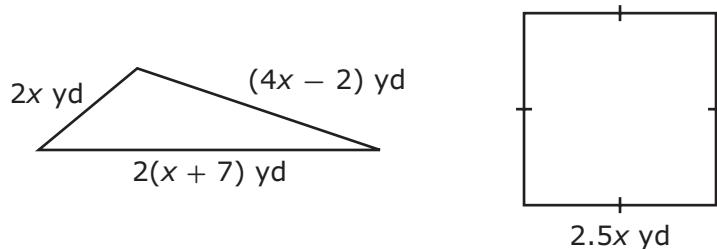
- 27** In each diagram, line g is parallel to line k , and line t intersects lines g and k .



Based on the diagrams, which statement about x is true?

- A** The value of x is 180, because the labeled angles in each diagram are supplementary and the sum of the measures of supplementary angles is 180 degrees.
- B** The value of x is 90, because the labeled angles in each diagram are complementary and the sum of the measures of complementary angles is 90 degrees.
- C** The value of x is 44, because the sum of the measures of the labeled angles in each diagram is 180 degrees.
- D** The value of x is 136, because the labeled angles in each diagram are congruent.

- 28** The side lengths in yards of a triangle and a square are shown in the diagram.



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

F -4

G $\frac{2}{3}$

H 6

J $\frac{5}{2}$

- 29** A teacher opened an investment account at a bank. At the end of each year, the bank paid 6.4% annual simple interest on the money in the account. The table shows the activity in the account for three years.

Investment Account Activity

Year	Beginning Balance for Year	Amount Deposited at Beginning of Year	New Balance	Interest Rate	Interest Earned	Ending Balance for Year
1	\$0.00	\$500.00	\$500.00	6.4%	\$32.00	\$532.00
2	\$532.00	\$500.00	\$1,032.00	6.4%	\$66.05	\$1,098.05
3	\$1,098.05	\$500.00	\$1,598.05	6.4%	\$102.28	\$1,700.33

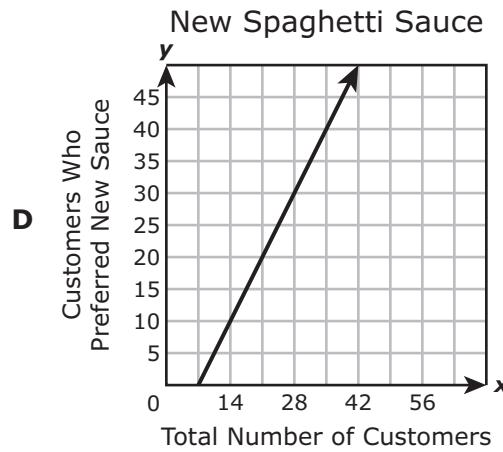
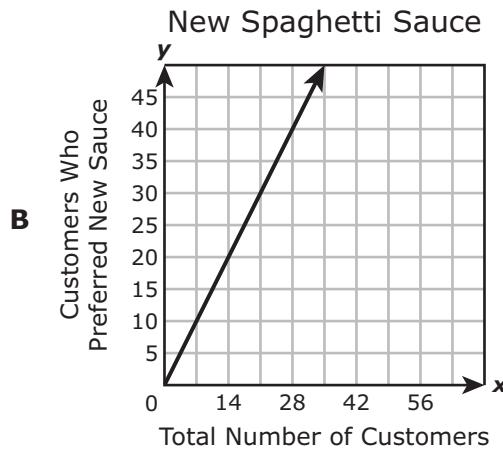
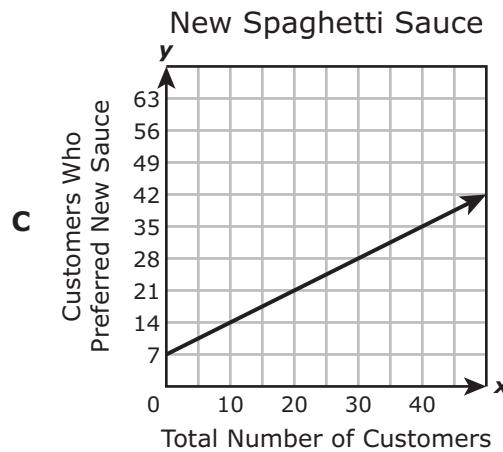
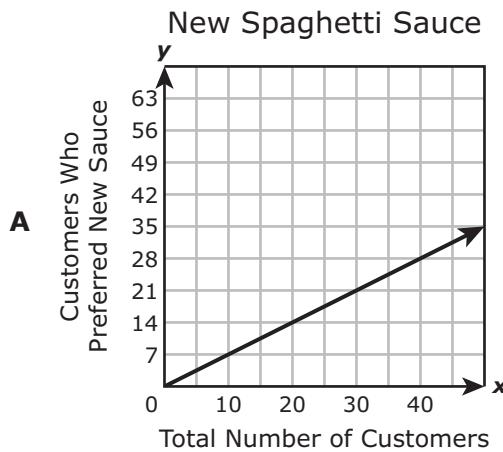
Which statement explains why the balance in this account has grown?

- A** The balance in the account has grown only because regular deposits were made to the account.
- B** The balance in the account has grown because regular deposits were made to the account and interest was earned on the previous year's balance.
- C** The balance in the account has grown only because interest was earned on the account.
- D** There is not enough information to determine why the balance in the account has grown.

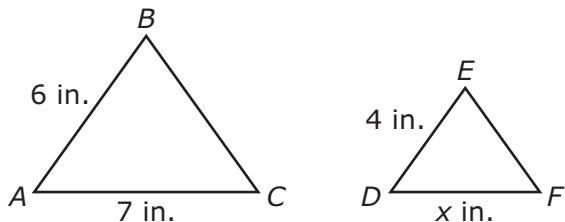
- 30** A figure was transformed on a coordinate grid using the rule $(x, y) \rightarrow (-x, -y)$. Which of the following describes this transformation?

- F** A reflection across the x -axis
- G** A reflection across the y -axis
- H** A 90° clockwise rotation about the origin
- J** A 180° clockwise rotation about the origin

-
- 31** A survey of customers at a restaurant revealed that 7 out of 10 customers preferred the restaurant's new spaghetti sauce. Which graph shows the relationship between y , the number of customers who preferred the new spaghetti sauce, and x , the total number of customers?



- 32** Triangle ABC and triangle DEF are similar.



Which proportion must be true?

F $\frac{7}{x} = \frac{4}{6}$

G $\frac{4}{6} = \frac{x}{7}$

H $\frac{6}{4} = \frac{x}{7}$

J $\frac{4}{x} = \frac{7}{6}$

-
- 33** Which list shows these numbers in order from least to greatest?

$$\sqrt{38}, -6.35, 63\%, -\frac{19}{3}$$

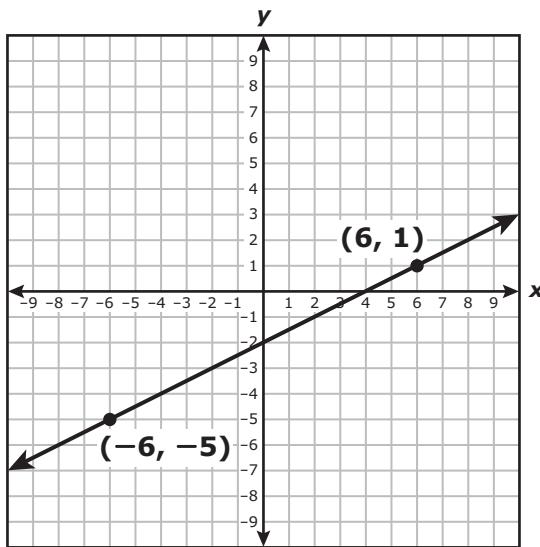
A $-6.35, -\frac{19}{3}, 63\%, \sqrt{38}$

B $63\%, \sqrt{38}, -\frac{19}{3}, -6.35$

C $-6.35, -\frac{19}{3}, \sqrt{38}, 63\%$

D $-\frac{19}{3}, -6.35, 63\%, \sqrt{38}$

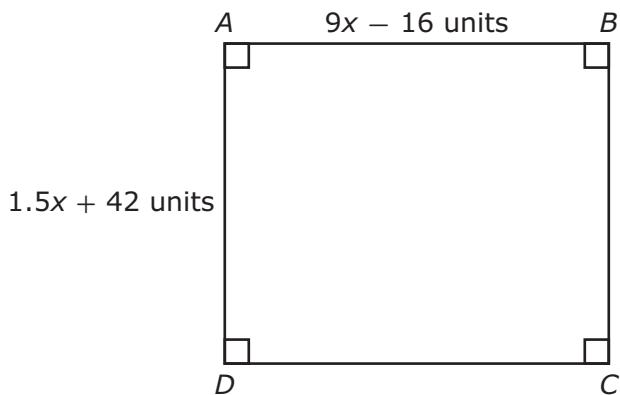
- 34** The graph of a linear function is shown on the coordinate grid.



What is the slope of the graph of this function in decimal form?

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

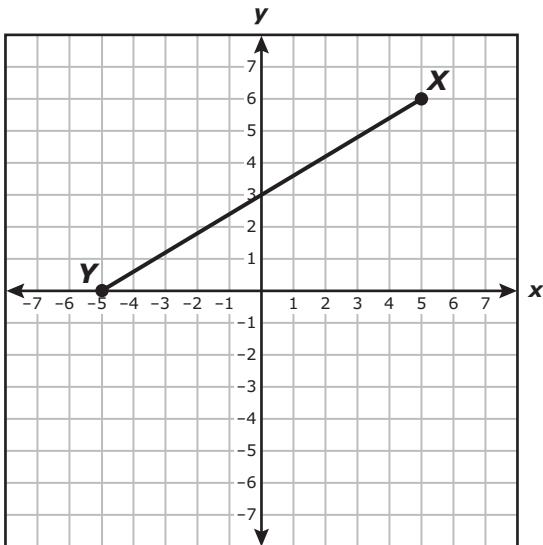
- 35** Rectangle $ABCD$ is shown with the dimensions given in units.



The length of \overline{AB} is greater than the length of \overline{AD} . Which inequality represents this situation?

- A** $9x - 16 < 1.5x + 42$
- B** $9x - 16 > 1.5x + 42$
- C** $10.5x < 26$
- D** $10.5x > 26$

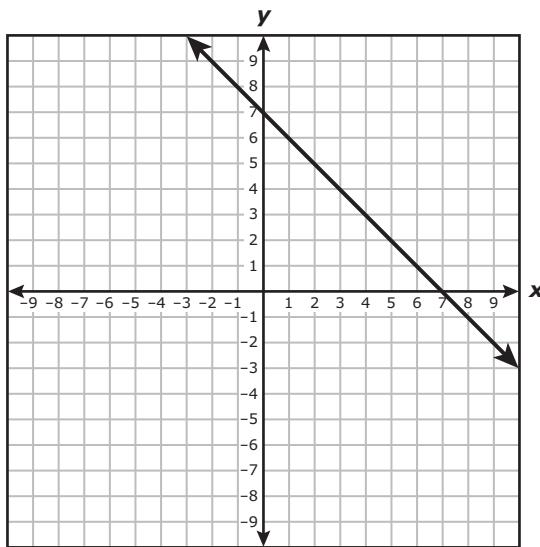
- 36** The coordinate grid shows \overline{XY} .



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

- F** 7.8 units
- G** 16.0 units
- H** 13.0 units
- J** 11.7 units

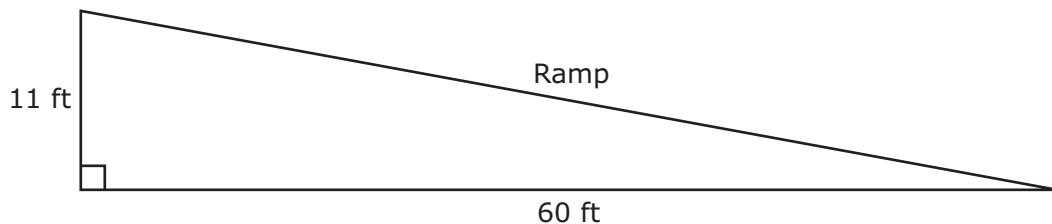
- 37** The graph shows a relationship between x and y .



Which statement is true?

- A** The graph shows a non-proportional relationship because the graph has a negative slope.
- B** The graph shows a non-proportional relationship because the graph does not contain the origin.
- C** The graph shows a proportional relationship because the x and y intercepts both contain 7.
- D** The graph shows a proportional relationship because the graph passes through 3 different quadrants.

- 38** The diagram represents a ramp in the shape of a right triangle and the lengths of two of its sides in feet.



What is the length of the ramp in feet?

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

- 39** A student solved the equation $x^2 = 132$ to find the length of the diagonal of a square in centimeters. Which measurement is closest to x , the length of the diagonal of this square, in centimeters?

- A** 66 cm
 - B** 44 cm
 - C** 33 cm
 - D** 11 cm
-

- 40** The table shows the dimensions of three cylinders.

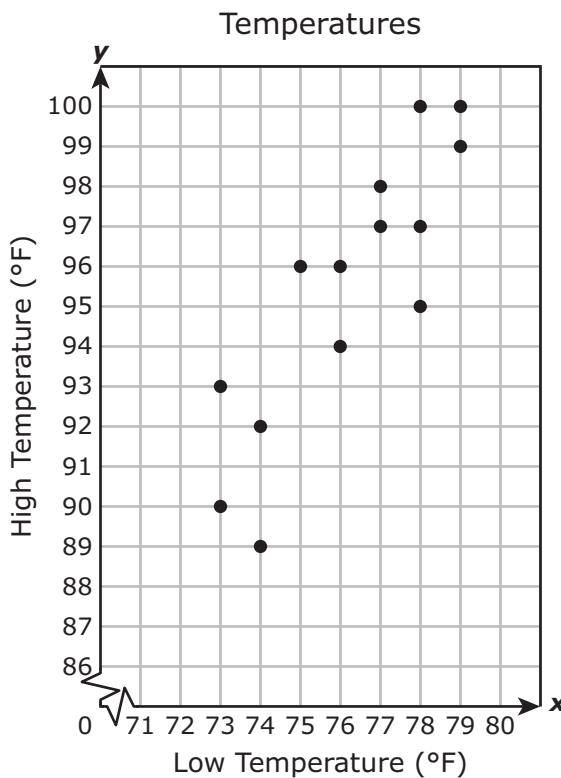
Cylinders

Cylinder	Radius (inches)	Height (inches)
W	3	9
X	4	2
Y	4.5	6

Which two cylinders have the same lateral surface area in square inches?

- F** Cylinders W and Y
- G** Cylinders W and X
- H** Cylinders X and Y
- J** None of these

- 41** The scatterplot shows the low temperature and high temperature each day for a two-week period of time.

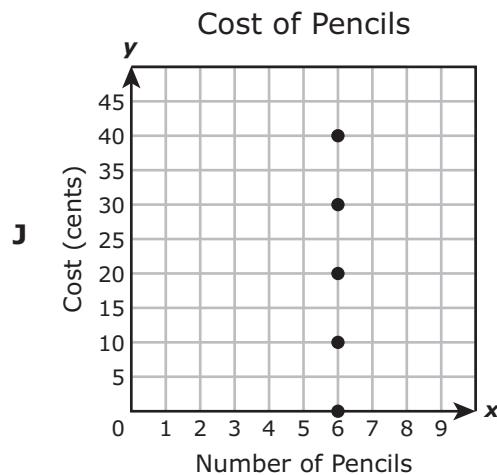
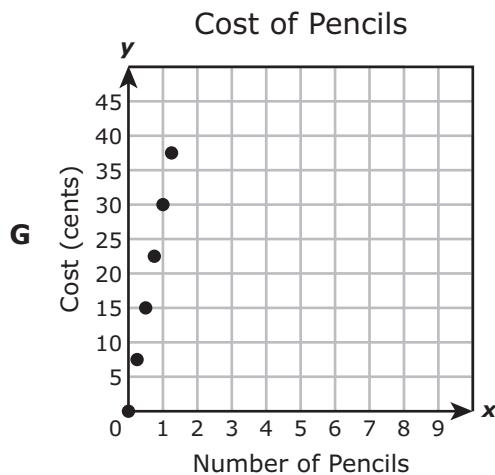
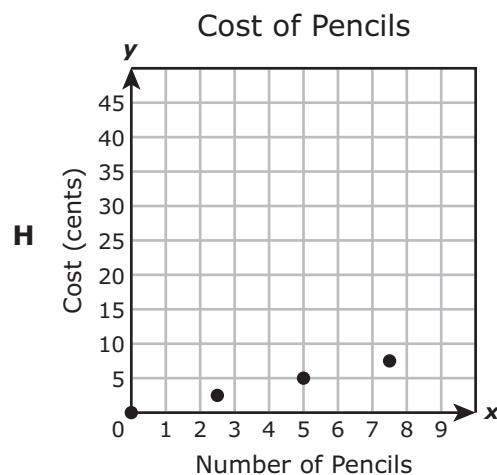
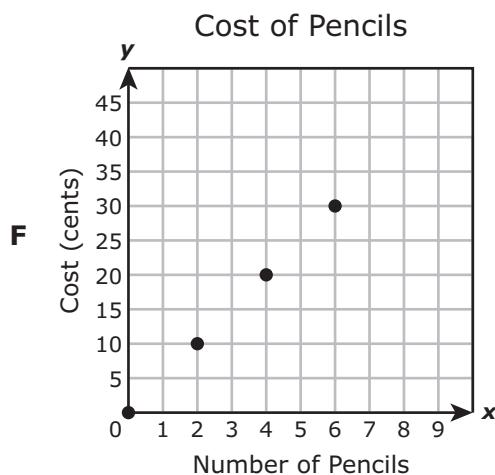


Based on the scatterplot, which is the best prediction of the high temperature in degrees Fahrenheit on a day when the low temperature is 71 °F?

- A** 92 °F
- B** 101 °F
- C** 88 °F
- D** 100 °F

- 42** The cost of 6 pencils at a store is 30 cents. Each pencil has the same cost.

Which graph has a slope that best represents the cost of each pencil at this store?



**STAAR
GRADE 8
Mathematics
April 2021**

