# GRADE 8

# MATHEMATICS

## 2009 Mathematics Standards of Learning

Released Spring 2014

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**SAMPLE A**

Three views of a rectangular prism are shown.



Front          Right Side          Top
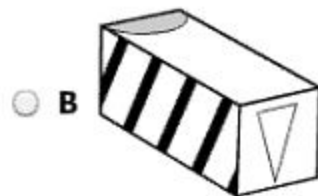
Which could be this prism?
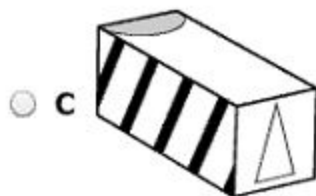


A



C



B



D
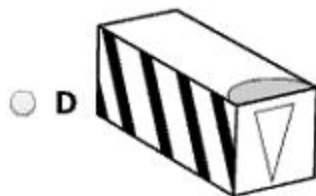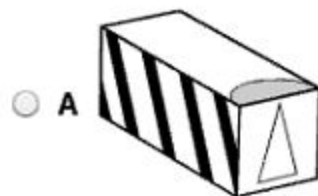
**Directions:** Type your answer in the box. Your answer must be in the form of an improper fraction. Use "/" for the fraction bar.

**SAMPLE B**

What is one solution to $5x + 1 = 7$ ?

Your answer must be in the form of an improper fraction.

$$x = \boxed{\phantom{xxxx}}$$

**What is the value of $4(6+2)^2$ ?**

A  64

B  160

C  256

D  1,024

What is $-\sqrt{324}$ ?

If $x = 2$ and $t = 4$, what is the value of $\frac{1}{8}(x^3 - 4)(t^2 + 8)$ ?

○ **A** 12

○ **B** 4

○ **C** −72

○ **D** −144

A food company reduced the amount of salt in one of their food products from 700 milligrams to 630 milligrams. What is the percent decrease in the amount of salt in this food product?

○ **A** 10%

○ **B** 12%

○ **C** 70%

○ **D** 90%

**Which number is an irrational number?**

- A  5.499
- B  $\sqrt{17}$
- C  $-\sqrt{9}$
- D  $-10$

Identify each number between $1.7 \times 10^0$ and 195%.

| $1.8 \times 10^1$ | $1\frac{7}{8}$ | 18.5 | $\frac{7}{4}$ |
| --- | --- | --- | --- |

Dora bought a total of 48 cupcakes. Each cupcake cost $0.55, including tax. Of the cupcakes she bought, $\frac{3}{8}$ were vanilla cupcakes. What was the total cost of only the vanilla cupcakes?

○ A  $26.40

○ B  $16.50

○ C  $9.90

○ D  $6.60

**Which list of numbers is ordered from greatest to least ?**

○ **A** 52%, 0.45, $3.1 \times 10^1$, $\dfrac{10}{11}$

○ **B** $3.1 \times 10^1$, 52%, 0.45, $\dfrac{10}{11}$

○ **C** 52%, $3.1 \times 10^1$, $\dfrac{10}{11}$, 0.45

○ **D** $3.1 \times 10^1$, $\dfrac{10}{11}$, 52%, 0.45

**Emil bought a camera for $268.26, including tax. He made a down payment of $12.00 and paid the balance in 6 equal monthly payments. What was Emil's monthly payment for this camera?**

○ **A** $42.71

○ **B** $44.71

○ **C** $46.71

○ **D** $56.71

**Which pair of numbers are both between 6 and 7 ?**

A $\sqrt{30}$ and $\sqrt{42}$

B $\sqrt{36}$ and $\sqrt{49}$

C $\sqrt{37}$ and $\sqrt{50}$

D $\sqrt{42}$ and $\sqrt{48}$

**Directions: Type your answer in the box.**

Kyle caught 9 insects for his science project in the first week. He caught 13 insects in the second week. What is the percent increase in the number of insects Kyle caught from the first week to the second week? Round your answer to the nearest whole number.

[    ] %

**Which number in this list is NOT an integer?**

$$\frac{12}{4}, \ -4^2, \ \sqrt{25}, \ -4.8$$
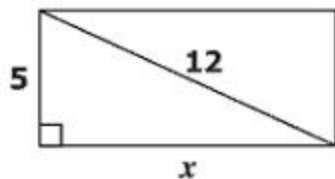
A $\frac{12}{4}$

B $-4^2$

C $\sqrt{25}$

D $-4.8$

**Which statement best describes $\sqrt{50}$ ?**

○ **A** Exactly 7

○ **B** Exactly 25

○ **C** Between 7 and 8

○ **D** Between 24 and 26

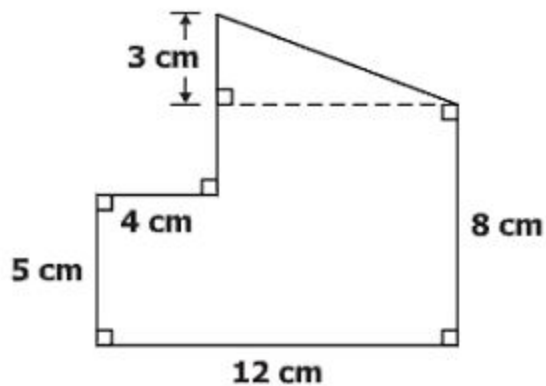What is the value of $\frac{8}{3}n^3$ when $n = \frac{3}{2}$ ?

- A  4

- B  6

- C  9

- D  12

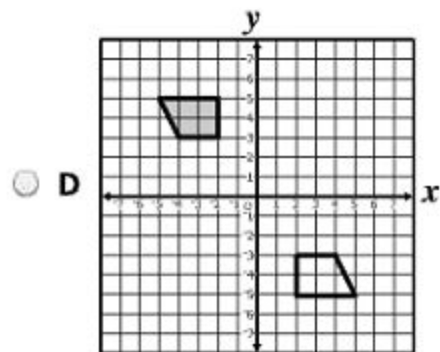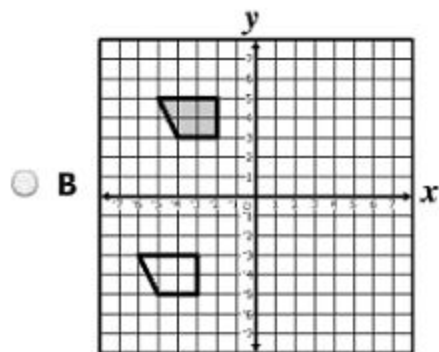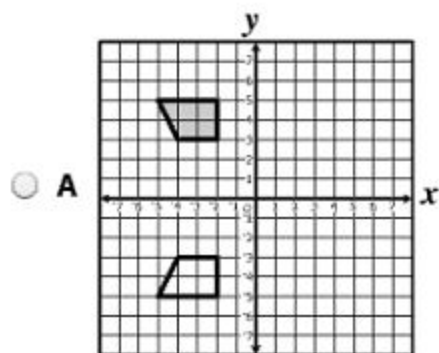**For the rectangle shown, which equation can be used to find the value of $x$ ?**



**A** $(x+5)^2 = 12^2$

**B** $5^2 + x^2 = 12^2$

**C** $5^2 + 12^2 = x^2$

**D** $5 + 12 = x^2$

**What is the area of this polygon?**



3 cm

4 cm

8 cm

5 cm

12 cm

○ **A** 77 sq cm

○ **B** 86 sq cm

○ **C** 96 sq cm

○ **D** 108 sq cm

Which grid shows only a translation of the shaded polygon to create the unshaded polygon?

A

C

B

D
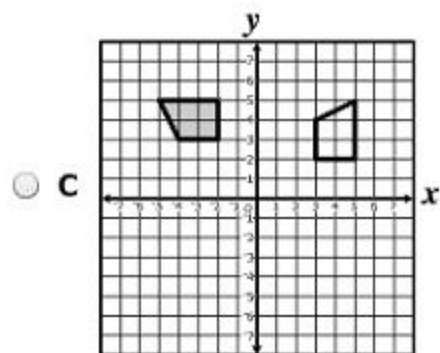
**Which of the following could be the measurements of two supplementary angles?**

A   7° and 83°

B   83° and 83°

C   97° and 83°

D   117° and 83°

Dwight drew a line segment on a coordinate grid. He plans to reflect the line segment over the y-axis.

Graph the new line segment by selecting the endpoints of the segment.
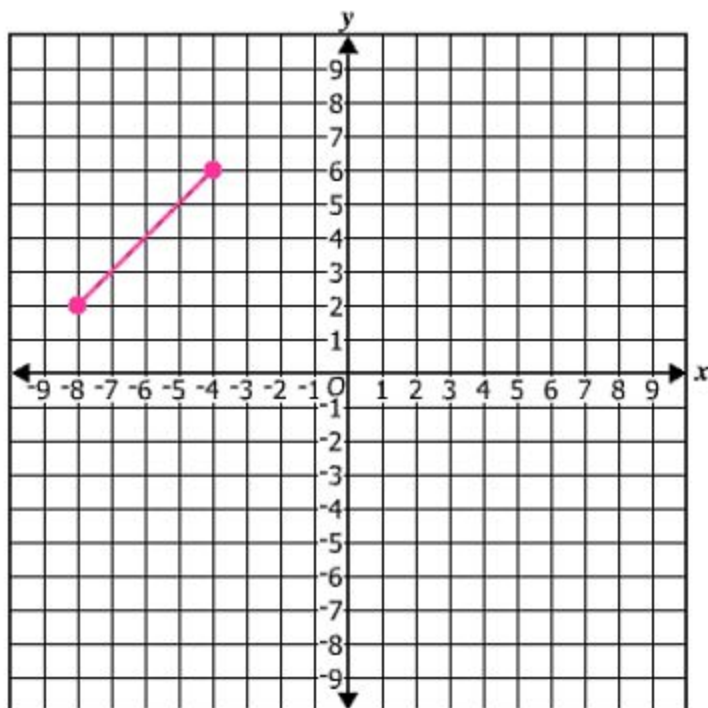
Josh has two rectangular prisms. The length of the second prism is 10 times the length of the first prism. The heights and widths of the two prisms are the same. Which best describes the volume of the second prism?

A The volume is 10 times the volume of the first prism.

B The volume is 30 times the volume of the first prism.

C The volume is 100 times the volume of the first prism.

D The volume is 1,000 times the volume of the first prism.

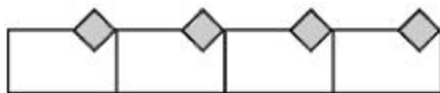This figure is formed by a square and an isosceles trapezoid.
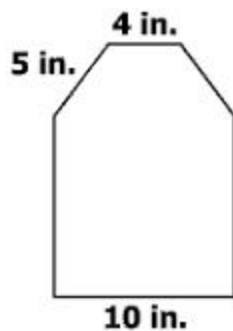


What is the perimeter of this figure?

○ **A** 19 in.

○ **B** 34 in.

○ **C** 39 in.

○ **D** 44 in.

The radius of the base of a cone is 6 inches. The height of the cone is 6 inches. Which is closest to the volume of the cone?

○ **A** 75 cu in.

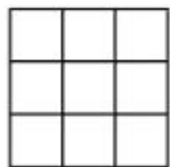○ **B** 113 cu in.

○ **C** 226 cu in.

○ **D** 678 cu in.

**One piece of a stained glass is transformed three times.**
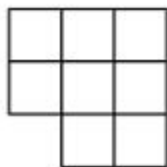


**What transformation was used to create this section of the stained glass window?**

○ **A** Translation

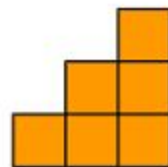○ **B** Reflection

○ **C** Rotation

○ **D** Dilation

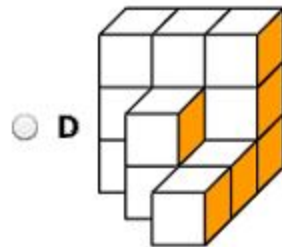A three-dimensional figure is constructed using identical cubes. Three views of this figure are shown.
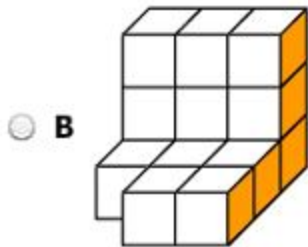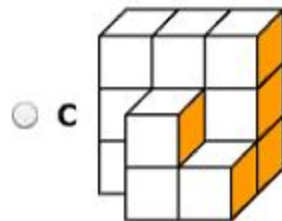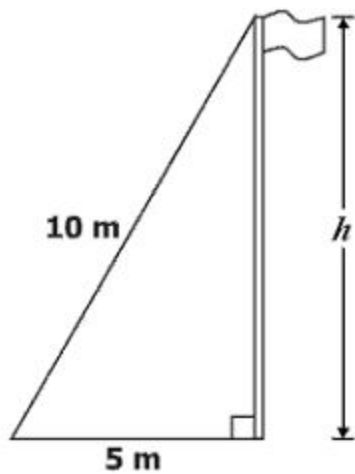
Front

Top

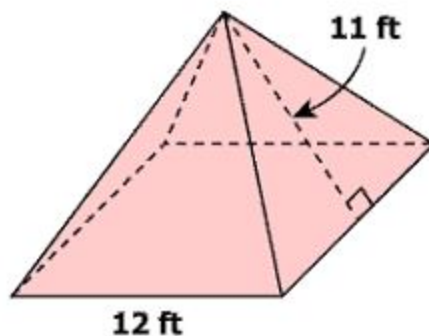Right Side

Which could be this three-dimensional figure?

A

B

C

D

A wire connects the top of a flagpole to the ground as shown.



Which is closest to the height, $h$, of the flagpole?

A  3.2 m

B  5.0 m

C  8.7 m

D  11.2 m

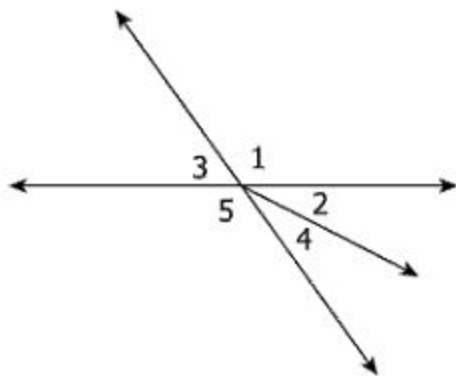**Raymond needs to cover the entire surface of this square-based pyramid with paper.**



11 ft

12 ft

**What is the minimum amount of paper he will need?**

○ **A** 276 sq ft

○ **B** 408 sq ft

○ **C** 528 sq ft

○ **D** 672 sq ft

**Look at the angles.**



**Identify each angle that is adjacent to Angle 2.**

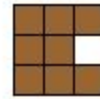| Angle 1 | Angle 3 | Angle 4 | Angle 5 |

**Identify each three-dimensional figure that could be represented by these three views.**
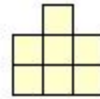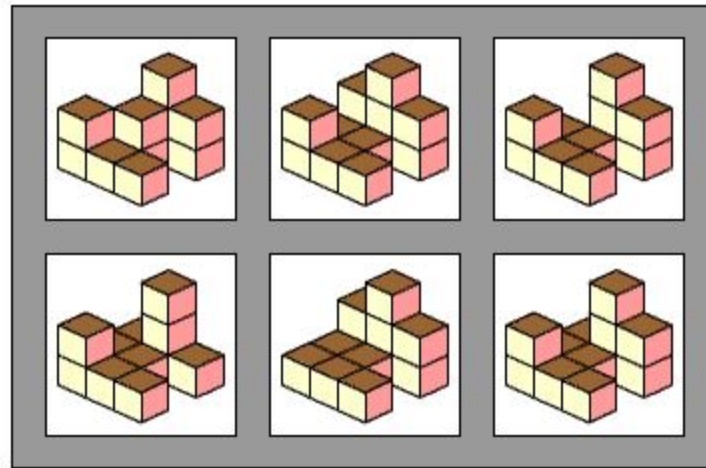


Front View    Right-side View    Top View

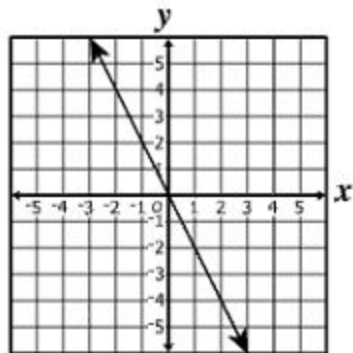**What is the solution of this equation?**

$$x = 5x + 6$$

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

B  -1

C  1

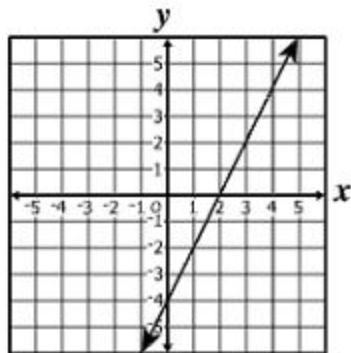D  $\dfrac{3}{2}$

**Which line appears to contain both ordered pairs shown in this table?**

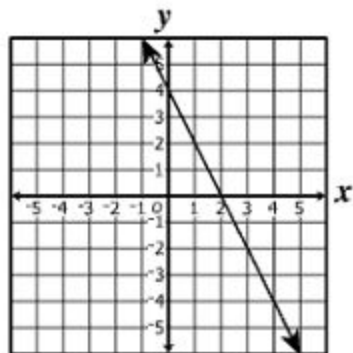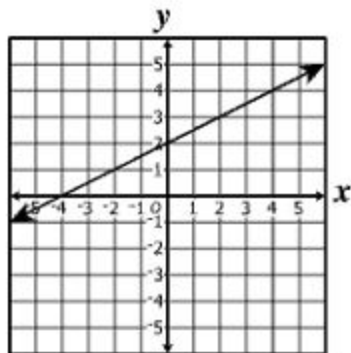| $x$ | $y$ |
|---|---|
| 2 | 0 |
| 0 | ⁻4 |

○ A



○ C



○ B



○ D

**Identify each equation that illustrates the commutative property of multiplication.**

$$xy + 3 = yx + 3$$

$$6(x + 7) = 6x + 42$$

$$3x + (5x + 7x) = (3x + 5x) + 7x$$

$$4(3) = 3(4)$$

$$12 + (^-3) = (^-3) + 12$$

The hourly wages of the 25 employees at a restaurant are shown.

**Employee Wages**



Based on the graph, what is the mean hourly wage of the 25 employees at this restaurant?

○ **A** $11.75

○ **B** $9.36

○ **C** $9.00

○ **D** $8.56

**What value of $x$ makes this equation true?**

$$5x + 8 + 3x = 26 + 6x$$
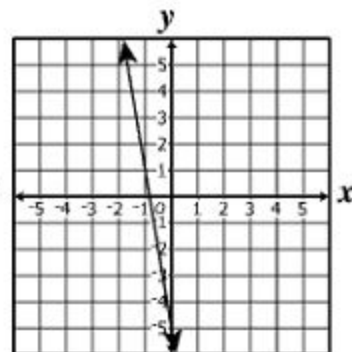
○ **A** 36

○ **B** 17

○ **C** 16

○ **D** 9

**Which line appears to be a graph of the equation shown?**

$$y = {}^-2x - 1$$

A
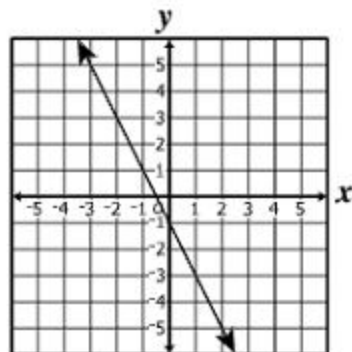


C



B
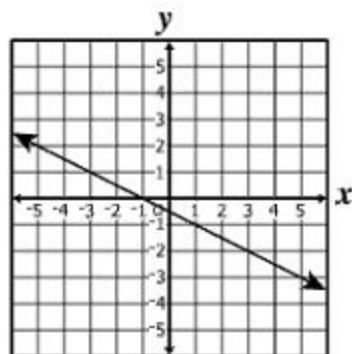


D
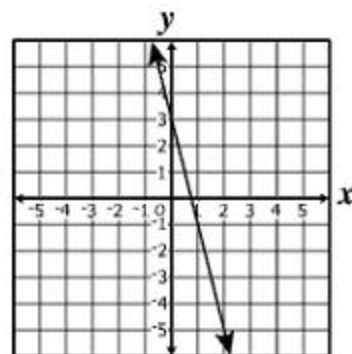
Two fair coins are flipped at the same time. What is the probability that both display tails?

A $\frac{1}{8}$

B $\frac{1}{4}$

C $\frac{1}{3}$

D $\frac{1}{2}$

**Which graph appears to contain all the ordered pairs in this relation?**

| $x$ | $y$ |
|---|---|
| −2 | −1 |
| 1 | 2 |
| 4 | 3 |

A


C


B


D
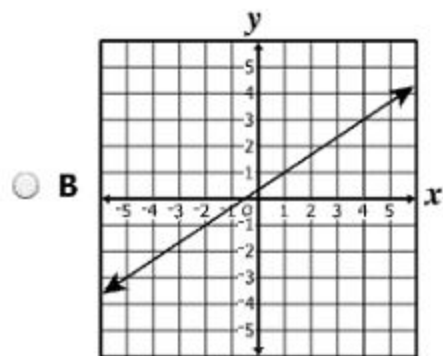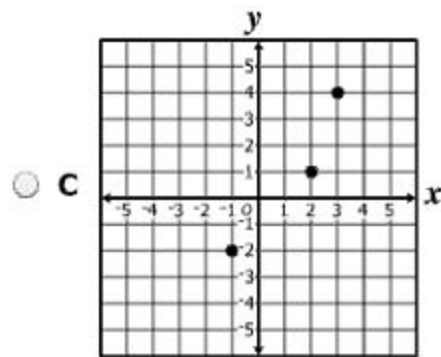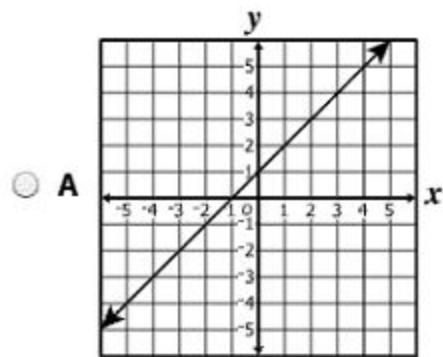
Which graph best represents the solution to $\frac{7}{8} \ge \frac{1}{4}x + \frac{1}{2}$ ?

A



B



C



D
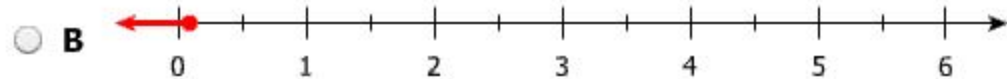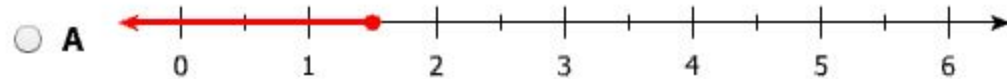
**Which of these best describes the relationship of the data shown on this scatterplot?**
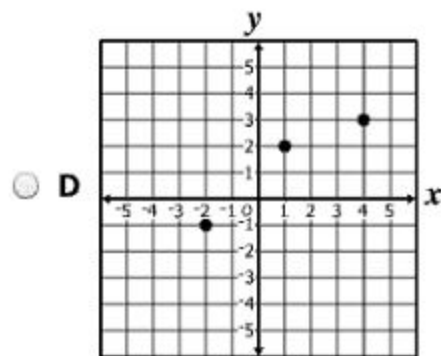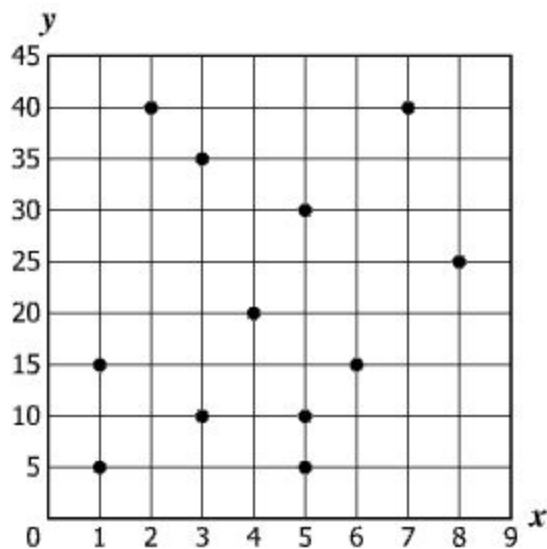


○ **A** Constant relationship

○ **B** Negative relationship

○ **C** Positive relationship

○ **D** No relationship

**What is the solution to** $\dfrac{n+4}{2} - 3 = 13$ ?

○ **A** $n = 4$

○ **B** $n = 14$

○ **C** $n = 16$

○ **D** $n = 28$

The graph shows Anna's height on each of her last five birthdays.
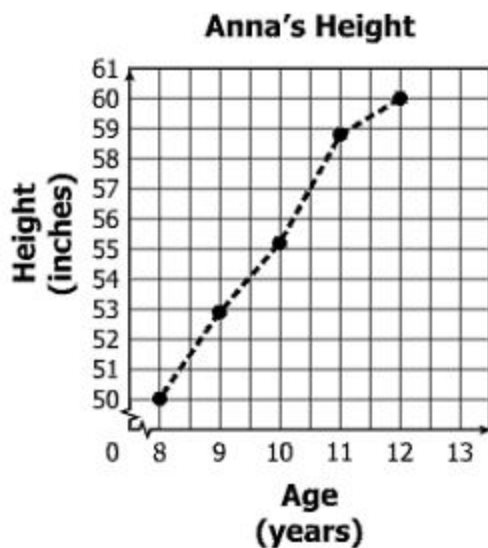
**Anna's Height**



Based on the graph, between which two consecutive years was the increase in Anna's height the greatest?

○ **A** Between 8 and 9 years

○ **B** Between 9 and 10 years

○ **C** Between 10 and 11 years

○ **D** Between 11 and 12 years

**Which best represents** $y = x - 1$ **?**

A

| $x$ | $y$ |
|-----|-----|
| 0   | 1   |
| 1   | 0   |

B

| $x$ | $y$ |
|-----|-----|
| 3   | 2   |
| 6   | 4   |

C
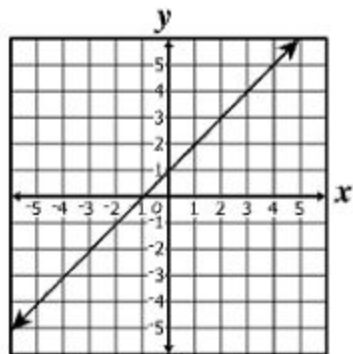


D
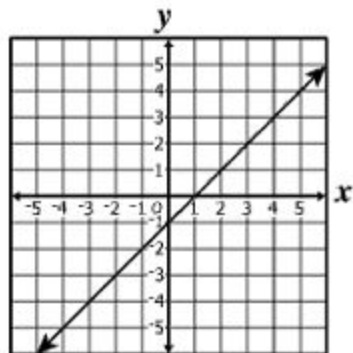
**What is the range of this relation?**
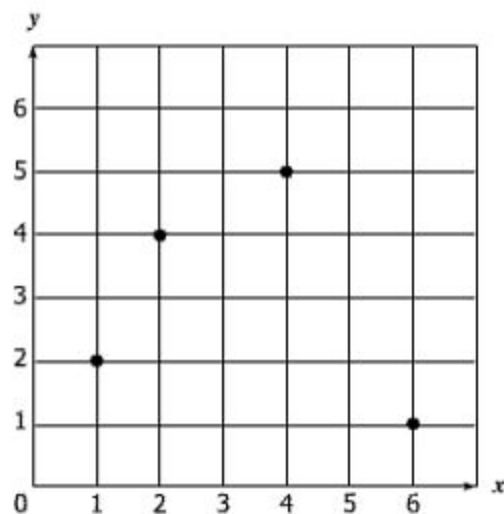


A  $\{1, 2, 4, 6\}$

B  $\{1, 2, 4, 5\}$

C  $\{1, 2, 4, 5, 6\}$

D  $\{0, 1, 2, 3, 4, 5, 6\}$

**What is the solution of this inequality?**

$$1.6 \geq 0.8x + 4$$

A  $-3 \geq x$

B  $-3 \leq x$

C  $7 \geq x$

D  $7 \leq x$

**Which is the greatest value in the range of $y = {}^-5x + 3$ for the domain $\{{}^-2,\ 0,\ 1,\ 3\}$?**

○ **A** 3

○ **B** 8

○ **C** 13

○ **D** 18

**Which table contains only points that lie on the line represented by** $y = \dfrac{2}{3}x - 6$ **?**

A

| x | y |
|---|---|
| 0 | -6 |
| 9 | 6 |

C

| x | y |
|----|----|
| -3 | -8 |
| 6 | -2 |

B

| x | y |
|----|---|
| 0 | 6 |
| 12 | 2 |

D

| x | y |
|----|----|
| -3 | -4 |
| 3 | -2 |

**The graph shows the number of text messages two students sent each day for 4 days.**
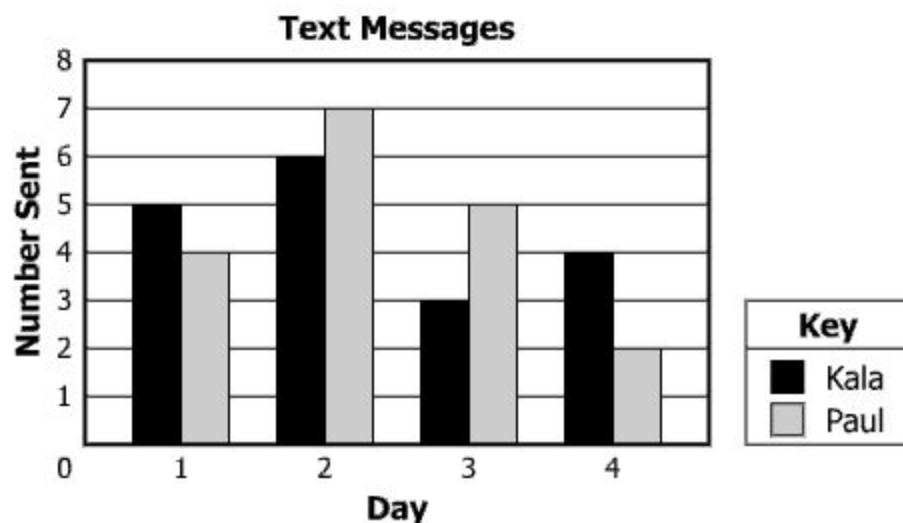


**Based on the graph, which statement is true?**

○ **A** On Day 2 and Day 3, the total number of text messages sent by Paul was 4 more than the total number of text messages sent by Kala.

○ **B** The total number of text messages sent by Kala was the same as the total number sent by Paul for these four days.

○ **C** The mean number of text messages Kala sent on Day 2 and Day 4 was exactly 4.5.

○ **D** Kala sent fewer text messages than Paul on Day 3 and Day 4 combined.

The scatterplot shows the relationship between Marvin's age and the time it took him to run a mile.

**Running Times**
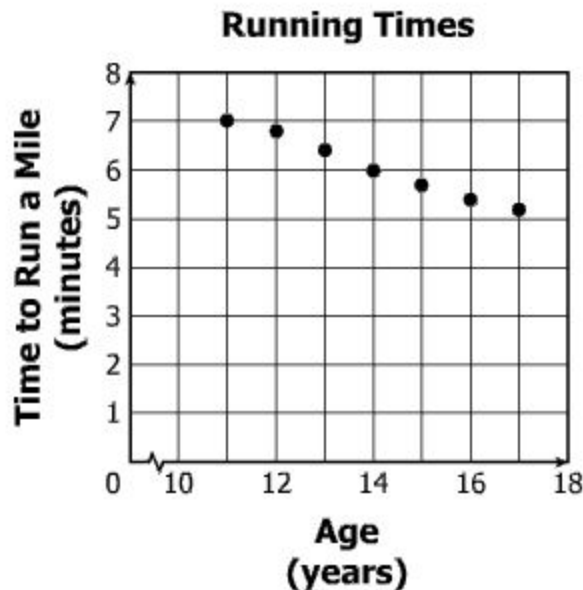


Which statement best describes the relationship between Marvin's age and the time it takes him to run a mile?

○ **A** As Marvin's age increased, the time it took him to run a mile increased.

○ **B** As Marvin's age increased, the time it took him to run a mile decreased.

○ **C** As Marvin's age increased, the time it took him to run a mile remains constant.

○ **D** There is no relationship between Marvin's age and the time it took him to run a mile.
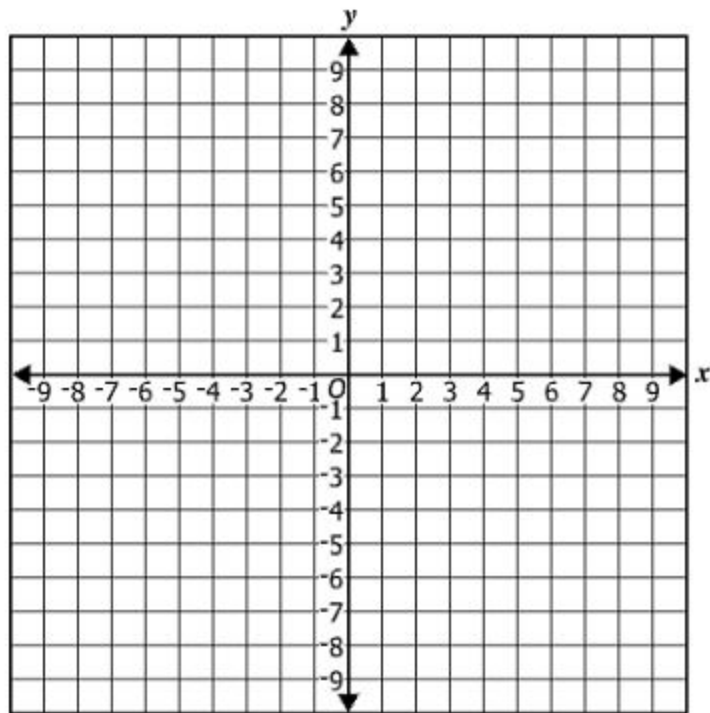
**Which relation has a domain of $\{3, 5, 8\}$ ?**

○ **A** $\{(5, 1), (3, 4), (8, 2), (3, 3)\}$

○ **B** $\{(3, 2), (5, 1), (8, 3), (1, 4)\}$

○ **C** $\{(2, 8), (1, 3), (3, 5)\}$

○ **D** $\{(3, 8), (5, 3), (3, 5)\}$

**Directions: Click on the grid to plot each ordered pair.**

A table of ordered pairs is shown.

| $x$ | $y$ |
| --- | --- |
| −2 | 2 |
| 4 | −1 |
| 8 | −3 |

Graph the relation represented by the table of ordered pairs.

A box contains 9 new light bulbs and 6 used light bulbs. Each light bulb is the same size and shape. Meredith will randomly select 2 light bulbs from the box without replacement. What is the probability Meredith will select a new light bulb and then a used light bulb?

A  $\dfrac{1}{54}$

B  $\dfrac{2}{15}$

C  $\dfrac{6}{25}$

D  $\dfrac{9}{35}$