

M.S. 267
Math, Science and Technology



Summer Vacation Math Packet
2023-2024
Grade 8 Rising Class

Name: _____
Due Date: September 7th, 2023

Grade 8 Mathematics Reference Sheet

CONVERSIONS

1 inch = 2.54 centimeters

1 meter = 39.37 inches

1 mile = 5,280 feet

1 mile = 1,760 yards

1 mile = 1.609 kilometers

1 kilometer = 0.62 mile

1 pound = 16 ounces

1 pound = 0.454 kilogram

1 kilogram = 2.2 pounds

1 ton = 2,000 pounds

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

1 gallon = 3.785 liters

1 liter = 0.264 gallon

1 liter = 1,000 cubic centimeters

FORMULAS

Triangle

$$A = \frac{1}{2}bh$$

Parallelogram

$$A = bh$$

Circle

$$A = \pi r^2$$

Circle

$$C = \pi d \text{ or } C = 2\pi r$$

General Prisms

$$V = Bh$$

Cylinder

$$V = \pi r^2 h$$

Sphere

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

Cone

$$V = \frac{1}{3}\pi r^2 h$$

Pythagorean Theorem

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

< PART I >

1 Clara goes miniature golfing. She pays \$7.50 for an admission ticket and \$6.25 for each round she golfs. The total amount Clara pays for admission and the number of rounds she golfs is \$26.25. Which equation can be used to determine the number of rounds, x , that Clara golfs?

- A $6.25x + 7.50 = 26.25$
- B $6.25x - 7.50 = 26.25$
- C $7.50x + 6.25 = 26.25$
- D $7.50x - 6.25 = 26.25$

2 What is the exact decimal equivalent of $\frac{7}{12}$?

- A 0.583
- B $0.58\bar{3}$
- C 1.714
- D $1.71\bar{4}$

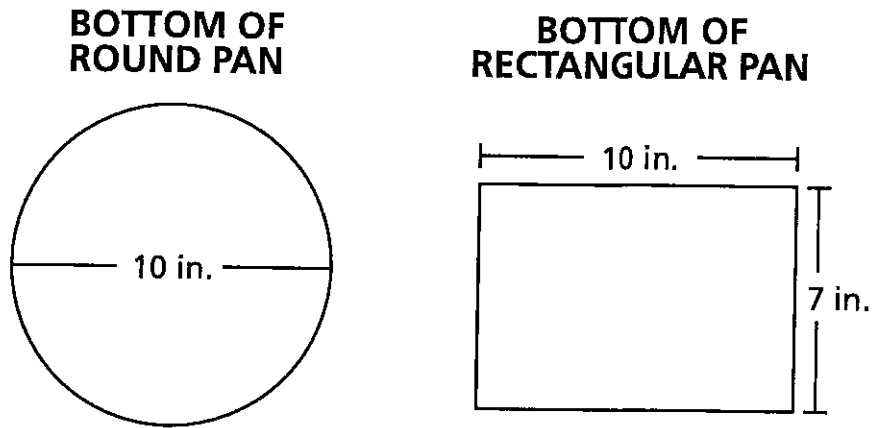
3 Joseph's lunch at a restaurant costs \$13.00, without tax. He leaves the waiter a tip of 17% of the cost of the lunch, without tax. What is the total cost of the lunch, including the tip, without tax?

- A \$2.21
- B \$10.79
- C \$13.17
- D \$15.21

GO ON

4

Jordan is baking brownies and will choose to use either a round or a rectangular pan. The dimensions of the bottom of each pan are shown below.



Which statement correctly describes how the area of the bottom of the round pan compares to the area of the bottom of the rectangular pan?

- A The area of the bottom of the round pan is greater than the area of the bottom of the rectangular pan by about 8.5 square inches.
- B The area of the bottom of the round pan is greater than the area of the bottom of the rectangular pan by about 244.2 square inches.
- C The area of the bottom of the round pan is less than the area of the bottom of the rectangular pan by about 7.2 square inches.
- D The area of the bottom of the round pan is less than the area of the bottom of the rectangular pan by about 38.6 square inches.

5

On average, Shawnte drinks $\frac{1}{2}$ of a 6-ounce glass of water in $\frac{2}{3}$ hour. How much water does she drink in an hour?

- A 0.75 ounce
- B 2 ounces
- C 4.5 ounces
- D 9 ounces

6

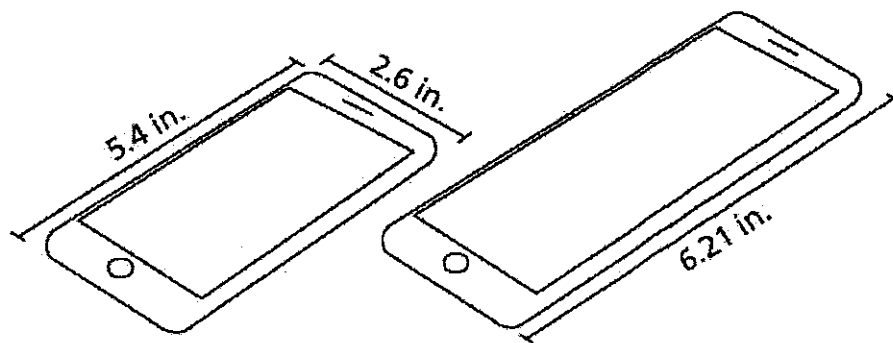
What is the value of the expression shown below?

$$\frac{-(-4)(-6) - \frac{3}{5}(10 + 15)}{\frac{1}{3}}$$

- A -117
- B -13
- C 3
- D 27

7

The diagram shows the length and width of a cell phone, and the length of a larger version of the same brand of cell phone.



The lengths and widths of the two cell phones are proportional. What is the width, in inches, of the larger version of the cell phone?

- A 1.15
- B 2.26
- C 2.99
- D 3.41

GO ON

8

From 12:00 midnight to 6:00 a.m., the temperature decreased by 12°C . If the original temperature was 12°C , which expression can be used to represent this situation?

- A $12 - 12$
- B $12 + 12$
- C $12 - (-12)$
- D $-12 + (-12)$

9

Jordan prepares 200 name tags to use at a meeting. The number for each color of name tag is described below.

- 35% of the name tags are blue
- $\frac{3}{8}$ of the name tags are yellow
- all of the remaining name tags are red

How many of Jordan's name tags are red?

- A 55
- B 90
- C 110
- D 145

10

The ratio of boys to girls in Mr. Johnson's after-school club is the same as the ratio of boys to girls in Ms. Greene's after-school club. There are 4 boys and 12 girls in Mr. Johnson's club. There are 6 boys in Ms. Greene's club. How many girls are in Ms. Greene's club?

- A 2
- B 12
- C 14
- D 18

11

The regular price of an item at a store is p dollars. The item is on sale for 20% off the regular price. Some of the expressions shown below represent the sale price, in dollars, of the item.

Expression A: $0.2p$

Expression B: $0.8p$

Expression C: $1 - 0.2p$

Expression D: $p - 0.2p$

Expression E: $p - 0.8p$

Which two expressions each represent the sale price of the item?

- A Expression A and Expression E
- B Expression B and Expression C
- C Expression B and Expression D
- D Expression C and Expression D

GO ON

12

Last week, the price of apples at a grocery store was \$1.60 per pound. This week, apples at the same grocery store are on sale at a 10% discount. What is the total price of $4\frac{1}{2}$ pounds of apples this week at the grocery store?

- A \$4.77
- B \$6.48
- C \$6.75
- D \$6.93

13

An object travels along a horizontal straight path at a constant rate. The object travels $\frac{1}{20}$ of the length of the path in $\frac{3}{4}$ second. At that rate, how many seconds does it take the object to travel the entire length of the path?

- A 15
- B $15\frac{3}{4}$
- C 20
- D $20\frac{3}{4}$

14

A furniture store has a sale during which the sale price of a sofa is $\frac{1}{3}$ off its original price. The original price of the sofa is \$1,029.00. A customer can get an additional 5% discount off the sale price for paying with cash. At checkout, a 6.5% sales tax on the final price is added to the cost of the sofa. What is the total cost of the sofa, including sales tax, for a customer paying with cash?

- A \$343.00
- B \$651.70
- C \$686.00
- D \$694.06

GO ON

15

Which table shows a proportional relationship between x and y ?

A

x	y
3	4
6	10
9	16
12	22
15	28

C

x	y
4	2
8	4
12	8
16	14
20	20

B

x	y
12	6
14	12
16	18
18	24
20	30

D

x	y
5	1
10	2
15	3
20	4
25	5

16

Which expression is equivalent to $7a - 8 - 12a + 4$?

- A $-9a$
- B $31a$
- C $-5a - 4$
- D $19a + 12$

17

A box contains paper clips of three different sizes. The numbers of each size of paper clip are listed below.

- 100 small paper clips
- 250 medium paper clips
- 150 large paper clips

One paper clip is randomly selected from the box. What is the probability that the paper clip selected is either small or medium?

- A $\frac{1}{3}$
- B $\frac{2}{3}$
- C $\frac{3}{7}$
- D $\frac{7}{10}$

18

What is $\frac{1}{2}\%$ of $\left[(-0.5) \times \left(-\frac{1}{4}\right)\right]$?

- A 0.000625
- B 0.00025
- C 0.065
- D 0.025

GO ON

19

Mario sells men's and women's shoes in his shoe store. He is considering selling children's shoes. He randomly selected 120 customers to participate in a survey. The survey results are shown below.

- 42 customers said they would shop for children's shoes
- 78 customers said they would not shop for children's shoes

Mario has an average of 440 customers per month. Based on the survey results, which value is the **best** estimate of the number of customers that would shop for children's shoes during an average month?

- A 120
- B 154
- C 220
- D 286

20

Danielle constructs a scale model of a building with a rectangular base. Her model is 2 inches in length and 1 inch in width. The scale on the model is 1 inch = 47 feet. What is the actual area, in square feet, of the base of the building?

- A 141
- B 282
- C 2,209
- D 4,418

21

What value will make the equation true?

$$-2.1 - \underline{\quad ? \quad} = -1\frac{1}{2}$$

- A 3.6
- B 0.6
- C -0.6
- D -3.6

22

Manny goes bowling.

- He has \$25.00 to spend.
- He spends \$4.25 to rent shoes.
- He spends \$2.50 for each game he bowls.

Which inequality can Manny use to determine x , the greatest number of games he can bowl?

- A $2.5 + 4.25x \geq 25$
- B $4.25 + 2.5x \geq 25$
- C $2.5 + 4.25x \leq 25$
- D $4.25 + 2.5x \leq 25$

GO ON

23

A middle school principal wants to change the lunch menu at the school. The principal surveys the students to determine how the students would feel about the changes. Which survey method will produce the **best** representative sample?

- A survey every fifth student who rides in a car to school
- B survey 3 randomly selected students from every homeroom
- C survey every tenth seventh-grade student during lunch
- D survey 5 randomly selected students from every art, drama, and music class

24

Kerry has a bag containing white and yellow marbles. Kerry randomly selects one marble from the bag, records the result, and returns the marble to the bag. The results of the first 65 selections are shown below.

- A white marble was selected 41 times.
- A yellow marble was selected 24 times.

Based on these results, what is the probability that the next marble Kerry selects, rounded to the nearest percent, will be white?

- A 41%
- B 50%
- C 59%
- D 63%

25

Which situation results in a final value of zero?

- A the overall change in temperature when the temperature goes from -10°F to 10°F
- B the total profit made when a person buys an item for \$2.25 and then sells the item for \$2.25
- C the overall change in altitude of a hot air balloon after rising 21 kilometers from sea level
- D the total distance a person travels when he bikes 3.1 miles to school and then bikes 3.1 miles back home

26

An equation is shown below.

$$2(x - 9) = 9 \div \left(-\frac{1}{3}\right)$$

What value of x makes the equation true?

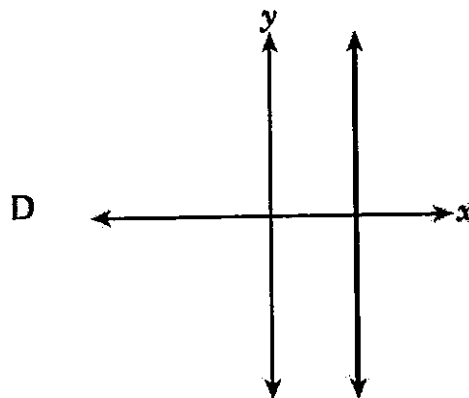
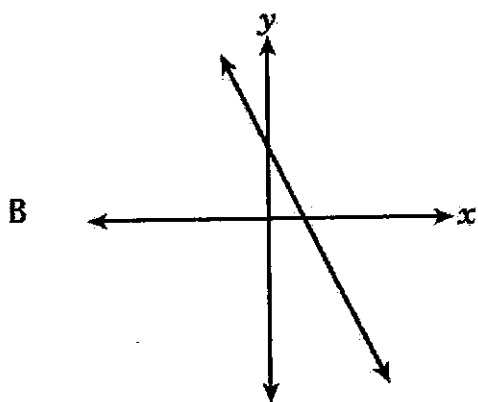
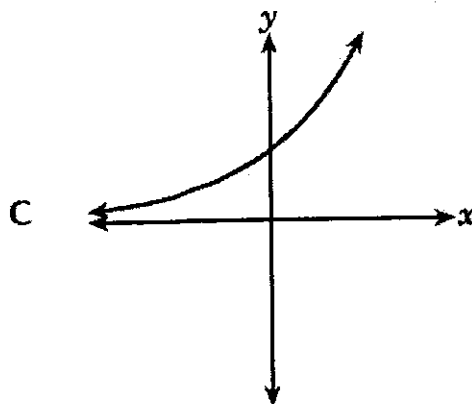
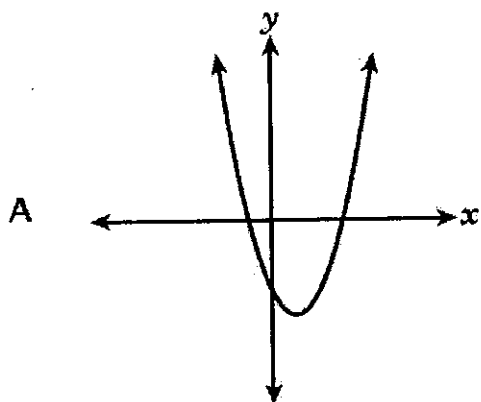
- A -9.0
- B -4.5
- C 3.0
- D 7.5

STOP

< PART II >

1

Which graph represents a linear function of x ?



2

What is the value of the expression shown below?

$$\frac{1.6 \times 10^5}{0.2 \times 10^2}$$

- A 0.8×10^3
- B 8×10^3
- C 0.8×10^7
- D 8×10^7

GO ON

3

At a factory, the cost of making different numbers of toothbrushes is shown in the table below.

COST OF TOOTHBRUSHES

Number of Toothbrushes	3	6	9	12
Cost (dollars)	\$4.50	\$9.00	\$13.50	\$18.00

A linear function models the cost based on the number of toothbrushes made. Which statement about the rate of change of this function is true?

- A The cost increases by \$1.50 for each additional toothbrush made.
- B The cost increases by \$4.50 for each additional toothbrush made.
- C The cost increases by \$9.00 for each additional 3 toothbrushes made.
- D The cost increases by \$18.00 for each additional 3 toothbrushes made.

4

A company makes two different-sized ice cream cones. The smaller cones are 3.5 inches tall and have a diameter of 3 inches. The larger cones are 5.1 inches tall and have a diameter of 4.5 inches. About how much greater, to the nearest tenth of a cubic inch, is the volume of the larger cone than the volume of the smaller cone?

- A 18.8
- B 56.4
- C 75.2
- D 225.5

5

Chris and Sam earn money shoveling snow, as described below.

- The amount of money Chris earns can be modeled by the equation $y = 8.25x$, where y is the total amount of money, in dollars, earned in x hours.
- The table below shows the relationship between the total amount of money earned, y , in dollars, and the total amount of time worked, x , in hours, for Sam.

SAM'S EARNINGS

x	4	6	8
y	30	45	60

Which statement correctly compares the rates at which Chris and Sam earn money shoveling snow?

- A Sam earns \$0.75 more per hour than Chris.
- B Chris earns \$0.75 more per hour than Sam.
- C Sam earns \$0.25 more per hour than Chris.
- D Chris earns \$0.25 more per hour than Sam.

6

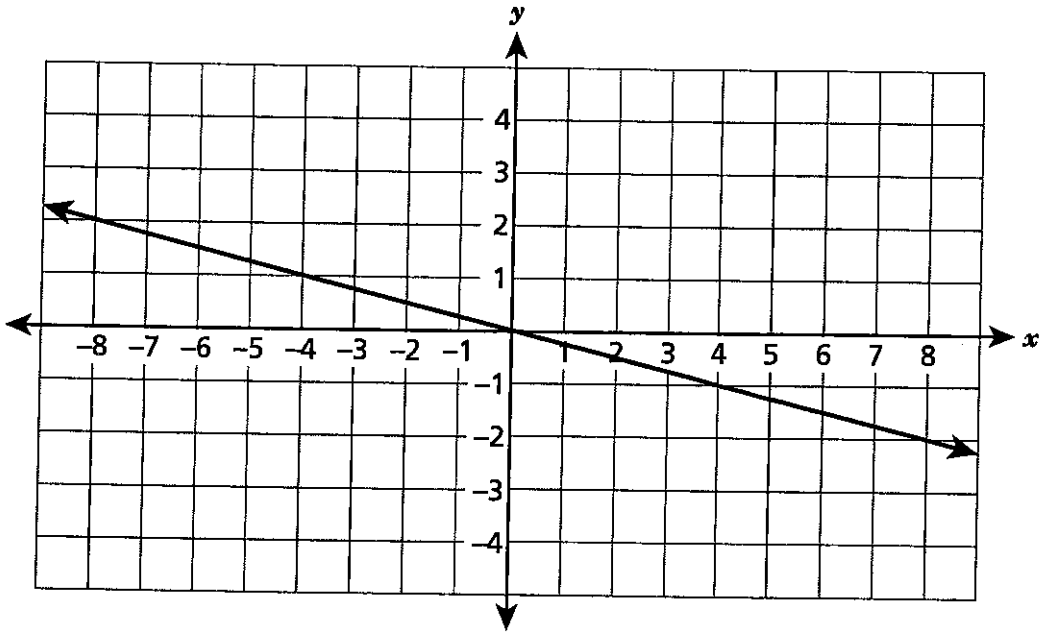
Which equation represents a function of x that is **not** linear?

- A $y = 4(x + 3)$
- B $y = 4^2 + 3x$
- C $y = 4x + 3x^2$
- D $y = \frac{4 + x}{3}$

GO ON

7

Which equation represents the line shown on the coordinate plane below?



- A $y = 4x$
- B $y = -4x$
- C $y = \frac{1}{4}x$
- D $y = -\frac{1}{4}x$

8

The closest distance between Earth and Mars is approximately 3.39×10^7 miles. The fastest rocket leaving Earth travels at an average speed of approximately 3.6×10^4 miles per hour. At that rate, which expression could be used to determine the approximate number of hours it would take the rocket to travel that distance?

A $(3.39 \times 10^7) - (3.6 \times 10^4)$

B $(3.6 \times 10^4) - (3.39 \times 10^7)$

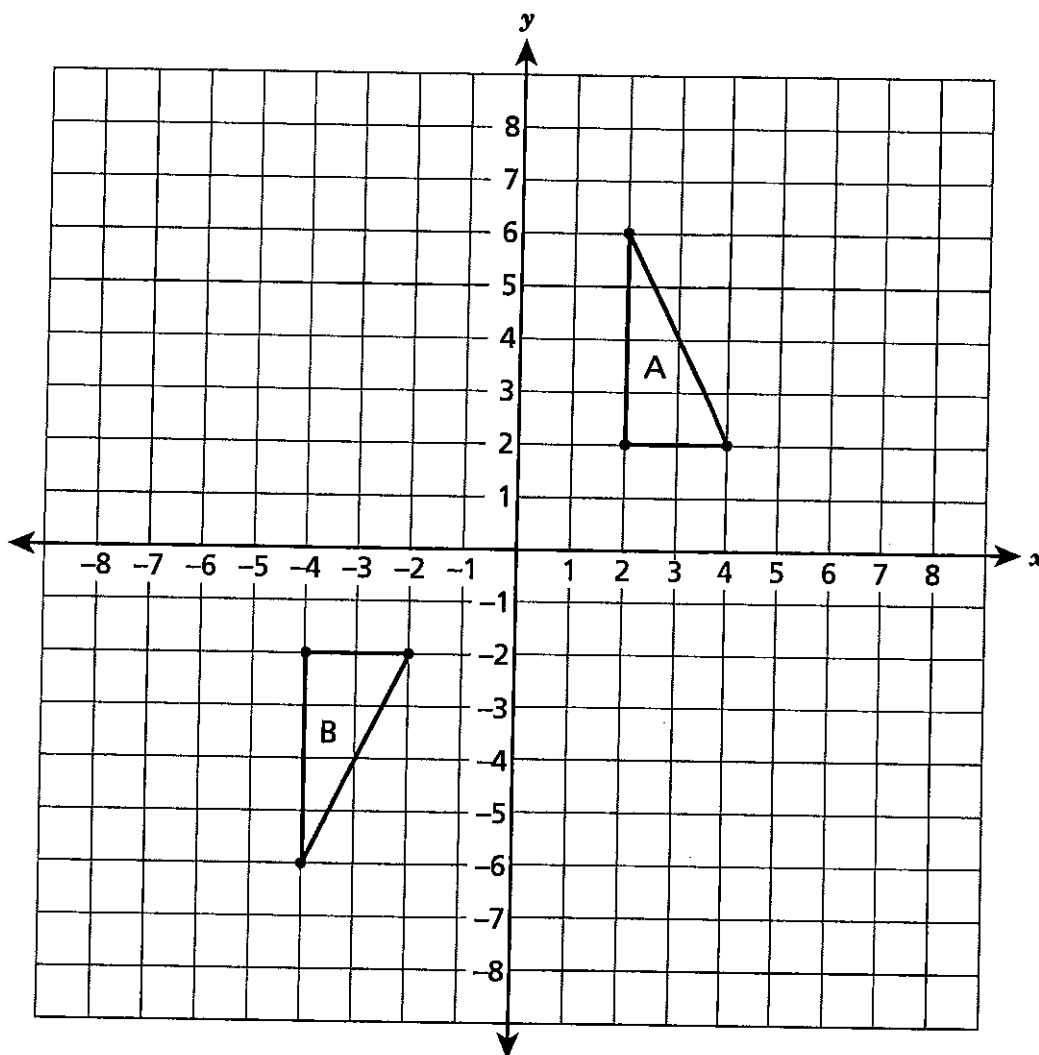
C $(3.39 \times 10^7) \div (3.6 \times 10^4)$

D $(3.6 \times 10^4) \div (3.39 \times 10^7)$

GO ON

9

Triangle A and triangle B are graphed on the coordinate plane below.



Which sequence of transformations will map triangle A onto its congruent image, triangle B?

- A a reflection over the x -axis, then a reflection over the y -axis
- B a translation 8 units down, then a reflection over the y -axis
- C a reflection over the x -axis, then a translation 6 units to the left
- D a rotation 90° clockwise about the origin, then a translation 6 units to the left

10

Which system of equations has no solution?

A
$$\begin{cases} 3x + 4y = 5 \\ 6x + 8y = 10 \end{cases}$$

B
$$\begin{cases} 7x - 2y = 9 \\ 7x - 2y = 13 \end{cases}$$

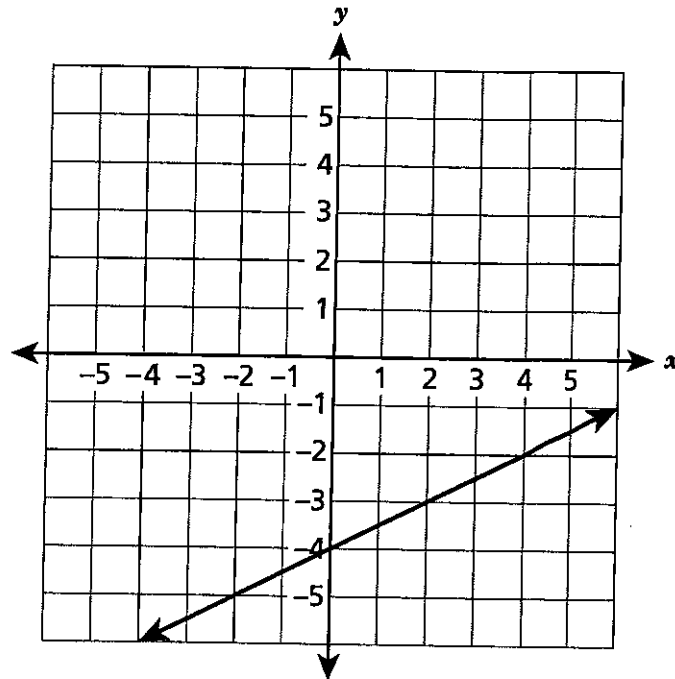
C
$$\begin{cases} 2x - y = -11 \\ -2x + y = 11 \end{cases}$$

D
$$\begin{cases} 3x + 6y = 1 \\ x + y = 0 \end{cases}$$

GO ON



A line is graphed on the coordinate plane below.



Line $y = -x + 2$ will be graphed on the same coordinate plane to create a system of equations. What is the solution to that system of equations?

- A $(-2, 4)$
- B $(0, -4)$
- C $(2, -4)$
- D $(4, -2)$

12

Linear function K passes through points $(-3, 7)$ and $(3, 3)$. What is the rate of change of function K?

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

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

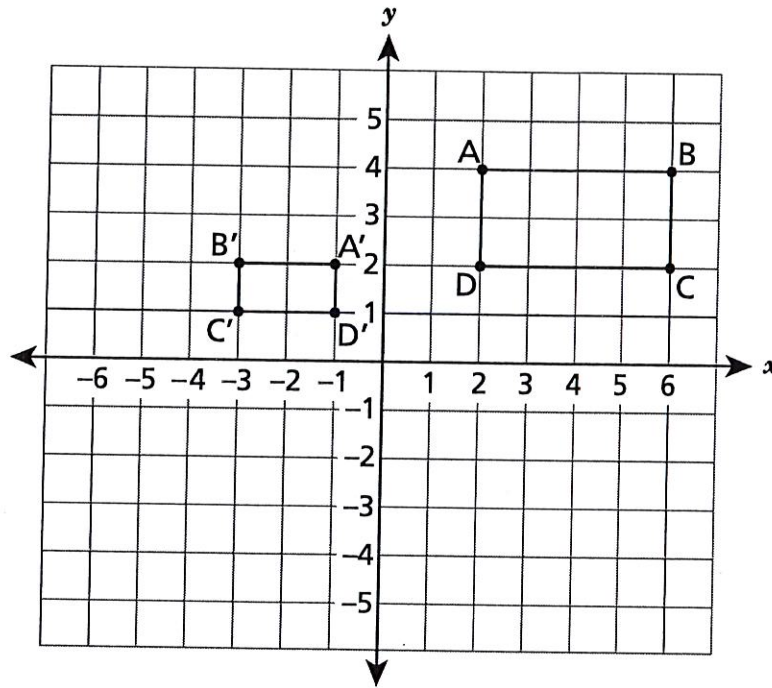
C $\frac{3}{2}$

D $\frac{2}{3}$

GO ON

13

Rectangle $A'B'C'D'$ is similar to rectangle $ABCD$, as shown on the coordinate plane below.



Which sequence of transformations maps rectangle $ABCD$ onto rectangle $A'B'C'D'$?

- A** a translation 8 units to the left, then a dilation by a scale factor of $\frac{1}{2}$ with a center of dilation at the origin
- B** a reflection over the y -axis, then a dilation by a scale factor of $\frac{1}{2}$ with a center of dilation at the origin
- C** a dilation by a scale factor of $\frac{1}{2}$ with a center of dilation at the origin, then a 90° counterclockwise rotation about the origin
- D** a 90° counterclockwise rotation about the origin, then a dilation by a scale factor of $\frac{1}{2}$ with a center of dilation at the origin

14

Patty has a flower box in the shape of a rectangular prism with interior dimensions that are 15 inches in length, 8 inches in width, and 6 inches in height. Patty will fill the flower box $\frac{3}{4}$ full of soil. How many cubic inches of soil will be in the flower box?

- A 387
- B 516
- C 540
- D 720

15

On a coordinate plane, the graph of a line passes through the origin and the point (10, 14). What is the equation of the line?

- A $y = \frac{5}{7}x$
- B $y = \frac{7}{5}x$
- C $y = x + \frac{5}{7}$
- D $y = x + \frac{7}{5}$

GO ON

16 Which statement about the solution to the equation shown below is true?

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

- A There is no solution.
- B There is only one solution, $x = -1$.
- C There is only one solution, $x = -9$.
- D There are an infinite number of solutions.

17 A study was conducted to determine the relationship between the age, x , in years, of a certain brand of motorcycle and its value, y , in dollars. The equation $y = -750x + 8,500$ best models the data. Based on the equation, what is the estimated value of a motorcycle that is 5 years old?

- A \$3,750
- B \$4,750
- C \$7,750
- D \$12,250

18 Which statement **best** describes the data in a scatter plot where the y -values are decreasing as the x -values are increasing?

- A The data can best be modeled by a vertical line.
- B The data can best be modeled by a horizontal line.
- C The data can best be modeled by a line with a positive slope.
- D The data can best be modeled by a line with a negative slope.

19

Which proportional relationship has the greatest rate of change?

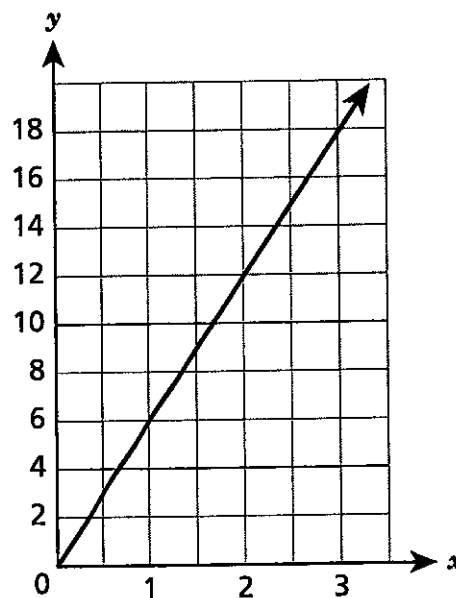
A $y = 7x$

C

x	y
0	0
2	8
4	16
6	24

B The value of y increases by 12 for every increase of 4 in the value of x .

D

**20**

A flower vase is in the shape of a cylinder and has a diameter of 5 inches and a height of 7 inches. Which equation could be used to determine the volume, in cubic inches, of the vase?

A $V = \pi(5)^2(7)$

B $V = \pi(7)^2(5)$

C $V = \pi(7)^2(2.5)$

D $V = \pi(2.5)^2(7)$

GO ON

21

The planet Mercury is approximately 3.6×10^7 miles away from the sun, and the planet Jupiter is approximately 4.8×10^8 miles away. About how many times farther from the sun is planet Jupiter than planet Mercury?

- A 1.3
- B 7.5
- C 13.3
- D 17.3

22

Which expression is equivalent to $(5^{-2})^5 \times 5^4$?

- A 5^{12}
- B 5^7
- C $\frac{1}{5^6}$
- D $\frac{1}{5^{40}}$

Linear functions M and P are shown below.

FUNCTION M

x	y
-2	-9
0	1
2	11
4	21

FUNCTION P

$$y = 7x + 9$$

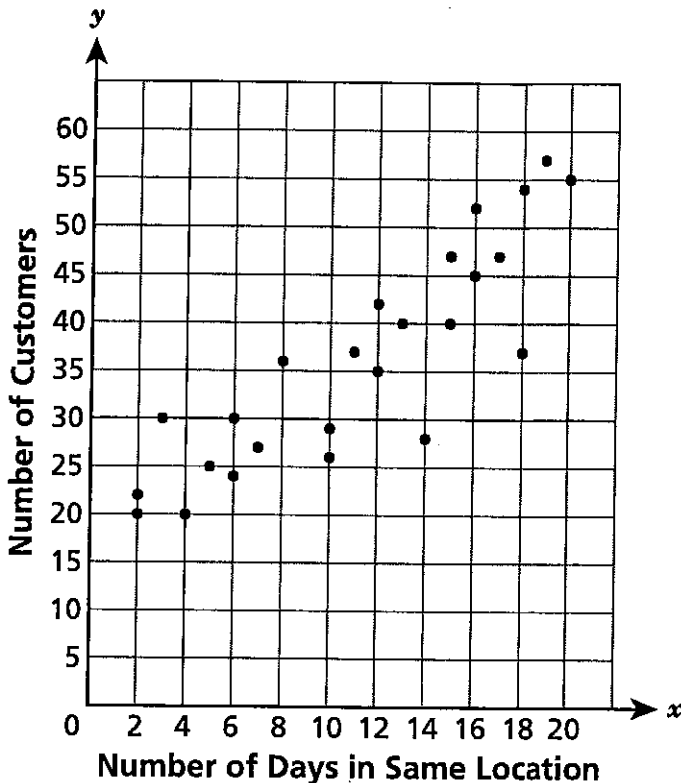
In comparing the rates of change, which statement about Function M and Function P is true?

- A Their rates of change differ by 2.
- B Their rates of change differ by 4.
- C Function M has a greater rate of change than Function P.
- D Function M and Function P have the same rate of change.

24

The scatter plot below shows the average number of customers who visit a food truck per day, depending on the number of days the food truck stays in the same location.

FOOD TRUCK CUSTOMERS

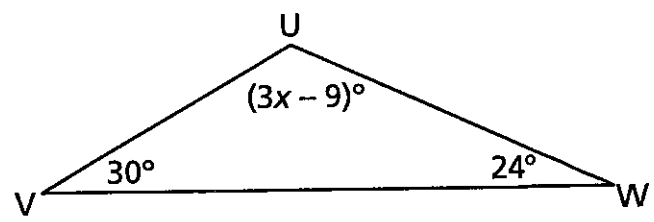


Which statement **best** describes the association between the number of days the food truck is in the same location and the number of customers who visit the food truck per day?

- A There is no association.
- B There is a nonlinear association.
- C There is a positive linear association.
- D There is a negative linear association.

25

The measures of the angles in triangle UVW are shown in the diagram below.

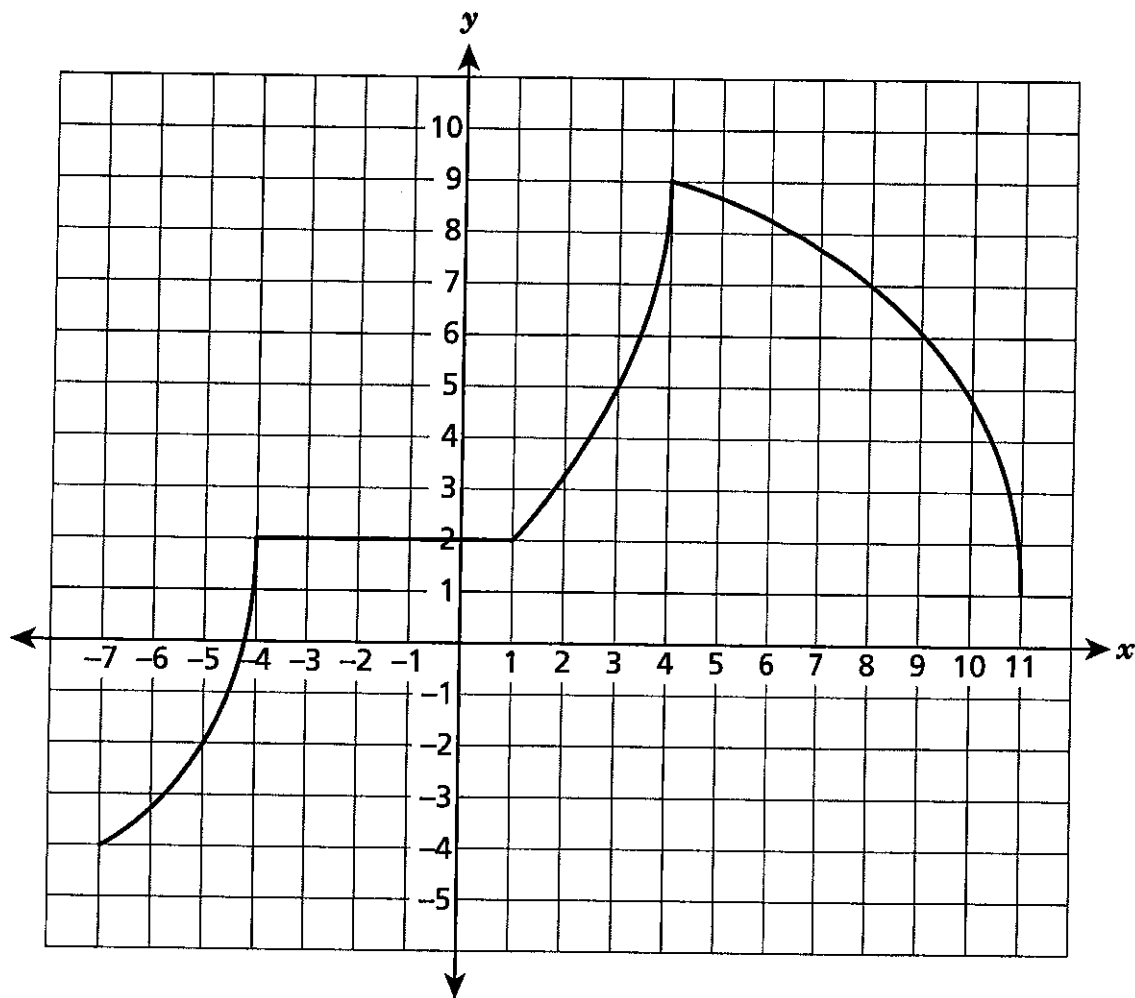


What is the value of x ?

- A 21
- B 39
- C 45
- D 126

GO ON

The graph of a function is shown on the coordinate plane below.



Which statement correctly describes the function on a given interval?

- A The function is decreasing and nonlinear between $x = -7$ and $x = -4$.
- B The function is increasing and linear between $x = -4$ and $x = 1$.
- C The function is increasing and linear between $x = 1$ and $x = 4$.
- D The function is decreasing and nonlinear between $x = 4$ and $x = 11$.