Algebra 1 Keystone Review

A1.1.1.1 Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, and exponents)

1. Which number is irrational?

   (A) $\sqrt{9}$　　　　(B) $\sqrt{8}$　　　　(C) 0.3333　　　　(D) $\frac{2}{3}$

2. In which group are the numbers arranged in order from smallest value to largest value?

   (A) π, 3.14, $\sqrt{9.86}$, $\frac{22}{7}$　　　　　　(B) $\sqrt{9.86}$, $\frac{22}{7}$, 3.14, π

   (C) $\frac{22}{7}$, 3.14, π, $\sqrt{9.86}$　　　　　　(D) 3.14, $\sqrt{9.86}$, π, $\frac{22}{7}$

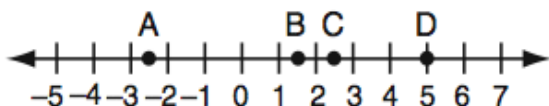3. Write the following numbers in order from smallest value to largest value:

$$\sqrt{3}, \ 1\tfrac{2}{3}, \ \tfrac{3}{2}, \ 1.75, \ 1$$

   Justify your answer.

4. If $2x^2 - x + 6$ is subtracted from $x^2 + 3x - 2$, the result is

   (A) $x^2 + 2x - 8$　　　(B) $x^2 - 4x + 8$　　　(C) $-x^2 + 2x - 8$　　　(D) $-x^2 + 4x - 8$

5. Which point on the accompanying number line best represents the position of $\sqrt{5}$?

   (A) A　　　　　　(B) B　　　　　　(C) C　　　　　　(D) D

6. Kyoko's mathematics teacher gave her the accompanying cards and asked her to arrange the cards in order from least to greatest. In what order should Kyoko arrange the cards?

$$\boxed{\pi} \ \ \boxed{\sqrt{8}} \ \ \boxed{3.\overline{1}} \ \ \boxed{2\sqrt{3}} \ \ \boxed{2\tfrac{4}{5}}$$

7. A list of numbers is shown below.

$$\frac{\sqrt{2}}{2} \quad 0.73 \quad 0.\overline{703} \quad \frac{\sqrt{3}}{3}$$

What is the order of the numbers from **least** to **greatest**?

(A) $0.\overline{703} \quad 0.73 \quad \dfrac{\sqrt{2}}{2} \quad \dfrac{\sqrt{3}}{3}$

(B) $\dfrac{\sqrt{3}}{3} \quad 0.\overline{703} \quad \dfrac{\sqrt{2}}{2} \quad 0.73$

(C) $\dfrac{\sqrt{2}}{2} \quad 0.\overline{703} \quad 0.73 \quad \dfrac{\sqrt{3}}{3}$

(D) $0.73 \quad 0.\overline{703} \quad \dfrac{\sqrt{3}}{3} \quad \dfrac{\sqrt{2}}{2}$

8. The perimeters, in inches, of four geometric shapes are listed below.

$$2\pi \quad 5\sqrt{5} \quad 4.2 \quad \pi^2$$

Which list gives the perimeters in order from **least** to **greatest**?

(A) $4.2 \quad \pi^2 \quad 2\pi \quad 5\sqrt{5}$

(B) $4.2 \quad 2\pi \quad \pi^2 \quad 5\sqrt{5}$

(C) $4.2 \quad 5\sqrt{5} \quad 2\pi \quad \pi^2$

(D) $2\pi \quad \pi^2 \quad 4.2 \quad 5\sqrt{5}$

9. Some real numbers are listed below.

$$\sqrt{15} \quad \pi \quad 3 \quad \sqrt{7}$$

What is the order of the real numbers from **least** to **greatest**?

(A) $3 \quad \pi \quad \sqrt{7} \quad \sqrt{15}$

(B) $\sqrt{7} \quad \sqrt{15} \quad 3 \quad \pi$

(C) $\sqrt{7} \quad 3 \quad \sqrt{15} \quad \pi$

(D) $\sqrt{7} \quad 3 \quad \pi \quad \sqrt{15}$

10. Which expression is equivalent to $7\sqrt{90}$?

(A) $16\sqrt{10}$

(B) $21\sqrt{10}$

(C) $70\sqrt{9}$

(D) $\sqrt{630}$

11. What is $\sqrt{72}$ expressed in simplest radical form?

(A) $2\sqrt{18}$

(B) $3\sqrt{8}$

(C) $6\sqrt{2}$

(D) $8\sqrt{3}$

12. When $5\sqrt{20}$ is written in simplest radical form, the result is $k\sqrt{5}$. What is the value of k?

(A) 20   (B) 10   (C) 7   (D) 4

13. What is $\dfrac{\sqrt{32}}{4}$ expressed in simplest radical form?

(A) $\sqrt{2}$ (B) $4\sqrt{2}$ (C) $\sqrt{8}$ (D) $\dfrac{\sqrt{8}}{2}$

14. A rectangular prism has a diagonal of $\sqrt{99}$ inches. Which expression also represents the **exact** length, in inches, of the same diagonal?

(A) 9.9 (B) $3\sqrt{11}$ (C) $9\sqrt{11}$ (D) 49.5

15. A square has a side length of $\sqrt{k}$ units. The side length of the square cannot be simplified. Which value could be the side length, in units, of the square?

(A) $\sqrt{4}$ (B) $\sqrt{12}$ (C) $\sqrt{30}$ (D) $\sqrt{56}$

16. What is $\sqrt{32}$ expressed in simplest radical form?

(A) $16\sqrt{2}$ (B) $4\sqrt{2}$ (C) $4\sqrt{8}$ (D) $2\sqrt{8}$

17. The length of the diagonal of a box is $\sqrt{20}$ feet. Which length, in feet, is equal to the length of the diagonal?

(A) $2\sqrt{5}$ (B) $5\sqrt{2}$ (C) $4\sqrt{5}$ (D) $5\sqrt{4}$

18. The distance between two points on a coordinate plane is $4\sqrt{3}$ units. Which number is equal to the distance, in units, between the two points?

(A) $\sqrt{12}$ (B) $\sqrt{36}$ (C) $\sqrt{43}$ (D) $\sqrt{48}$

19. Express $-3\sqrt{48}$ in simplest radical form.

20. Which number is closest to the value of $\sqrt{70}$?
(A) 7   (B) 8   (C) 9   (D) 35

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A1.1.1.2 Apply number theory concepts to show relationships between real numbers in problem solving settings.

1. What is the least common multiple (LCM) of $8x^2$ and $12x^3$? _____

2. What is the least common denominator of $\frac{1}{2}$, $\frac{2}{7x}$, and $\frac{5}{x}$?
   (A) 9x   (B) 2x   (C) 14x   (D) $14x^2$

3. The length of a rectangular room is 7 less than three times the width, w, of the room. Which expression represents the area of the room?
   (A) $3w - 4$ (B) $3w - 7$ (C) $3w^2 - 4w$ (D) $3w^2 - 7w$

4. The ages of three brothers are consecutive even integers. Three times the age of the youngest brother exceeds the oldest brother's age by 48 years. What is the age of the *youngest* brother?
   (A) 14   (B) 18   (C) 22   (D) 26

5. The sum of two numbers is 47, and their difference is 15. What is the larger number?
   (A) 16   (B) 31   (C) 32   (D) 36

6. When 36 is subtracted from the square of a number, the result is five times the number. What is the positive solution?
   (A) 9   (B) 6   (C) 3   (D) 4

7. Mae sold raffle tickets to Steven and to Theo. Each ticket costs k dollars. Steven bought 10 raffle tickets. Theo bought 15 raffle tickets. Which expression must be equal to the difference between how many dollars Theo spent and how many dollars Steven spent?
   (A) $5 + k$ (B) $5 - k$ (C) $5k$ (D) $\frac{5}{k}$

8. At the beginning of her mathematics class, Mrs. Reno gives a warm-up problem. She says, "I am thinking of a number such that 6 less than the product of 7 and this number is 85." Which number is she thinking of?
   (A) $11\frac{2}{7}$ (B) 13   (C) 84   (D) 637

9. Angelo, Brandon, and Carl work in the same office. Angelo's age is 4 years more than twice Carl's age. Brandon is 5 years younger than Carl. The average of the three ages is 41. Find the age of *each* of the men.

10. In the Ambrose family, the ages of the three children are three consecutive even integers. If the age of the youngest child is represented by $x+3$, which expression represents the age of the oldest child?
    (A) $x + 5$ (B) $x + 6$ (C) $x + 7$ (D) $x + 8$

11. A rectangle has an area of 24 square units. The width is 5 units less than the length. What is the length, in units, of the rectangle?
    (A) 6   (B) 8   (C) 3   (D) 19

A1.1.1.3 Use exponents, roots, and/or absolute values to solve problems.

1. The expression $8^{-4} \times 8^6$ is equivalent to
    (A) 8^{-24} (B) 8^{-2} (C) 8^2 (D) 8^{10}

2. Which expression is equivalent to $(3x^2)^3$?
    (A) $9x^5$ (B) $9x^6$ (C) $27x^5$ (D) $27x^6$

3. The expression $6\sqrt{50} + 6\sqrt{2}$ written in simplest radical form is
    (A) $6\sqrt{52}$ (B) $12\sqrt{52}$ (C) $17\sqrt{2}$ (D) $36\sqrt{2}$

4. The expression $\sqrt{54 - b}$ is equivalent to a positive integer when b is equal to
    (A) -10 (B) 54 (C) 16 (D) 4

5. If $a = 3$ and $b = -1$, what is the value of $ab - b^2$?
    (A) -2 (B) 2 (C) -4 (D) 4

6. Brett was given the problem: "Evaluate $2x^2 + 5$ when x = 3." Brett wrote that the answer was 41. Was Brett correct? Explain your answer.

7. If $a = 3$ and $b = -2$, what is the value of the expression $\dfrac{a^{-2}}{b^{-3}}$?
    (A) $-\dfrac{9}{8}$ (B) -1 (C) $-\dfrac{8}{9}$ (D) $\dfrac{8}{9}$

8. What is the value of $\dfrac{x^2 - 4y}{2}$ if x = 4 and y = −3?
    (A) -2 (B) 2 (C) 10 (D) 14

9. The expression $(3c)^{-2}$ is equivalent to
    (A) $-6c^2$ (B) $\dfrac{1}{3c^2}$ (C) $\dfrac{1}{9c^2}$ (D) $\dfrac{3}{c^2}$

10. The expression $\dfrac{-32x^8}{4x^2}$, $x \neq 0$, is equivalent to
    (A) $8x^4$ (B) $8x^6$ (C) $-8x^4$ (D) $-8x^6$

11. Express the product of $3\sqrt{20}(2\sqrt{5}-7)$ in simplest radical form.

12. Simplify the expression below.

$$(x^2y^3)(x^4y^2)$$

(A) x^6y^5 (B) x^8y^6 (C) $2x^8y^6$ (D) $2x^6y^5$

13. Simplify the expression below.

$$\frac{12x^2y^3}{3xy}$$

(A) $4xy^2$ (B) $4x^2y^2$ (C) $\dfrac{4}{xy^2}$ (D) $\dfrac{4x}{y^2}$

14. Express in simplest form: $\dfrac{45a^4b^3 - 90a^3b}{15a^2b}$

15. Which expression represents $(3x^2y^4)(4xy^2)$ in simplest form?

(A) $12x^2y^8$ (B) $12x^2y^6$ (C) $12x^3y^8$ (D) $12x^3y^6$

16. An expression is shown below.

$$\frac{x^2x^4}{x}$$

Which expression is equivalent to the given expression for all $x \neq 0$?

(A) x^5 (B) x^6 (C) x^7 (D) x^8

17. Simplify: $\dfrac{27k^5m^8}{(4k^3)(9m^2)}$

18. The length of a rectangle is $2\sqrt{8}$ units. The width of the rectangle is $\sqrt{8}$ units. What is the area, in square units, of the rectangle?

(A) 8   (B) 16   (C) 32   (D) 64

19. In the accompanying diagram of **Δ ABC**, altitude $BD = 4\sqrt{6}$ and $AC = 5\sqrt{2}$. Find the area of the triangle to the *nearest tenth of a square unit.*

B

$4\sqrt{6}$

A   D   C

$5\sqrt{2}$

(Not drawn to scale)
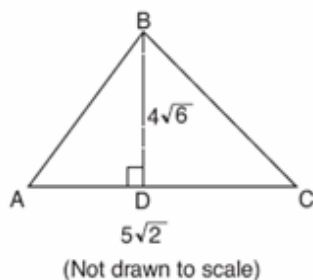
20. Which expression represents $\dfrac{27x^{18}y^5}{9x^6y}$ in simplest form?
(A) $3x^{12}y^4$ (B) $3x^3y^5$ (C) $18x^{12}y^4$ (D) $18x^3y^5$

21. Which expression represents $\dfrac{-14a^2c^8}{7a^3c^2}$ in simplest form?

(A) $-2ac^4$ (B) $-2ac^6$ (C) $\dfrac{-2c^4}{a}$ (D) $\dfrac{-2c^6}{a}$

22. What is the product of $(6a^2b^3c^4)$ and $(3a^3b^4c)$?
(A) $9a^5b^7c^4$ (B) $9a^5b^7c^5$ (C) $18a^5b^7c^5$ (D) $18a^5b^7c^4$

23. If the mass of a proton is 1.67×10^{-24} gram, what is the mass of 1,000 protons?
(A) 1.67×10^{-27} g   (B) 1.67×10^{-23} g   (C) 1.67×10^{-22} g   (D) 1.67×10^{-21} g

24. Two objects are 2.4×10^{20} centimeters apart. A message from one object travels to the other at a rate of 1.2×10^5 centimeters per second. How many seconds does it take the message to travel from one object to the other?
(A) 1.2×10^{15} (B) 2.0×10^4 (C) 2.0×10^{15} (D) 2.88×10^{25}

25. What is the quotient of $\dfrac{24x^6y^{12}z^{18}}{6x^3y^6z^9}$?
(A) $4x^2y^2z^2$ (B) $4x^3y^6z^9$ (C) $18x^2y^2z^2$ (D) $18x^3y^6z^9$

26. The expression $\sqrt{28} + \sqrt{63}$ is equivalent to

(A) $\sqrt{91}$ (B) $5\sqrt{7}$ (C) $6\sqrt{7}$ (D) $13\sqrt{7}$

27. What is the sum of $\sqrt{50}$ and $\sqrt{8}$?

    (A) $\sqrt{58}$ (B) $7\sqrt{2}$ (C) $9\sqrt{2}$ (D) $29\sqrt{2}$

28. The expression $\sqrt{72} - 3\sqrt{2}$ written in simplest radical form is

    (A) $5\sqrt{2}$ (B) $3\sqrt{6}$ (C) $3\sqrt{2}$ (D) $\sqrt{6}$

29. The expression $\sqrt{28} - \sqrt{7}$ is equivalent to

    (A) $\sqrt{7}$ (B) 2   (C) $3\sqrt{7}$ (D) 4

30. The value of $\sqrt{x^2 - 9}$ is a real and irrational number when x is equal to

    (A) 5   (B) 0   (C) −3   (D) 4

31. The value of the expression $-|a - b|$ when a = 7 and b = −3 is

    (A) −10   (B) 10   (C) −4   (D) 4

32. What is the value of the expression $|-5x + 12|$ when x = 5?

    (A) −37   (B) −13   (C) 13   (D) 37

33. What is the value of the expression $2x^3y$ when x = -2 and y = 3?

    (A) −192   (B) −108   (C) −48   (D) 48

A1.1.1.4 Use estimation strategies in problem-solving situations.

1. The circumference of a tree stump is 37.5 inches. Which length, in inches, is **closest** to the diameter of the tree stump?
    (A) 9   (B) 10   (C) 12   (D) 13

2. Jerome is putting a square concrete block in a square garden. The garden is $7\frac{7}{8}$ feet long on each side. The concrete block is $1\frac{1}{8}$ feet long on each side. Which estimation is **closest** to percent of the garden's total area that will be covered by the concrete block?
    (A) 2%   (B) 4%   (C) 7%   (D) 14%

3. Amy surveyed 25 male and 25 female 16-year-olds about the number of times they visited a library last summer. The double bar graph below shows the results of her survey.
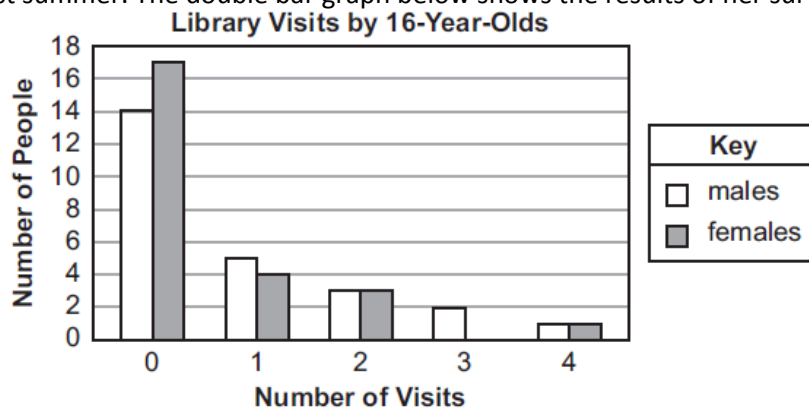
Amy uses her graph to estimate information about a population of 400 male and 600 female 16-year-olds. Based on the results of Amy's survey, which estimate is **most likely** the number of people in this population of 1,000 who visited a library 0 times last summer?

    (A) 496   (B) 608   (C) 620   (D) 632

A1.1.1.5 Simplify expressions involving polynomials.

1. What is the polynomial resulting from the subtraction below?

$$(3x^2 + 4x - 7) - (x^2 - 2x + 6)$$

2. Which expression is an equivalent form of $\dfrac{2x^3 + 4x^2}{2x^2}$?

    (A) $x + 2$ (B) $2x(x + 1)$ (C) $2x^2(x + 1)$ (D) $2x^2(x + 3)$

3. When $4x^2 + 7x - 5$ is subtracted from $9x^2 - 2x + 3$, the result is
    (A) $5x^2 + 5x - 2$ (B) $5x^2 - 9x + 8$ (C) $-5x^2 + 5x - 2$ (D) $-5x^2 + 9x - 8$

4. If $P = a^2 + a - 1$ and $R = -a - 1$, which expression represents $P + R$?
    (A) $a^2 + 2$ (B) $a^2 - 2$ (C) $a^2 + 2a$ (D) $a^2 + 2a - 2$

5. Which expression is equivalent to $121 - x^2$?

    (A) $(x - 11)(x - 11)$ (B) $(x + 11)(x - 11)$ (C) $(11 - x)(11 + x)$ (D) $(11 - x)(11 - x)$

6. Which expression is equivalent to $9x^2 - 16$?

    (A) $(3x + 4)(3x - 4)$ (B) $(3x - 4)(3x - 4)$ (C) $(3x + 8)(3x - 8)$ (D) $(3x - 8)(3x - 8)$

7. Which value of x makes the expression $\dfrac{x^2 - 9}{x^2 + 7x + 10}$ undefined?

    (A) -5 (B) 2 (C) 3 (D) -3

8. What is the product of $(c + 8)$ and $(c - 5)$?
    (A) $c^2 + 3c - 40$ (B) $c^2 - 3c - 40$ (C) $c^2 + 13c - 40$ (D) $c^2 - 40$

9. Simplify the expression below.

$$10y^2 - 15\, y^2$$

    (A) -5 (B) 5 (C) $-5y^2$ (D) $-5y^4$

10. The sum of $8x^2 - x + 4$ and $x - 5$ is
    (A) $8x^2 + 9$ (B) $8x^2 - 1$ (C) $8x^2 - 2x + 9$ (D) $8x^2 - 2x - 1$

11. The expression $(2x^2 + 6x + 5) - (6x^2 + 3x + 5)$ is equivalent to
    (A) $-4x^2 + 3x$ (B) $4x^2 - 3x$ (C) $-4x^2 - 3x + 10$ (D) $4x^2 + 3x - 10$

12. What is the sum of $x^2 - 3x + 7$ and $3x^2 + 5x - 9$?
    (A) $4x^2 - 8x + 2$ (B) $4x^2 + 2x + 16$ (C) $4x^2 - 2x - 2$ (D) $4x^2 + 2x - 2$

13. The three sides of a triangle have lengths of x units, $(x - 4)$ units, and $(x^2 - 2x - 5)$ units for some value of x greater than 4. What is the perimeter, in units, of the triangle?
    (A) $x^2 - 2x - 9$ (B) $x^2 - 9$ (C) $x^2 - 1$ (D) $x^2 + 1$

14. Factored completely, the expression $3x^2 - 3x - 18$ is equivalent to
    (A) $3(x^2 - x - 6)$ (B) $3(x - 3)(x + 2)$ (C) $(3x - 9)(x + 2)$ (D) $(3x + 6)(x - 3)$

15. The sum of $4x^3 + 6x^2 + 2x - 3$ and $3x^3 + 3x^2 - 5x - 5$ is
    (A) $7x^3 + 3x^2 - 3x - 8$ (B) $7x^3 + 3x^2 + 7x + 2$
    (C) $7x^3 + 9x^2 - 3x - 8$ (D) $7x^6 + 9x^4 - 3x^2 - 8$

16. What is the product of $2r^2 - 5$ and $3r$?
    (A) $6r^3 - 15r$ (B) $6r^3 - 5$ (C) $6r^2 - 15r$ (D) $6r^2 - 15$

17. Factor completely: $4x^3 - 36x$

18. Which expression represents $\dfrac{2x^2 - 12x}{x - 6}$ in simplest form?
    (A) 0   (B) $2x$ (C) $4x$ (D) $2x + 2$

19. What is the product of $-3x^2y$ and $(5xy^2 + xy)$?
    (A) $-15x^3y^3 - 3x^3y^2$ (B) $-15x^3y^3 - 3x^3y$ (C) $-15x^2y^2 - 3x^2y$ (D) $-15x^3y^3 + xy$

20. The expression $(a^2 + b^2)^2$ is equivalent to
    (A) $a^4 + b^4$ (B) $a^4 + a^2b^2 + b^4$ (C) $a^4 + 2a^2b^2 + b^4$ (D) $a^4 + 4a^2b^2 + b^4$

21. If Ann correctly factors an expression that is the difference of two perfect squares, her factors could be
    (A) $(2x + y)(x - 2y)$ (B) $(2x + 3y)(2x - 3y)$
    (C) $(x - 4)(x - 4)$ (D) $(2y - 5)(y - 5)$

22. Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to
    (A) $x^2(4x + 6)(3x - 2)$ (B) $2(2x^2 + 3x)(3x^2 - 2x)$
    (C) $2x^2(2x - 3)(3x + 2)$ (D) $2x^2(2x + 3)(3x - 2)$

23. What is a common factor of $x^2 - 9$ and $x^2 - 5x + 6$?
    (A) $x + 3$ (B) $x - 3$ (C) $x - 2$ (D) x^2

24. If $(x - 4)$ is a factor of $x^2 - x - w = 0$, then the value of w is
    (A) 12   (B) −12   (C) 3   (D) −3

25. Simplify the expression below.
$$4k^2 + 5k - 3 + 5k^2 + 2$$
    (A) $4k^2 + 10k - 1$ (B) $9k^2 + 5k - 1$ (C) $9k^2 + 7k - 3$ (D) $14k^2 + 5k - 1$

26. When $3g^2 - 4g + 2$ is subtracted from $7g^2 + 5g - 1$, the difference is
    (A) $-4g^2 - 9g + 3$ (B) $4g^2 + g + 1$ (C) $4g^2 + 9g - 3$ (D) $10g^2 + g + 1$

27. Express both the perimeter and the area of the rectangle shown in the accompanying diagram as polynomials in simplest form.
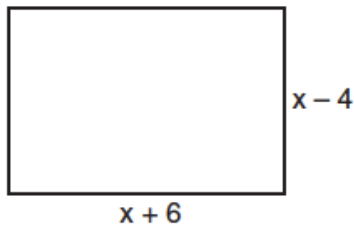
28. Simplify the expression below.

$$5x(2x - 5)$$

    (A) $10x - 5$ (B) $10x^2 - 5$ (C) $10x - 25x$ (D) $10x^2 - 25x$

29. Simplify the expression below.
$$(3x^3 + 2x^2 - 5x) + (-8x^3 + 3x)$$
    (A) $-11x^3 + 2x^2 - 2x$ (B) $11x^3 - 2x^2 + 8x$ (C) $-5x^3 + 2x^2 - 2x$ (D) $5x^3 - 2x^2 - 8x$

30. What is the product of the expression below?
$$(2x - 5)(2x - 3)$$
    (A) $4x^2 + 16x + 15$ (B) $4x^2 - 16x - 15$ (C) $4x^2 + 16x - 15$ (D) $4x^2 - 16x + 15$

31. Simplify the expression below.

$$12ab + 8ab + 5ab$$

    (A) $3ab$ (B) $25ab$ (C) $25(3ab)$ (D) $25 + ab$

32. Simplify the expression below.

$$(3a^2 + 5a - 11) - (11a^2 + 2a - 12)$$

(A) $-8a^2 + 3a + 1$ (B) $-8a^2 + 7a - 23$ (C) $14a^2 + 7a + 1$ (D) $14a^2 + 3a - 23$

33. What is the product of the expression below?

$$(a - 3b)(2a + 2b)$$

(A) $2a^2 - 4ab - 6b^2$ (B) $2a^2 + 4ab - 6b^2$ (C) $2a - 4ab - 6b$ (D) $2a + 4ab + 6b$

34. Which expression is equivalent to $(x^4 + 2x + 5) + (x^3 + 3x + 7)$?
   (A) $2x^4 + 5x + 12$ (B) $2x^7 + 5x^2 + 12$ (C) $x^4 + x^3 + 5x + 12$ (D) $x^4 + x^3 + 5x^2 + 12$

35. What is the factored form of the expression $x^2 + 3x - 10$?
   (A) $(x - 5)(x - 2)$ (B) $(x - 5)(x + 2)$ (C) $(x + 5)(x - 2)$ (D) $(x + 5)(x + 2)$

36. Simplify the expression below.

$$3xy(9xy + 14x)$$

(A) $27xy + 42x$ (B) $9xy + 42x^2y$ (C) $27x^2y^2 + 14x$ (D) $27x^2y^2 + 42x^2y$

37. What is $3m^3 + 6m^2$ divided by $3m$?
   (A) $m^2 + 6m^2$ (B) $m^2 + 2m$ (C) $3m^2 + 6m$ (D) $m^3 + 2m^2$

38. Simplify the expression below.

$$\frac{3x^6 + 9x^4 - 6x^2}{3x^2}$$

(A) $x^4 + 3x^2 - 2$ (B) $x^4 + 6x^2 + 3$ (C) $x^3 + 3x^2 - 3x$ (D) $x^3 + 6x^2 + 3x$

39. The expression $9x^2 - 100$ is equivalent to
   (A) $(9x - 10)(x + 10)$ (B) $(3x - 10)(3x + 10)$ (C) $(3x - 100)(3x - 1)$ (D) $(9x - 100)(x + 1)$

40. Multiply $(a + 2)(3a - 1)$.
   (A) $3a^2 - 2$ (B) $3a^2 + 5a$ (C) $3a^2 + 4a - 2$ (D) $3a^2 + 5a - 2$

41. What are the factors of $x^2 - 5x + 6$?
   (A) $(x + 2)$ and $(x + 3)$ (B) $(x - 2)$ and $(x - 3)$
   (C) $(x + 6)$ and $(x - 1)$ (D) $(x - 6)$ and $(x + 1)$

42. Factor the expression below using the greatest common factor (GCF).
$$12n^5 + 8n^3 + 6n$$
   (A) $2n(6n^4 + 4n^2 + 3)$ (B) $2n(6n^5 + 4n^3 + 3n)$
   (C) $2n(12n^5 + 4n^2 + 6)$ (D) $2n(6n^4 + 8n^3 + 6n)$

43. Factored completely, the expression $2x^2 + 10x - 12$ is equivalent to
   (A) $2(x - 6)(x + 1)$ (B) $2(x + 6)(x - 1)$ (C) $2(x + 2)(x + 3)$ (D) $2(x - 2)(x - 3)$

44. Rita multiplied the monomials $12a^3b^6$ and $3ab^2$ as shown below.

$$(12a^3b^6)(3ab^2) = 36a^4b^8$$

Is Rita's answer correct? On the lines below, explain how you determined your answer.

_____

_____

_____

_____

_____

45. Which value of x is the solution of $\dfrac{2x}{5} + \dfrac{1}{3} = \dfrac{7x-2}{15}$?

(A) $\dfrac{3}{5}$ (B) $\dfrac{31}{26}$ (C) 3   (D) 7

46. Which expression represents $\dfrac{25x - 125}{x^2 - 25}$ in simplest form?

(A) $\dfrac{5}{x}$ (B) $\dfrac{-5}{x}$ (C) $\dfrac{25}{x - 5}$ (D) $\dfrac{25}{x + 5}$

47. What is the sum of $\dfrac{-x + 7}{2x + 4}$ and $\dfrac{2x + 5}{2x + 4}$?

(A) $\dfrac{3x + 12}{2x + 4}$ (B) $\dfrac{x + 12}{4x + 8}$ (C) $\dfrac{3x + 12}{4x + 8}$ (D) $\dfrac{x + 12}{2x + 4}$

48. Simplify the expression below.

$$\dfrac{4x^3 + 8x^2 - 10x}{2x}$$

(A) $2x^2 + 4x - 5$ (B) $2x^2 + 4x - 10$ (C) $8x^3 + 4x^2 - 5$ (D) $8x^4 + 16x^3 - 10x^2$

49. Which expression is equivalent to $\dfrac{x^2 + 4x + 4}{x^2 - 4}$ for all values of x greater than 2?

(A) $4x - 1$ (B) $4x$ (C) $\dfrac{x - 2}{x + 2}$ (D) $\dfrac{x + 2}{x - 2}$

50. What is the simplified form of the expression below?

$$\frac{8x^6 - 6x^3}{2x^2}$$

(A) $4x^3 - 3$ (B) $4x^4 - 3$ (C) $4x^3 - 3x$ (D) $4x^4 - 3x$

51. An expression is shown below.

$$\frac{x^2 - 4x + 4}{x^2 - 4}$$

Which expression is equivalent to the given expression for all $x \neq -2, 2$?

(A) $x + 4$ (B) $\dfrac{-4x + 4}{-4}$ (C) $\dfrac{x + 2}{x - 2}$ (D) $\dfrac{x - 2}{x + 2}$

52. What is the product of $2x^3 + 9$ and $x^3 + 7$?

(A) $2x^6 + 63$ (B) $2x^9 + 9$ (C) $2x^6 + 23x^3 + 63$ (D) $2x^9 + 23x^3 + 63$

53. Express in simplest form: $\dfrac{x^2 - 5x - 24}{x^2 - 8x}$

54. One factor of the expression $x^2y^2 - 16$ is

(A) $xy - 4$ (B) $xy - 8$ (C) $x^2 - 4$ (D) $x^2 + 8$

55. Factored, the expression $16x^2 - 25y^2$ is equivalent to

(A) $(4x - 5y)(4x + 5y)$ (B) $(4x - 5y)(4x - 5y)$
(C) $(8x - 5y)(8x + 5y)$ (D) $(8x - 5y)(8x - 5y)$

56. Which expression represents $\dfrac{x^2 - 2x - 15}{x^2 + 3x}$ in simplest form?

(A) -5 (B) $\dfrac{x - 5}{x}$ (C) $\dfrac{-2x - 5}{x}$ (D) $\dfrac{-2x - 15}{3x}$

57. Perform the indicated operations.

The expression $x^2 + bx + 12$ can be factored for three different positive values of b.

A. Find the difference: $(x^2 + 4x - 5) - (3x^2 + 1)$

B. Expand: $(x^2 + 3)(x + 2)$

C. Simplify: $\dfrac{x^2 - 9}{x^2 + x - 12}$; $x \neq -4, 3$

D. What are the three different positive values of b?

58. Multiply the two binomials below.

$$(2x - 3)(2x + 3)$$

(A) $4x^2 + 9$ (B) $4x^2 - 9$ (C) $4x^2 - 6x - 9$ (D) $4x^2 - 12x + 9$

59. Simplify the expression below.

$$(3x^2 - 6x - 4) - (x^2 + 4x - 2)$$

(A) $2x^2 - 10x - 2$ (B) $2x^2 - 2x - 6$ (C) $3x^2 - 10x - 6$ (D) $3x^2 + 10x + 2$

60. Factor $y^2 + 3y - 18$ into two binomials.
(A) $(y + 9)(y - 2)$ (B) $(y - 9)(y + 2)$ (C) $(y + 6)(y - 3)$ (D) $(y - 6)(y + 3)$

61. To find the volume of a rectangular prism, Harris multiplies the area of the base times the height. The area of the base is $(x + 4)$ square inches for some value of x. The height is $(2x + 3)$ inches. What is the volume, in cubic inches, of the rectangular prism?
(A) $11x$ (B) $2x^2 + 12x$ (C) $2x^2 + 7x + 12$ (D) $2x^2 + 11x + 12$

62. Nancy wrote the expression shown below.

$x^2 + 14x + 48$

Which expression is a factor of Nancy's expression?

(A) $x + 6$ (B) $x + 14$ (C) $x + 24$ (D) $x + 48$

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63. What is the factored form of $x^2 - 36$?

   (A) $(x - 6)^2$ (B) $(x + 6)^2$ (C) $x(x - 36)$ (D) $(x + 6)(x - 6)$

64. Todd wrote the expression shown below.

$$\frac{2x^2 - 2x - 60}{x - 6}$$

   Which expression is equivalent to Todd's expression when $x \neq 6$?

   (A) $x + 5$ (B) $2x - 5$ (C) $2x + 10$ (D) $2x^2 - x - 10$

65. If $3x$ is one factor of $3x^2 - 9x$, what is the other factor?

   (A) $3x$ (B) $x^2 - 6x$ (C) $x - 3$ (D) $x + 3$

66. A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?

   (A) $x + 4$ (B) $x + 2$ (C) 3   (D) $x^2 + 6x + 8$

67. What is the sum of $\dfrac{3x^2}{x - 2}$ and $\dfrac{x^2}{x - 2}$?

   (A) $\dfrac{3x^4}{(x - 2)^2}$ (B) $\dfrac{3x^4}{x - 2}$ (C) $\dfrac{4x^2}{(x - 2)^2}$ (D) $\dfrac{4x^2}{x - 2}$

A1.1.2.1 Write, solve, and/or graph linear equations using various methods.

1. In the equation $\frac{1}{4}n + 5 = 5\frac{1}{2}$, n is equal to

   (A) 8 (B) 2 (C) $\frac{1}{2}$ (D) $\frac{1}{8}$

2. Multiply the expression below.

   $$(3x - 5)(2x - 8)$$

   (A) $5x^2 + 3$ (B) $6x^2 - 40$ (C) $6x^2 + 34x + 40$ (D) $6x^2 - 34x + 40$

3. A balloon is released from a height of 6 feet. The balloon rises at a constant rate of 3 feet per second. Which equation represents the height of the balloon (y), in feet, x seconds after it is released?
   (A) $y = 3x + 6$ (B) $y = 6x + 3$ (C) $x = 3y + 6$ (D) $x = 6y + 3$

4. Carlos sells tickets for a concert. He earns $200 plus $2.50 per ticket he sells. So far, Carlos has earned $300. How many more tickets does Carlos need to sell to earn $350?
   (A) 20 (B) 50 (C) 125 (D) 150

5. Marta purchased screws and nails at a hardware store. She paid $0.10 for each screw and $0.05 for each nail. She purchased 15 screws but did not count the number of nails she purchased. She paid a total of $5.20 for the screws and nails. How many nails did Marta purchase?

   (A) 74 (B) 101 (C) 104 (D) 196

6. Mr. Aziz is a sculptor. He makes sculptures either out of bronze or out of steel. He charges $280 for each bronze sculpture he sells and $440 for each steel sculpture he sells. Last year, he made 8 sculptures and sold all of them for a total of $2,400. How many bronze sculptures did Mr. Aziz make last year?
   (A) 1 (B) 3 (C) 5 (D) 7

7. Julia went to the movies and bought one jumbo popcorn and two chocolate chip cookies for $5.00. Marvin went to the same movie and bought one jumbo popcorn and four chocolate chip cookies for $6.00. How much does one chocolate chip cookie cost?
   (A) $0.50 (B) $0.75 (C) $1.00 (D) $2.00

8. Nina is an artist who sells paintings online. She charges the same amount to ship each painting.

   - When she sells 4 paintings, she charges a total of $9.96 for shipping.

   - When she sells 8 paintings, she charges a total of $19.92 for shipping.

   How much more does Nina charge for shipping 20 paintings than for shipping 16 paintings?

   (A) $2.49 (B) $9.96 (C) $19.92 (D) $29.96

9. When air is pumped into an automobile tire, the pressure is inversely proportional to the volume. If the pressure is 35 pounds when the volume is 120 cubic inches, what is the pressure, in pounds, when the volume is 140 cubic inches?

10. James has pennies, nickels, and dimes in his bank. He has more than $1.60 and less than $2.00 in the bank. There are 5 times as many pennies as dimes. There is an equal number of nickels and dimes. What is the exact amount of money in his bank?
(A) $1.60   (B) $1.70   (C) $1.80   (D) $1.90

11. Robin spent $17 at an amusement park for admission and rides. If she paid $5 for admission, and rides cost $3 each, what is the total number of rides that she went on?
(A) 12   (B) 2   (C) 9   (D) 4

12. Hector is buying carrots and potatoes from the grocery store. The carrots cost $0.64 per pound, and potatoes cost $0.50 per pound. He creates a graph that shows all the combinations of pounds of carrots and pounds of potatoes that he can buy for $4.00. He graphs pounds of carrots on the *x*-axis and pounds of potatoes on the *y*-axis. What is the *y*-intercept of Hector's graph?
(A) 6.25   (B) 7   (C) 7.125   (D) 8

13. Jamie and Chris both started a stamp collection at the same time. Jamie started her stamp collection with 100 stamps and added 13 stamps to her collection each week. Chris started his stamp collection with 130 stamps and added 8 stamps to his collection each week. After how many weeks did Jamie and Chris have the same number of stamps in their collections?
(A) 6   (B) 10   (C) 178   (D) 230

14. Clayton is flying a model helicopter. The helicopter starts on the roof of a building that is 85 feet above the ground. Clayton makes the helicopter climb at a constant rate. After 10 seconds, the helicopter is 120 feet above the ground. How many feet above the ground will the helicopter be after 20 seconds?
(A) 130   (B) 155   (C) 205   (D) 240

15. Alice spent $57.00 at the pet store. She spent $12.00 on dog food and spent $4.50 each on some dog toys. The equation shown below models this situation.

$$57.00 = 4.50x + 12.00$$

What does *x* represent in this equation?

(A) the cost of a dog toy   (B) the cost of the dog food
(C) the number of dog toys   (D) the weight of the dog food

16. The school librarian orders a magazine subscription for the library. She also orders additional subscriptions for some of the teachers. Each of the teacher subscriptions costs the same amount. However, the library subscription costs more because it is the first subscription. Which equation could represent the total cost (*y*), in dollars, for *x* teacher subscriptions and the library subscription?
(A) $y = 12x$ (B) $y = 14x + 12$ (C) $y = 15x + 15$ (D) $y = 16x + 18$

17. Which point is on the line $4y - 2x = 0$?
(A) (−2,−1)   (B) (−2,1)   (C) (−1,−2)   (D) (1,2)

18. Solve for *x*: $5(x - 2) = 2(10 + x)$

19. Which value of p is the solution of $5p - 1 = 2p + 20$?

(A) $\dfrac{19}{7}$ (B) $\dfrac{19}{3}$ (C) 3   (D) 7

20. Solve for x: $\dfrac{3}{5}(x + 2) = x - 4$

(A) 8   (B) 13   (C) 15   (D) 23

21. On a certain day in Toronto, Canada, the temperature was 15° Celsius (C). Using the formula $F = \dfrac{9}{5}C + 32$, Peter converts this temperature to degrees Fahrenheit (F). Which temperature represents 15°C in degrees Fahrenheit?

(A) −9   (B) 35   (C) 59   (D) 85

22. Peter makes banners. He charges a fixed amount to create the banner's design. He then charges an additional amount for each banner a customer orders. He uses the equation $y = 44.95x + 39.95$ to find the total amount (y), in dollars, he will charge a customer who orders x banners. Which statement about how Peter charges his customers must be true?
(A) Peter charges $44.95 to create the banner's design.
(B) Peter charges $39.95 for each banner a customer orders.
(C) The difference in the total amount charged between an order of 3 banners and an order of 4 banners is $39.95.
(D) The difference in the total amount charged between an order of 3 banners and an order of 4 banners is $44.95.

23. The height of an ice sculpture is 5 feet before it starts to melt. As the ice sculpture melts, its height decreases by 0.5 foot per hour. Which equation represents the height of the ice sculpture (y), in feet, based on the amount of time (x), in hours, since it started to melt?
(A) $x = 5 - 0.5y$ (B) $x = 0.5 - 5y$ (C) $y = 5 - 0.5x$ (D) $y = 0.5 - 5x$

24. Which linear equation represents a line containing the point (1,3)?
(A) $x + 2y = 5$ (B) $x - 2y = 5$ (C) $2x + y = 5$ (D) $2x - y = 5$

25. Anna will spend $30 to buy chicken and beef. Anna uses an equation to determine the number of pounds of chicken (y) she can buy based on the number of pounds of beef (x) she buys. The ordered pair (5, 2) is a solution to the equation. What does the ordered pair (5, 2) represent in this situation?
(A) Anna will spend $5 to buy 2 pounds of beef.
(B) Anna will spend $2 to buy 5 pounds of chicken.
(C) Anna can buy 5 pounds of chicken when she buys 2 pounds of beef.
(D) Anna can buy 2 pounds of chicken when she buys 5 pounds of beef.

26. Emma takes care of dogs while their owners are on vacation. She charges $35 for each of the first 3 days she takes care of a dog and $25 for each day thereafter. Which equation can be used to find the total cost (y), in dollars, to have Emma take care of a dog for x days, where x is a whole number greater than 3?
(A) $y = 25 + 35x$ (B) $y = 35 + 25x$ (C) $y = 75 + 35(x - 3)$ (D) $y = 105 + 25(x - 3)$

27. Caroline used a pump to remove water from a pond. The pump removes 300 gallons of water per hour. On Saturday, she used the pump to remove 450 gallons. She continued to use the pump on Sunday. Which equation represents the relationship between the total amount of water (y), in gallons, Caroline removed from the pond over the weekend after using the pump for x hours on Sunday?

(A) $y = 300x + 450$ (B) $y = 300(x + 450)$ (C) $y = 450x + 300$ (D) $y = 450(x + 300)$

28. Donovan publishes a magazine of short stories. He keeps track of the number of copies (y) of the magazine he has sold after each of the first x days. After 1 day, Donovan had sold 20 copies of his magazine. After 2 days, he had sold 32 copies of his magazine. He connects these two points with a straight line to estimate his future sales. What is the equation of the line Donovan drew?

(A) $y - 32 = 12(x - 20)$
(B) $y - 20 = 12(x - 2)$
(C) $y - 20 = 12(x - 1)$
(D) $y - 2 = 12(x - 1)$

29. Ms. Madero sells tables. She charges $26 per square foot of the tabletop and charges a fixed fee of $75. Which equation could be used to find the area (x), in square feet, of the tabletop of a table that Ms. Madero sells for $244?

(A) $26x + 75 = 244$ (B) $26x = 75 + 244$ (C) $75x + 26 = 244$ (D) $75x = 26 + 244$

30. The width of a rectangle is 3 less than twice the length, x. If the area of the rectangle is 43 square feet, which equation can be used to find the length, in feet?

(A) $2x(x - 3) = 43$ (B) $x(3 - 2x) = 43$
(C) $2x + 2(2x - 3) = 43$ (D) $x(2x - 3) = 43$

31. An amusement park has a group rate. The amusement park charges $14 for each of the first 10 people in the group and $12 for each additional person. The equation shown below represents this situation for a group that recently visited the amusement park.

$$20 + 12x = 236$$

What does the solution of the given equation represent?

(A) the amount paid by the group
(B) the number of people in the group
(C) the number of people in the group who paid exactly $12 each
(D) the amount paid in all by the people in the group who paid exactly $12 each

32. The graph of the equation $2x + 6y = 4$ passes through point (x,-2). What is the value of x?
(A) −4   (B) 8   (C) 16   (D) 4

33. Which point lies on the line whose equation is $2x - 3y = 9$?
(A) (−1,−3)   (B) (−1, 3)   (C) (0, 3)   (D) (0,−3)

34. Solve the equation below for x.

$$2(6 + 2x) = 8x$$

(A) $x = 1$ (B) $x = 2$ (C) $x = 3$ (D) $x = 6$

35. Rhonda has $1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine x, the number of nickels she has?
(A) $0.05(x + 6) + 0.10x = 1.35$ (B) $0.05x + 0.10(x + 6) = 1.35$
(C) $0.05 + 0.10(6x) = 1.35$ (D) $0.15(x + 6) = 1.35$

36. Mr. Allen sells fruit trees to raise money for charity. He sells each fruit tree for the same amount. He also donates a fixed amount of money to the charity in addition to his fruit tree sales. The equation shown below represents his sales and donation to charity last week.

$$45.75x + 2,500 = 6,526$$

The solution to Mr. Allen's equation is $x = 88$. What does the solution represent?

(A) Mr. Allen sold each fruit tree for $88.
(B) Mr. Allen sold 88 fruit trees last week.
(C) Mr. Allen gave a total of $8,800 to charity last week.
(D) Mr. Allen's fixed amount that he gave to charity was $88.

37. Max is paid a salary of $225 a week plus 2.5% commission on his total sales. Write an equation for P, Max's pay for one week, in terms of T, his weekly total sales.

Use this equation to determine his total pay for a week in which his total sales are $4,650.

38. Kevin delivers groceries to people's homes. He charges a fixed rate per mile and also a fixed delivery fee. When Kevin makes a 10-mile trip to deliver groceries, he charges $11. When he makes a 5-mile trip to deliver groceries, he charges $8.25. Which equation could be used to determine the amount of money (y), in dollars, Kevin will charge when he makes a trip of x miles to deliver groceries?
(A) $y = 0.55x + 5.5$ (B) $y = 0.8x + 3$ (C) $y = x + 1$ (D) $y = 2x - 1.75$

39. What is the value of n in the equation $3n - 8 = 32 - n$?
(A) -10 (B) -6 (C) 6   (D) 10

40. What is the value of w in the equation $\frac{1}{2} w + 7 = 2w - 2$?

(A) 6   (B) 2   (C) $3\frac{1}{3}$ (D) 3.6

41. What is the value of x in the equation $6(x - 2) = 36 - 10x$?
(A) -6 (B) 1.5   (C) 3   (D) 6

42. Solve for x: $5(x - 2) = 2(10 + x)$

43. What is the value of x in the equation 5 - 3x = - 7?

(A) $-\dfrac{2}{3}$ (B) $\dfrac{2}{3}$ (C) −4   (D) 4

44. If 3(x + 2) - 2(x + 1) = 8, the value of x is

(A) 1   (B) $\dfrac{1}{5}$ (C) 5   (D) 4

45. If $x + y$ = -10 and $x - y$ = 2, what is the value of x?
(A) −6   (B) 6   (C) −4   (D) 4

46. If 2(x + 3) = x + 10, then x equals
(A) 14   (B) 7   (C) 5   (D) 4

47. If 3($x - 2$) = 2x + 6, the value of x is
(A) 0   (B) 5   (C) 12   (D) 20

48. Which property of real numbers is illustrated by the equation $-\sqrt{3} + \sqrt{3} = 0$?
(A) additive identity   (B) commutative property of addition
(C) associative property of addition   (D) additive inverse

49. Debbie solved the linear equation 3(x + 4) − 2 = 16 as follows:

[Line 1] $3(x + 4) - 2 = 16$

[Line 2] $3(x + 4) = 18$

[Line 3] $3x + 4 = 18$

[Line 4] $3x = 14$

[Line 5] $x = 4\dfrac{2}{3}$

She made an error between lines

(A) 1 and 2   (B) 2 and 3   (C) 3 and 4   (D) 4 and 5

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50. Marta solved an equation. Her work is shown below.

equation: $2(x - 4) + 2x = x + 7$
line 1: $2x - 8 + 2x = x + 7$
line 2: $4x - 8 = x + 7$
line 3: $3x - 8 = 7$
line 4: $3x = 15$
line 5: $x = 5$

Which step in Marta's work is justified by the distributive property?

(A) from the equation to line 1
(B) from line 1 to line 2
(C) from line 2 to line 3
(D) from line 4 to line 5

51. Victoria is solving the equation $\frac{2}{3}x - 3 = 4\frac{1}{5}$. Some of her steps are shown below.

- equation 1: $\frac{2}{3}x - 3 = 4\frac{1}{5}$

- equation 2: $\frac{2}{3}x - 3 = \frac{21}{5}$

- equation 3: $\frac{2}{3}x - 3 + 3 = \frac{21}{5} + 3$

Which statement correctly explains whether equation 3 in Victoria's work is valid in solving the equation?

(A) It is valid because -3 + 3 = 0.

(B) It is not valid because Victoria did not also add 3 to $\frac{2}{3}x$.

(C) It is not valid because Victoria should subtract 3 instead of adding 3.

(D) It is valid because Victoria added the same amount to each side of the equation.

52. Which property is illustrated by the equation $\frac{3}{2}x + 0 = \frac{3}{2}x$?
(A) commutative property of addition
(B) distributive property
(C) additive inverse property
(D) additive identity property

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53. Perform the indicated tasks.

Part A. In the table below, identify the algebraic property that justifies each step of solving the equation $3(x - 2) = 5x$.

	$3(x - 2) = 5x$	Algebraic Property
equation 1:	$3x - 6 = 5x$	
equation 2:	$-6 = 2x$	
equation 3:	$-3 = x$	

Part B. Show how to solve the equation $5(x - 2) = 10x + 20$ by first using the multiplicative property of equality and then using the additive property of equality.

54. Perform the indicated operation: $-6(a - 7)$

State the name of the property used.

55. Which equation illustrates the associative property of addition?
(A) $x + y = y + x$ (B) $3(x + 2) = 3x + 6$
(C) $(3 + x) + y = 3 + (x + y)$ (D) $3 + x = 0$

56. Which expression is an example of the associative property?

(A) $(x + y) + z = x + (y + z)$ (B) $x + y + z = z + y + x$

(C) $x(y + z) = xy + xz$ (D) $x \times 1 = x$

57. Mary is solving the equation $3(x + 4) = 7x - 20$. The first thing she does is rewrite the equation as shown below.
$$3x + 12 = 7x - 20$$

Which property did Mary use to get from the original equation to her rewritten equation?

(A) associative property of multiplication
(B) commutative property of multiplication
(C) distributive property
(D) multiplicative property of equality

58. The statement 2 + 0 = 2 is an example of the use of which property of real numbers?

    (A) associative (B) additive identity (C) additive inverse (D) distributive

59. If M and A represent integers, $M+A=A+M$ is an example of which property?
    (A) commutative (B) associative (C) distributive (D) closure

60. Which equation illustrates the associative property?
    (A) a(1) = a   (B) a + b = b + a
    (C) a(b + c) = (ab) + (ac)   (D) (a + b) + c = a + (b + c)

61. Which property is illustrated by the equation 6 + (4 + x) = 6 + (x + 4)?
    (A) associative property of addition   (B) associative property of multiplication
    (C) distributive property   (D) commutative property of addition

62. Which property is represented by the statement $\frac{1}{2}$ (6a + 4b) = 3a + 2b?
    (A) commutative (B) distributive (C) associative (D) identity

63. Tony is solving the equation 4x = 12x + 20 for x. Tony uses the multiplicative property of equality to rewrite the equation as x = 3x + 20. Which statement correctly explains whether Tony used the property correctly?

    (A) Tony used the property correctly because he multiplied every term containing x by $\frac{1}{4}$.
    (B) Tony used the property correctly because he multiplied one term on each side of the equals sign by $\frac{1}{4}$.
    (C) Tony did not use the property correctly because he did not multiply every term on both sides of the equals sign by $\frac{1}{4}$.
    (D) Tony did not use the property correctly because he should have multiplied both sides of the equals sign by $\frac{1}{12}$, not $\frac{1}{4}$.

26

A1.1.2.2 Write, solve, and/or graph systems of linear equations using various methods.

1. What is the value of the y-coordinate of the solution to the system of equations $x + 2y = 9$ and $x - y = 3$?

   (A) 6   (B) 2   (C) 3   (D) 5

2. What is the value of the y-coordinate of the solution to the system of equations $x - 2y = 1$ and $x + 4y = 7$?

   (A) 1   (B) −1   (C) 3   (D) 4

3. Rafael plays a trivia game with 2 rounds. In the first round, he earns 5 points for answering a question correctly and loses 3 points for answering a question incorrectly. In the second round, he earns 10 points for answering a question correctly and loses 4 points for answering a question incorrectly. The equations below represent Rafael's performance in each round.

$$5x - 3y = 22$$
$$10x - 4y = 46$$

Which condition **must** be true to make the pair of equations a system of equations?

   (A) He answers a total of 15 questions correctly.
   (B) He answers the same number of questions correctly as he answers incorrectly in each round.
   (C) He answers twice as many questions correctly in the second round as he answers correctly in the first round.
   (D) He answers the same number of questions correctly in both rounds and the same number of questions incorrectly in both rounds.

4. Which graph could be used to find the solution to the following system of equations?

$$y = -x + 2$$
$$y = x^2$$

(A)

(B)

(C)

(D)
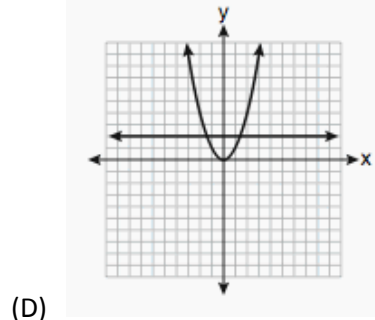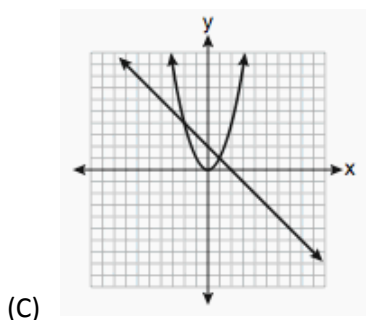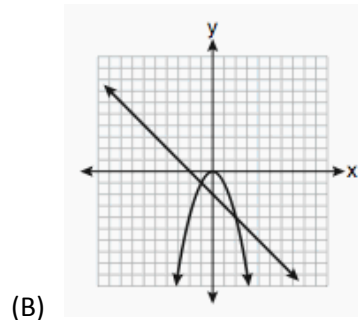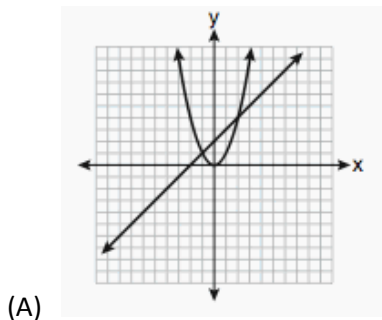
5. Which ordered pair satisfies the system of equations below?

$$3x - y = 8$$
$$x + y = 2$$

(A) (3,–1)   (B) (2.5,–0.5)   (C) (2.5,0.5)   (D) (5,–3)

6. If $a + 3b = 13$ and $a + b = 5$, the value of b is

(A) 1   (B) 7   (C) 4.5   (D) 4

7. Solve the following system of equations algebraically or graphically for x and y :

$$y = x^2 - 4x + 3$$
$$y = x - 1$$
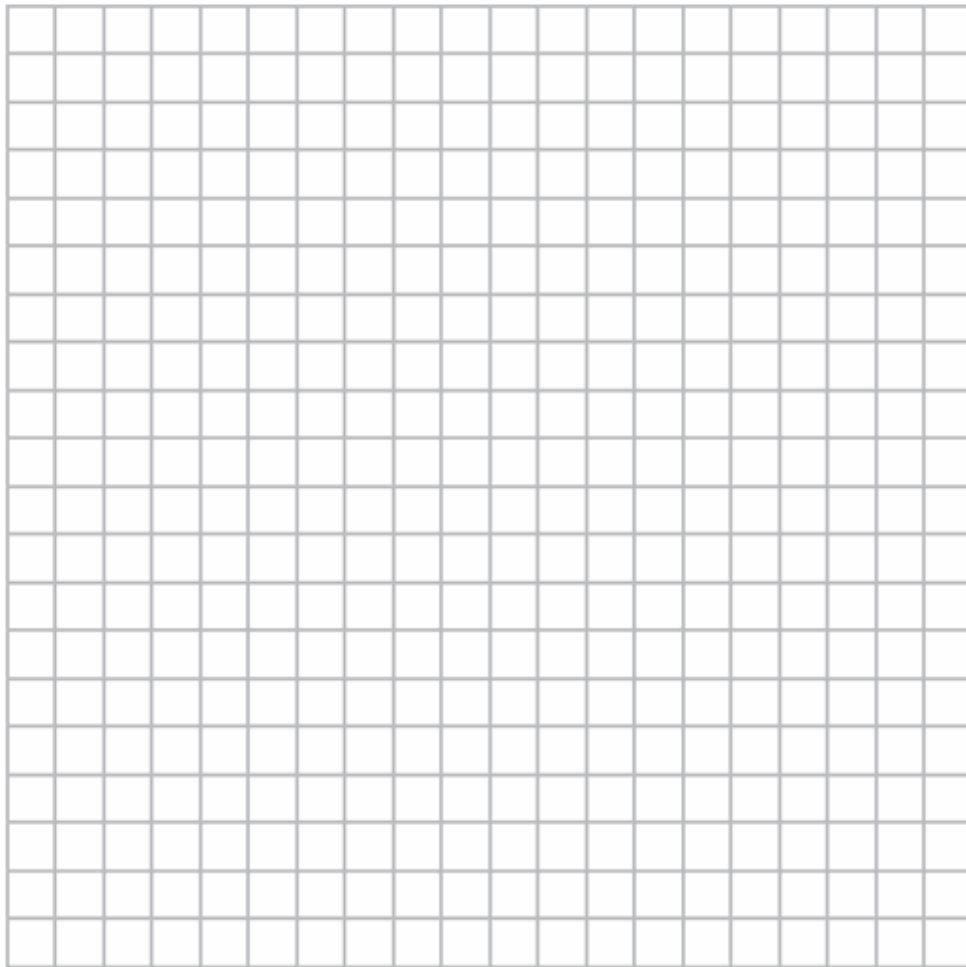
8. What is the value of the y-coordinate of the solution to the system of equations $2x + y = 8$ and $x - 3y = -3$?

(A) –2   (B) 2   (C) 3   (D) –3

9. Find the value of a in the equation below.

$$3a + 2 = a - 6$$

(A) 4   (B) 2   (C) −2   (D) −4

10. Eric works at a food cart that sells hamburgers and hot dogs. Each hamburger costs $4.75 and each hot dog costs $3.75. On Monday afternoon, he sold a total of 84 hamburgers and hot dogs and collected a total of $339. Which system of equations could be used to find the number of hamburgers (x) Eric sold on Monday afternoon?

(A) $x + y = 84$
    $4.75x + 3.75y = 339$

(B) $x + y = 84$
    $3.75x + 4.75y = 339$

(C) $x + y = 339$
    $4.75x + 3.75y = 84$

(D) $x + y = 339$
    $3.75x + 4.75y = 84$

11. On the grid below, solve the system of equations graphically for x and y.

$$4x - 2y = 10$$
$$y = -2x - 1$$
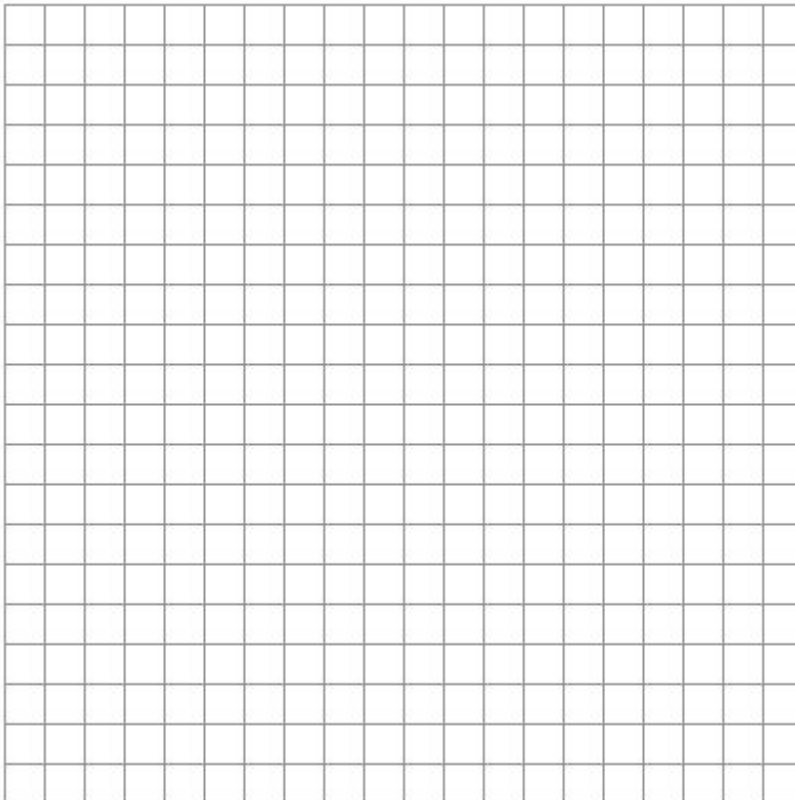
12. Carl and Laura are reading different copies of the same book. Carl has already read 10 pages of his copy of the book when Laura begins reading her copy of the book. A system of equations can be used to compare the number of pages (y) each person has read x minutes after Laura begins reading her copy of the book. The solution to the system of equations is (40, 50). What does the solution (40, 50) represent in this situation?

(A) Carl has read 40 pages and Laura has read 50 pages.
(B) Carl has read 50 pages and Laura has read 40 pages.
(C) Carl and Laura have both read 40 pages after Laura has been reading for 50 minutes.
(D) Carl and Laura have both read 50 pages after Laura has been reading for 40 minutes.

13. The lines drawn on the coordinate plane below represent a system of linear equations.
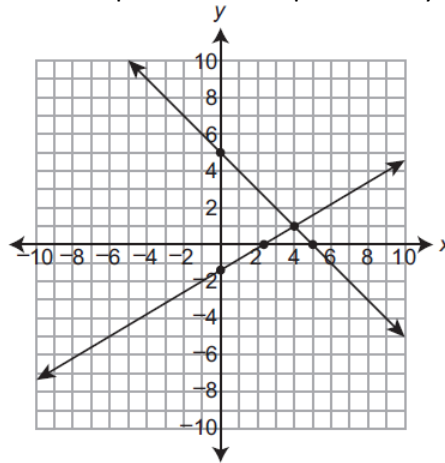
How many of the 5 points that are plotted on the coordinate plane are solutions of the system of linear equations?

(A) 1   (B) 2   (C) 4   (D) 5

14. Solve the following system of equations algebraically:

$$3x + 2y = 4$$
$$4x + 3y = 7$$

15. A company buys gold. On Thursday, the company bought 4.75 ounces of gold. On Friday, the company bought 9.35 ounces of gold. The company paid $15 more per ounce on Friday than on Thursday. The company spent a total of $17,060.25 buying gold on Thursday and Friday. The system of equations shown below represents this situation.

$$4.75x + 9.35y = 17,060.25$$
$$x + 15 = y$$

What does the y-value of the solution of the system of equations represent?

(A) The price per ounce of gold on Friday.
(B) The price per ounce of gold on Thursday.
(C) The number of ounces of gold the company bought on Friday.
(D) The number of ounces of gold the company bought on Thursday.

A1.1.3.1 Write, solve, and/or graph linear inequalities using various methods.

1. The number line below represents all the possible distances, in miles, Peter runs each week while preparing for a race.

   Peter's Weekly Running Distances

   Distance (miles)
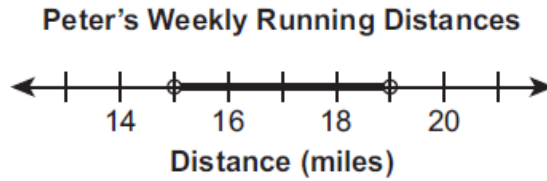
   What does the solution set shown on the number line represent in this situation?

   (A) Peter always runs 19 miles each week.
   (B) Peter never runs less than 19 miles in a week.
   (C) Peter never runs more than 15 miles in a week.
   (D) Peter always runs between 15 miles and 19 miles each week.

2. If $t < \sqrt{t}$, t could be

   (A) 0   (B) 2   (C) $\frac{1}{2}$ (D) 4

3. The statement "$x \geq 4$ and $2x - 4 < 6$" is true when x is equal to
   (A) 1   (B) 10   (C) 5   (D) 4

4. Which graph represents the solution set for the expression $|2x + 3| > 7$?

   (A)   (B)

   (C)   (D)
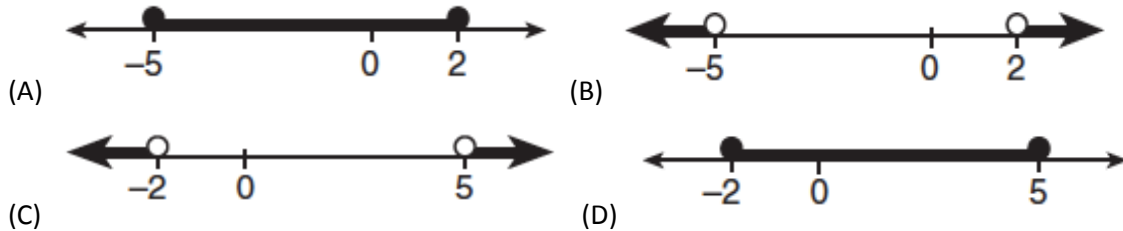
5. Which number line shows the solution to the inequality $-6 < x < 4$?

   (A)

   (B)

   (C)

   (D)
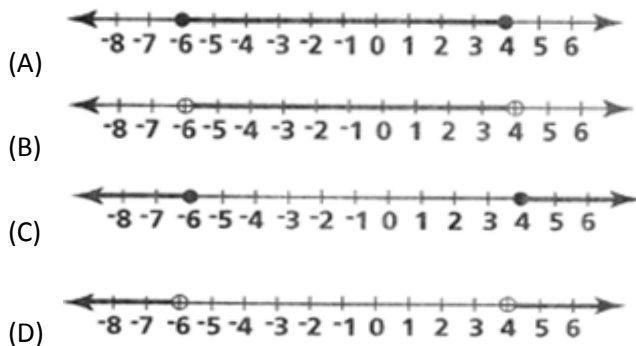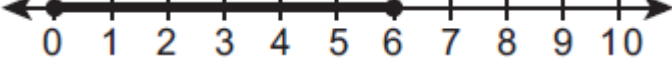
6. Graph the solution set for the inequality $4x - 3y > 9$ on the set of axes below.

   Determine if the point $(1,-3)$ is in the solution set. Justify your answer.

7. Which value of x is in the solution set of the inequality $-2(x - 5) < 4$?
   (A) 0   (B) 2   (C) 3   (D) 5

8. The statement "$a > 2$ and $a < 5$" is true when a is equal to
   (A) 10   (B) 2   (C) 3   (D) 5
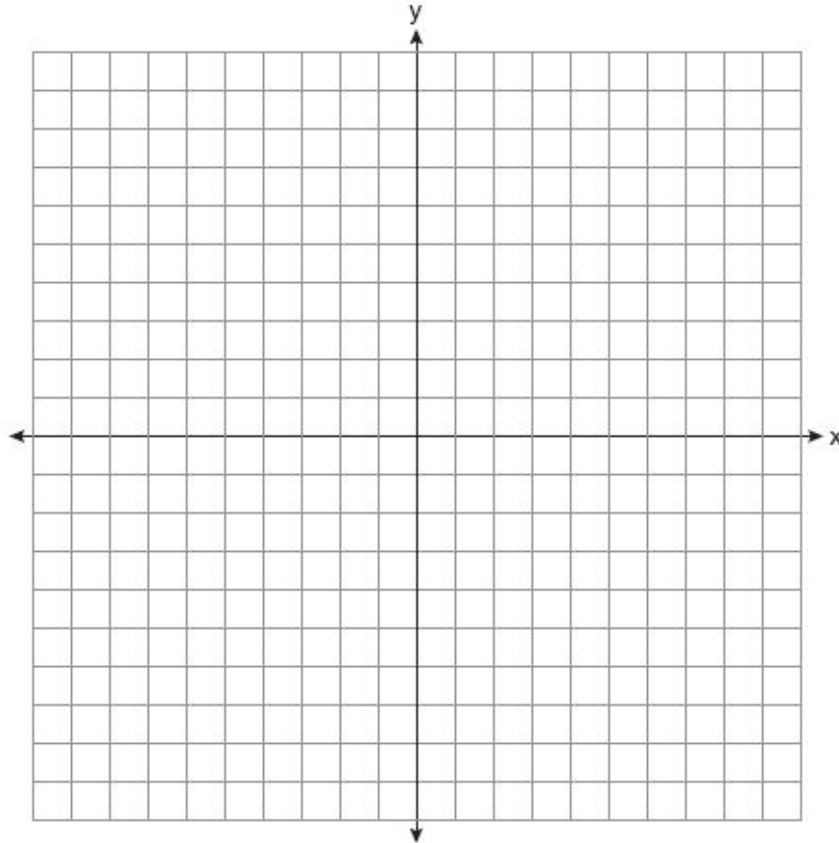
9. Jana scored 29 goals last hockey season. This hockey season, she scored 0 goals in 22 games, 1 goal in each of 16 games, and 2 goals in each of the remaining games. She scored fewer goals this season than last season. Which number line **best** represents all the possible numbers of games in which Jana scored 2 goals this season?

(A)

(B)

(C)

(D)

10. Which graph represents the solution of $3y - 9 \le 6x$?
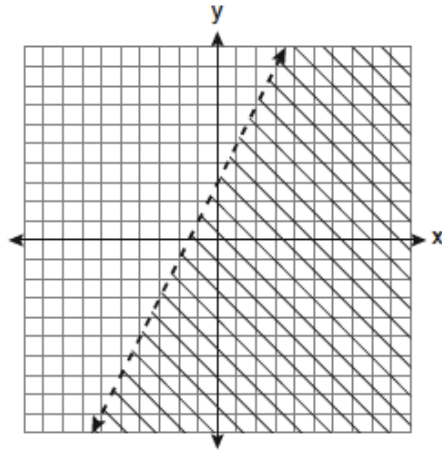
(A)
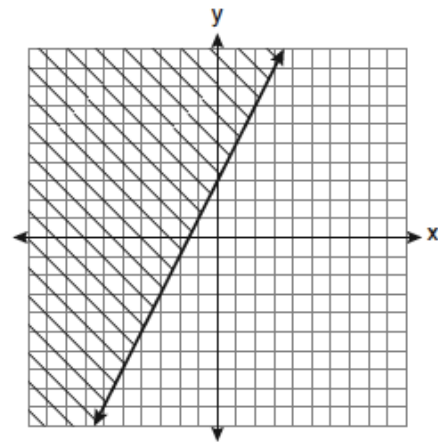
(B)
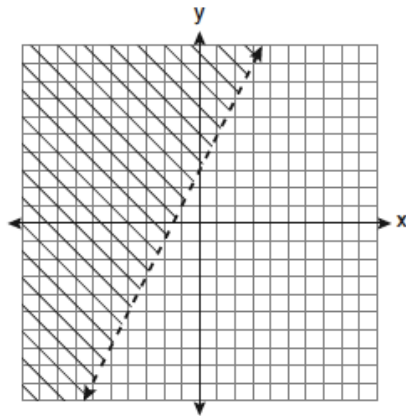
(C)
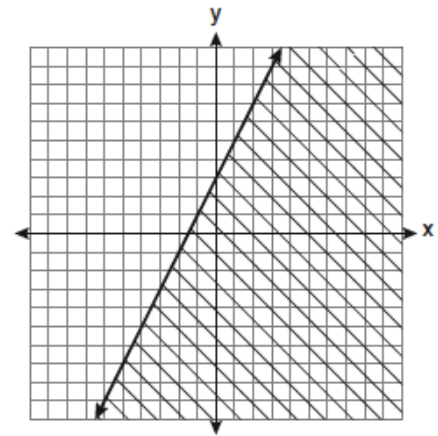
(D)

11. What is the solution set of the inequality $|3 - 2x| \ge 4$?

(A) $\left\{x \mid \frac{7}{2} \le x \le -\frac{1}{2}\right\}$

(B) $\left\{x \mid -\frac{1}{2} \le x \le \frac{7}{2}\right\}$

(C) $\left\{x \mid x \le -\frac{1}{2} \text{ or } x \ge \frac{7}{2}\right\}$

(D) $\left\{x \mid x \le \frac{7}{2} \text{ or } x \ge -\frac{1}{2}\right\}$

12. Perform the indicated operations.

The number line below represents the solution set of an absolute value inequality of the form $|x + b| < c$.

-5 -4 -3 -2 -1 0 1 2 3 4 5
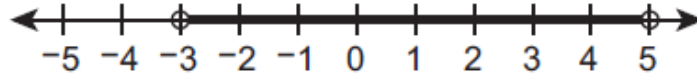
A. On the number line shown below, graph the solution set of $2x + 7 < 3x - 1$.

0 1 2 3 4 5 6 7 8 9 10
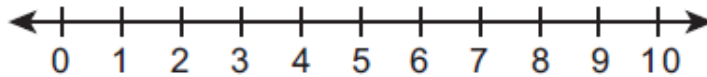
B. On the number line shown below, graph the solution set of $5 \le 2x + 1 < 9$.

0 1 2 3 4 5 6 7 8 9 10
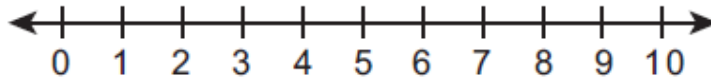
C. Write the absolute value inequality that has the solution set graphed on the number line.

D. Show that the solution set of $|5x + 4| \ge 13$ is $x \le -3.4$ or $x \ge 1.8$.

13. Which inequality is shown in the accompanying diagram?
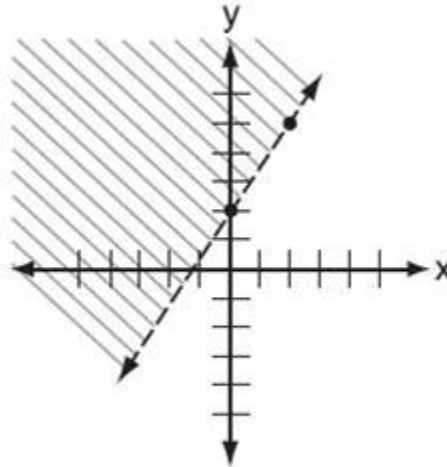
(A) $y > \dfrac{3}{2}x + 2$ (B) $y < \dfrac{3}{2}x + 2$ (C) $y \ge \dfrac{3}{2}x + 2$ (D) $y \le \dfrac{3}{2}x + 2$

14. Alicia walks and runs for exercise. She has a maximum amount of time she will spend each week running. She walks at a speed of 0.064 miles per minute and runs at a speed of 0.08 miles per minute. The inequality graphed below shows all possible combinations of minutes Alicia will spend walking and running each week.

Alicia's Exercise
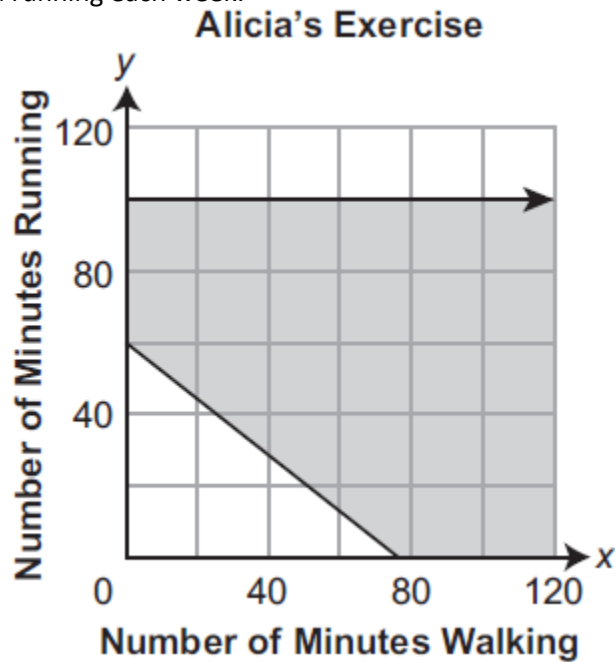
Based on the graph, which statement is true?

(A) Alicia will not run more than 100 minutes each week and will walk or run at least 4.8 miles each week.

(B) Alicia will not walk more than 100 minutes each week and will walk or run at least 4.8 miles each week.

(C) Alicia will spend no more than 100 minutes walking or running combined and will walk or run at least 6.4 miles each week.

(D) Alicia will spend no more than 100 minutes walking or running combined and will walk or run no more than 8 miles each week.

15. Pat said that the amount of money he has in his pocket is greater than or equal to $5.75 but less than $13.00. Which number line shows the amount of money Pat might have?

(A)

(B)

(C)

(D)

35
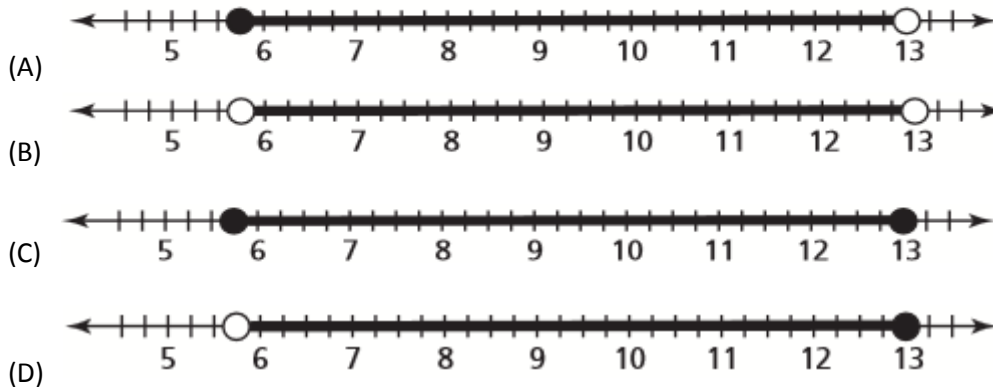
16. Maureen tracks the range of outdoor temperatures over three days. She records the following information.

Day 1:

−20°F   40°F

Day 2:

0°F   50°F

Day 3:

−23°F   45°F
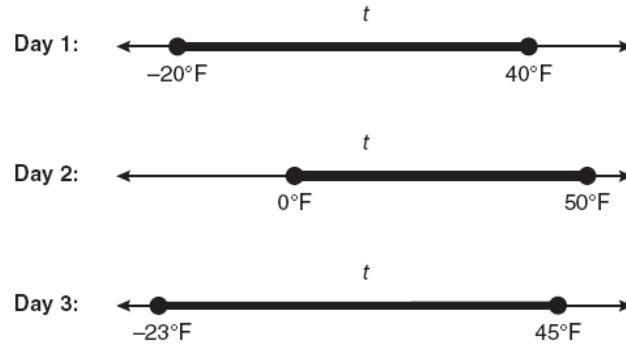
Express the intersection of the three sets as an inequality in terms of temperature, t.

17. Peter begins his kindergarten year able to spell 10 words. He is going to learn to spell 2 new words every day.

Write an inequality that can be used to determine how many days, d, it takes Peter to be able to spell *at least* 75 words.

Use this inequality to determine the minimum number of whole days it will take for him to be able to spell *at least* 75 words.

18. Hannah has a 50-gallon saltwater aquarium. Her fish are healthy when the percentage of salt in the water is between 1.02% and 1.04%. Which compound inequality represents all the possible values of the number of gallons of salt (x) that should be in the aquarium to keep the fish healthy?
(A) $0.51 < x < 0.52$ (B) $0.97 < x < 0.99$ (C) $1.02 < x < 1.04$ (D) $1.07 < x < 1.09$

19. An inequality is shown below.
$$16 \leq 12x + 4 \leq 20$$

What is the solution set of the inequality?

(A) $1 \leq x \leq 1\frac{1}{3}$

(B) $1\frac{2}{3} \leq x \leq 2$

(C) $12 \leq x \leq 16$

(D) $16 \leq x \leq 20$

20. The gas tank in Lou's car holds 13 gallons of gasoline. There are already 7 gallons of gasoline in the tank. He is putting gasoline that costs $2.50 per gallon in his car. Lou spends x dollars putting gasoline in his car. Which number line shows all the possible amounts Lou spends?

(A)
```
◄─●─┼─┼─┼─●─┼─┼─┼─┼─┼─┼─►
  0  2  4  6  8 10 12 14 16 18 20
```

(B)
```
◄─●─┼─┼─┼─●─┼─┼─┼─┼─┼─┼─►
  0  2  4  6  8 10 12 14 16 18 20
```

(C)
```
◄─●─┼─┼─┼─┼─┼─┼─●─┼─┼─┼─►
  0  2  4  6  8 10 12 14 16 18 20
```

(D)
```
◄─●─┼─┼─┼─┼─┼─┼─┼●─┼─┼─►
  0  2  4  6  8 10 12 14 16 18 20
```
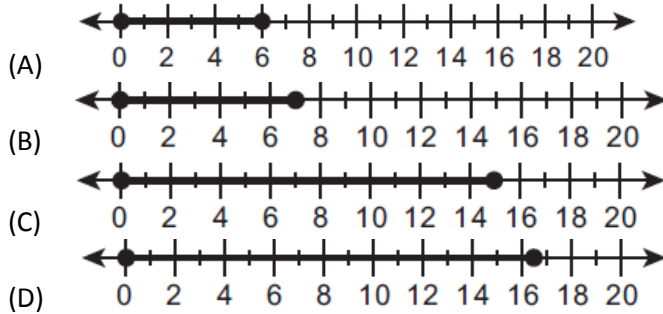
21. A band earns $1,500 for playing a show. It also earns a portion of the selling price of each ticket. Every ticket costs the same amount. The band will not earn more than $4,375 total, as shown by the inequality below.

$$1{,}500 + 12.5x \le 4{,}375$$

What does the solution to the inequality represent?

(A) There will be no more than 230 tickets sold.
(B) There will be no more than 1,150 tickets sold.
(C) The band can earn no more than $230 from ticket sales.
(D) The band can earn no more than $1,150 from ticket sales.

22. What is the solution of $3(2m - 1) \le 4m + 7$?
(A) $m \le 5$ (B) $m \ge 5$ (C) $m \le 4$ (D) $m \ge 4$

23. Jaime is cutting strips of ribbon for a project. He tries to cut each piece to be 12 inches long, but sometimes he cuts it too long or too short by as much as 0.25 inch. Which inequality describes all the possible lengths (x), in inches, of the ribbons Jaime cut?
(A) $|0.25 - x| \le 12$ (B) $|12 - 0.25| \le x$ (C) $|12 + 0.25| \le x$ (D) $|12 - x| \le 0.25$

24. Nina is a photographer. She intends to sell her photographs at an art show for $2.50 each. She spent $14.00 to have her photographs printed. She created the inequality below to represent this situation.

$$2.50x - 14.00 > 0$$

What is represented by the solution set of Nina's inequality?

(A) the number of photographs Nina sold at the show
(B) the number of photographs Nina has for sale at the show
(C) the number of photographs Nina has left over after the show
(D) the number of photographs Nina needs to sell at the show to earn a profit

25. Which quadrant will be completely shaded in the graph of the inequality $y \le 2x$?
(A) Quadrant I   (B) Quadrant II   (C) Quadrant III   (D) Quadrant IV

26. Mrs. Smith wrote "Eight less than three times a number is greater than fifteen" on the board. If *x* represents the number, which inequality is a correct translation of this statement?
    (A) $3x - 8 > 15$ (B) $3x - 8 < 15$ (C) $8 - 3x > 15$ (D) $8 - 3x < 15$

27. Which value of *a* does *not* satisfy the inequality $|a| > 2a - 3?$
    (A) −1 (B) 0 (C) 3 (D) −5

28. Solve the inequality below for y and graph the solution set on the number line provided.

    $3y + 45 \leq 54$
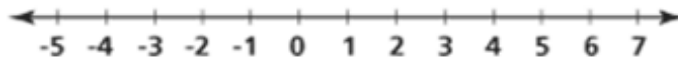
29. Lucy flies a model helicopter. She estimates that it will take her helicopter at least 6 minutes to travel a distance of 10,000 feet. She writes the inequality shown below.

    $10,000 \geq 6x$

    What does *x* represent in Lucy's inequality?

    (A) the minimum speed, in miles per hour, of her helicopter
    (B) the minimum speed, in feet per minute, of her helicopter
    (C) the maximum speed, in miles per hour, of her helicopter
    (D) the maximum speed, in feet per minute, of her helicopter

30. The number line below represents the lengths, in inches, of fish that can be kept when caught on a certain lake.

    Lengths of Fish That Can Be Kept
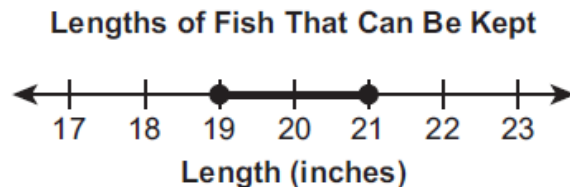
    Length (inches)

What does the solution set shown on the number line represent in this situation?

    (A) A fish can be kept if its length is less than 19 inches or greater than 21 inches.
    (B) A fish can be kept if its length is less than 19 inches and greater than 21 inches.
    (C) A fish can be kept if its length is at least 19 inches or not greater than 21 inches.
    (D) A fish can be kept if its length is at least 19 inches and not greater than 21 inches.

31. Alex works about 30 hours each week. He may work as many as 3 hours more or 3 hours less each week. Which inequality represents all the possible numbers of hours (*x*) that Alex could work in one week?
    (A) $27 < x < 33$ (B) $27 \leq x \leq 33$ (C) $30 < x < 33$ (D) $30 \leq x \leq 33$

32. Michelle can spend no more than 4 hours studying each night. Which number line represents all the possible numbers of hours Michelle can spend studying each night?

(A)

(B)

(C)

(D)
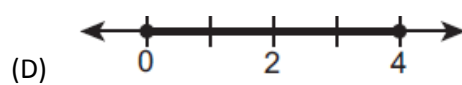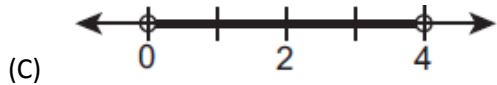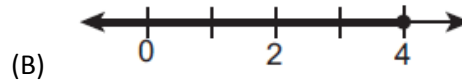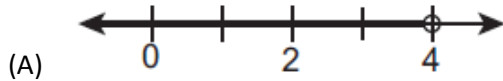
33. Jason customizes and sells water bottles. He must sell each water bottle for more than $15 to make a profit. Which number line represents all the possible prices for which Jason could sell a water bottle and make a profit?

(A)

Price ($)

(B)

Price ($)

(C)

Price ($)

(D)

Price ($)
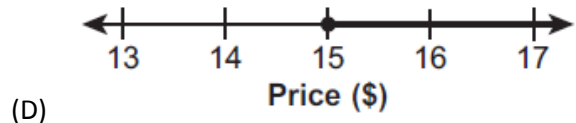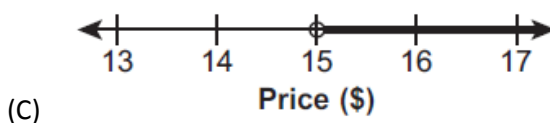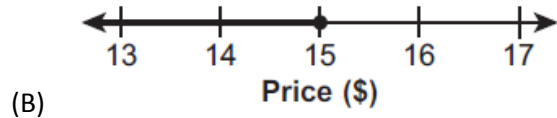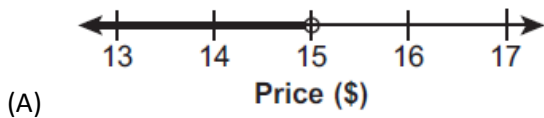
34. Students in a ninth grade class measured their heights, h, in centimeters. The height of the shortest student was 155 cm, and the height of the tallest student was 190 cm. Which inequality represents the range of heights?

(A) $155 < h < 190$ (B) $155 \leq h \leq 190$ (C) $h \geq 155$ or $h \leq 190$ (D) $h > 155$ or $h < 190$

A1.1.3.2 Write, solve, and/or graph systems of linear inequalities using various methods.

1. Amy repairs cars and trucks. Last year, she repaired more cars than trucks. She also repaired at least 14 cars and trucks in all. To represent this situation, Amy wrote the system of inequalities shown below.

$$x > y$$
$$x + y \geq 14$$

What does the solution (9, 7) represent in Amy's system?

(A) Amy repaired 9 cars and 7 trucks last year.
(B) Amy repaired 9 trucks and 7 cars last year.
(C) Amy repaired 9 vehicles last year, 7 of which were cars.
(D) Amy repaired 9 vehicles last year, 7 of which were trucks.

2. Craig earns at least $100 each week. He works no more than 18 hours each week. He earns $5 per hour mowing lawns and $7 per hour tutoring. Which graph shows all the possible hours Craig can work mowing lawns and tutoring in a week?

(A)

(B)

(C)

(D)
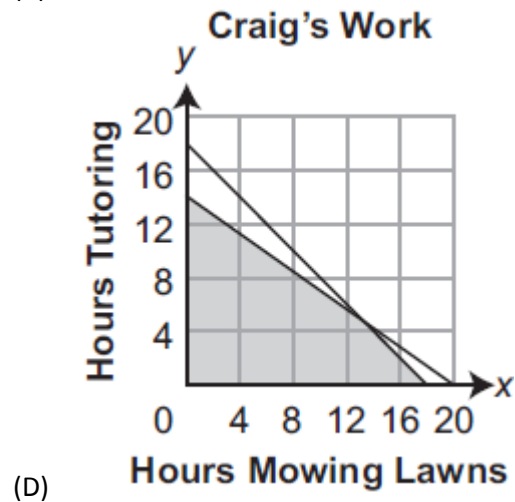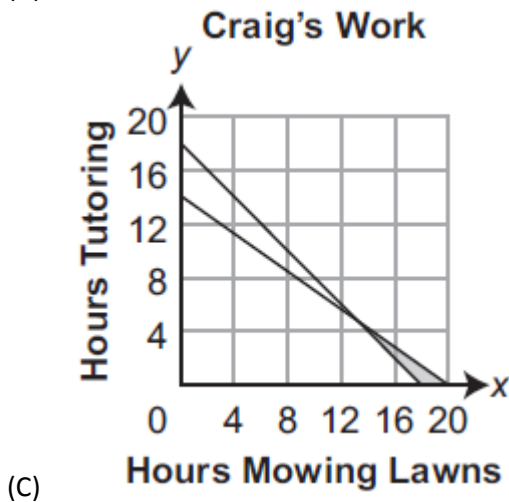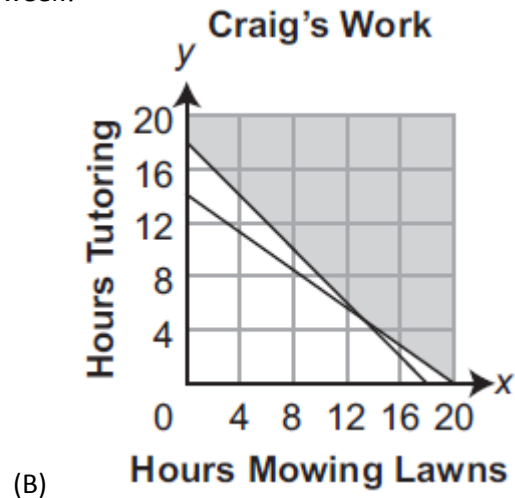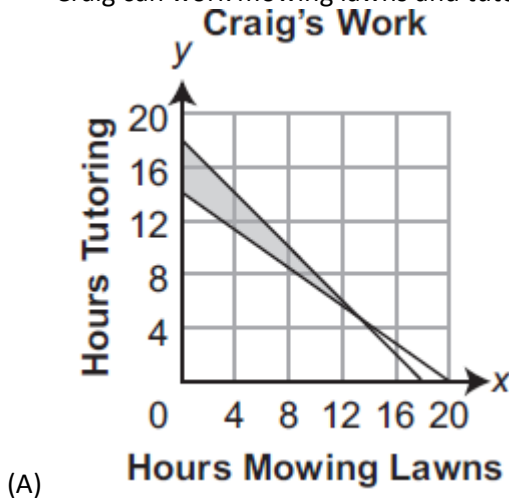
3. Which ordered pair is in the solution set of the following system of inequalities?

$$y < \frac{1}{2}x + 4$$

$$y \geq -x + 1$$

(A) (−5,3)   (B) (0,4)   (C) (3,−5)   (D) (4,0)

4. A farmer uses strawberries to make strawberry jam and strawberry ice cream to sell at a local farmers' market. The farmer has a limited amount of strawberries. She sells the jam by the pint and the ice cream by the quart. She uses $1\frac{1}{4}$ cups of strawberries to make each pint of strawberry jam and 2 cups of strawberries to make each quart of strawberry ice cream. She will make more pints of strawberry jam than she will make quarts of strawberry ice cream. The system of inequalities shown below represents this situation, but the solution set of the system of inequalities has **not** been shaded in.

Strawberry Jam and
Strawberry Ice Cream
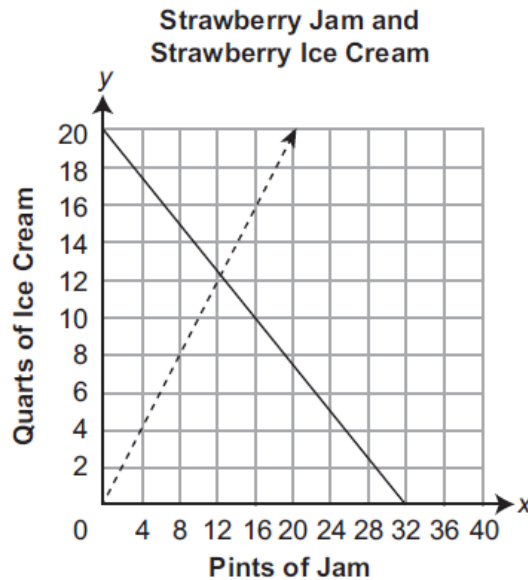
A. Shade in the solution set of the system of inequalities.

B. How many cups of strawberries does the farmer have in all?

C. What is the **maximum** number of pints of strawberry jam that can be made when the farmer makes 9 quarts of strawberry ice cream?

D. Explain why there will always be some unused strawberries when the farmer makes 6 quarts of strawberry ice cream.

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5. Which ordered pair is in the solution set of the following system of linear inequalities?

$$y < 2x + 2$$
$$y \geq -x - 1$$

(A) (0,3) (B) (2,0) (C) (−1,0) (D) (−1,−4)

6. A restaurant has a 5-gallon container of tea. The restaurant serves tea to its customers in either a small mug or a large mug. The system of linear inequalities graphed below represents all the possible combinations of amounts of tea remaining in the container after different numbers of mugs are served.

Tea Remaining
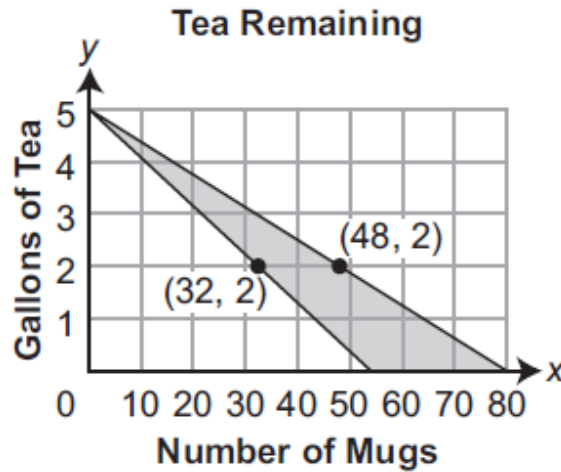
The ordered pair (30, 3) is in the solution set of the inequality.

A. How many full small mugs of tea can the restaurant serve from 1 gallon of tea?

B. How many full large mugs of tea can the restaurant serve from 5 gallons of tea?

C. Write an inequality that represents all the possible numbers of mugs (*x*) the restaurant has served when there is 1 gallon of tea remaining in the container.

D. How many of the mugs that are represented by the ordered pair (30, 3) are small mugs?

7. Victoria is a chemist. As part of an experiment, she mixes an acid with water. She wants the volume of the mixture to measure at least 8 deciliters. She also wants the mixture to be at least $\frac{2}{3}$ water. To represent this situation, Victoria draws the lines for a system of inequalities as shown below.

Victoria's Mixture
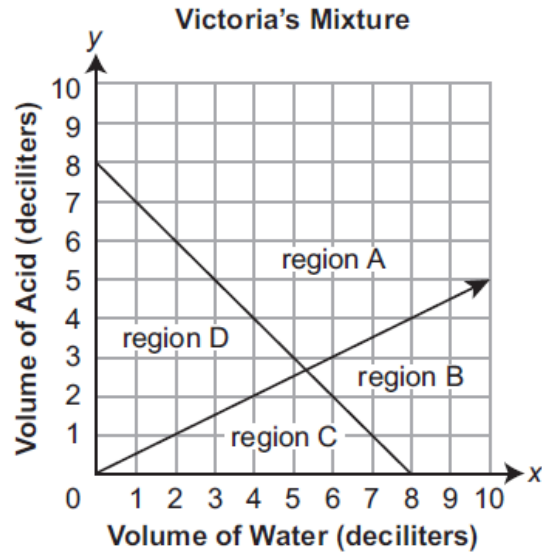
Which region of her coordinate plane should Victoria shade to represent her situation?

(A) region A   (B) region B   (C) region C   (D) region D

8. A bus can carry up to 64 people. Of the people on the bus, at least 5 must be adults. All of the people on the bus are either students or adults. Which graph shows all the possible numbers of students (*x*) and numbers of adults (*y*) that can take the bus?

People on Bus

(A)

People on Bus

(B)

People on Bus

(C)

People on Bus

(D)
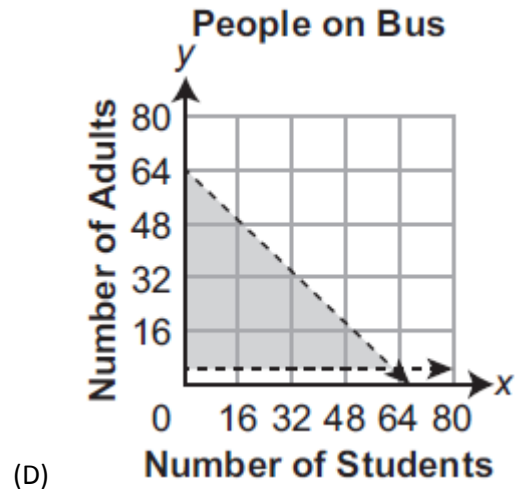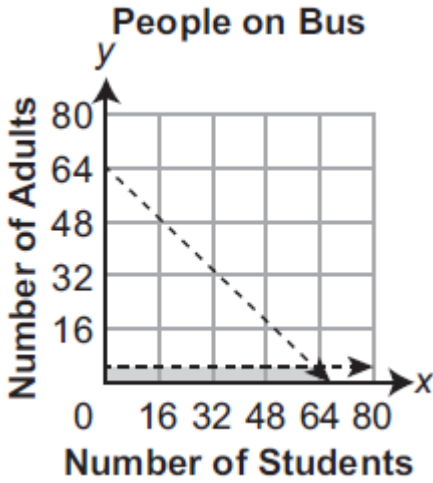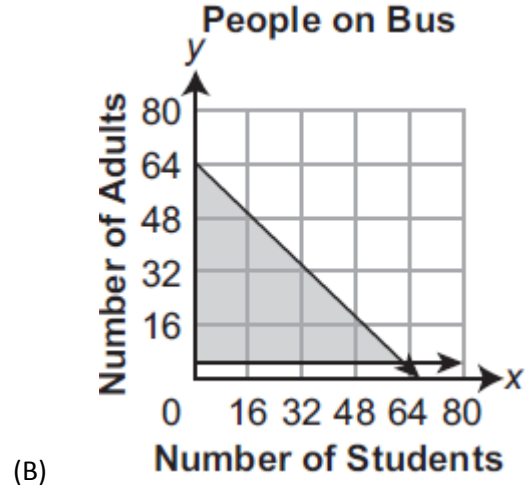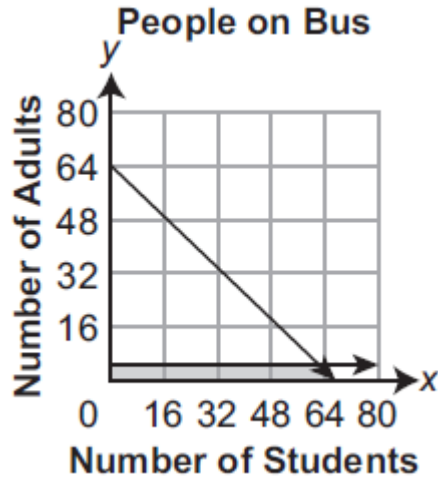
9. Andrea works at two different jobs. She works no more than 40 hours per week combined between the two jobs. At one job, she makes $12 per hour. At her other job, she makes $16 per hour. Each week she earns at least $460. Andrea writes a system of inequalities to represent this situation. One of her inequalities is shown below.

$$x + y \le 40$$

What should be the other inequality in Andrea's system of inequalities?

(A) $12x + 16y \le 40$ (B) $12x + 16y \ge 40$ (C) $12x + 16y \le 460$ (D) $12x + 16y \ge 460$

10. Which ordered pair is in the solution set of the system of linear inequalities graphed below?
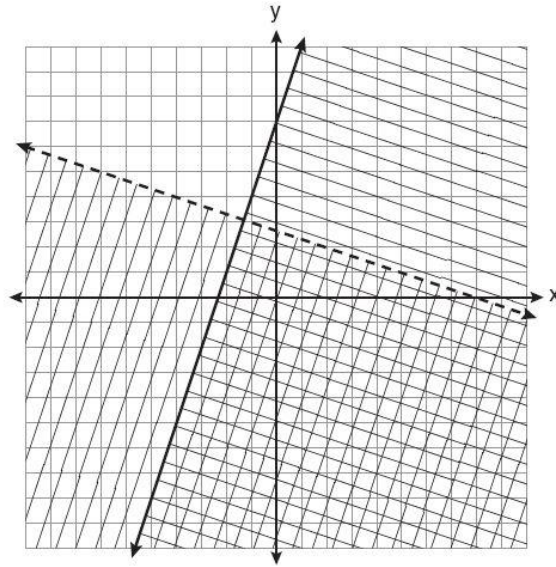
(A) (1,−4)   (B) (−5,7)   (C) (5,3)   (D) (−7,−2)

11. On the set of axes below, solve the following system of inequalities graphically.

$$y < 2x + 1 \text{ and } y \geq -\frac{1}{3}x + 4$$

State the coordinates of a point in the solution set.
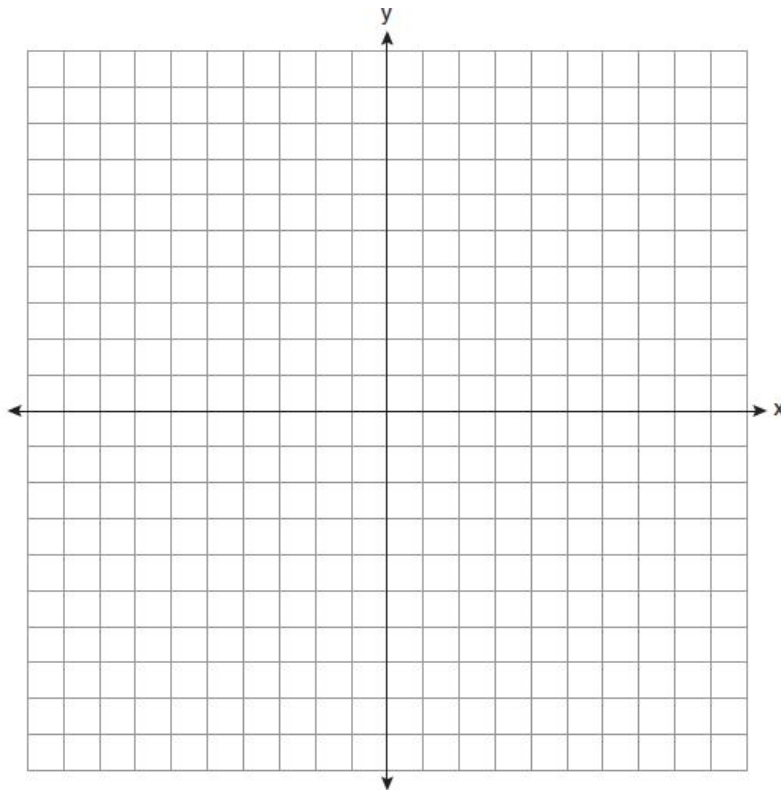
12. Eddie mows lawns and paints houses to earn extra money. He never spends more than 15 hours a week mowing lawns and painting houses. He always spends at least as much time painting houses as he does mowing lawns. Which graph shows all the possible combinations of hours Eddie could spend mowing lawns and painting houses in a week?

(A)

Eddie's Mowing and Painting

(B)

Eddie's Mowing and Painting

(C)

Eddie's Mowing and Painting

(D)

Eddie's Mowing and Painting
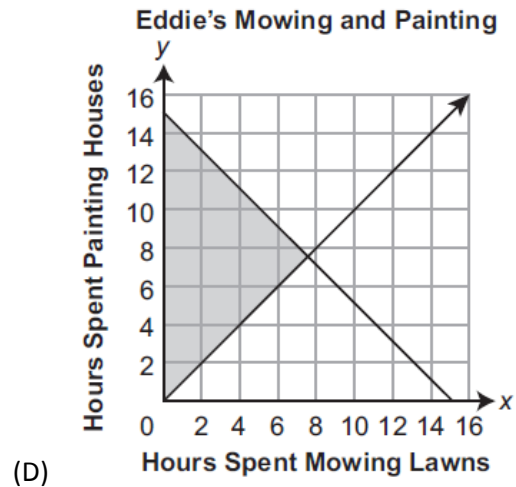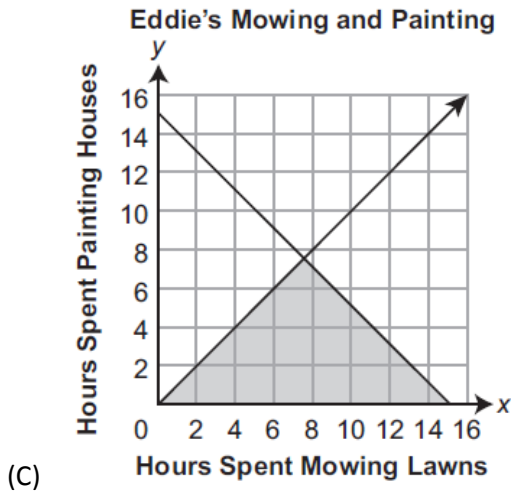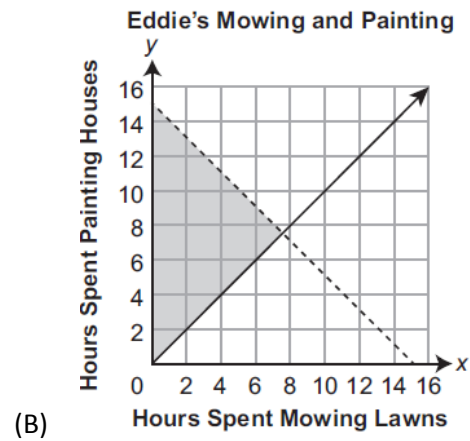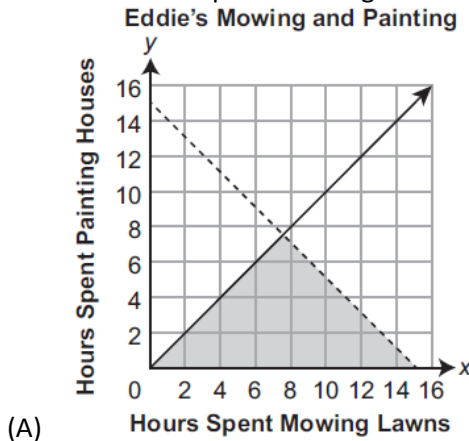
13. Natalie makes flower arrangements using tulips and lilies. She wants each arrangement to have no more than 12 flowers. She also wants each arrangment to have at least twice as many tulips as lilies. To represent the possible numbers of tulips and lilies in a flower arrangement, Natalie wrote the system of inequalities shown below.

$$x + y \leq 12$$
$$x \geq 2y$$

The point (8, 3) is a solution to the system of inequalities. What is represented by the solution (8, 3)?

(A) Natalie could make a flower arrangement with 8 lilies and 3 tulips.
(B) Natalie could make a flower arrangement with 8 tulips and 3 lilies.
(C) Natalie could make a flower arrangement with 8 flowers in total, 3 of which are lilies.
(D) Natalie could make a flower arrangement with 8 flowers in total, 3 of which are tulips.

14. Cormac uses milk and water when he makes tea. He makes sure to never have more than 2 cups of milk and water combined. He also likes the amount of milk to be less than $\frac{1}{2}$ the amount of water. He writes the system of inequalities shown below to represent this situation.

$$x + y \le 2$$

$$x < \frac{1}{2}y$$

The point $\left(\frac{1}{3}, 1\frac{1}{2}\right)$ is a solution to Cormac's system of inequalities. Which statement explains what the point $\left(\frac{1}{3}, 1\frac{1}{2}\right)$ represents?

(A) Cormac could use $\frac{1}{3}$ cup of milk and $1\frac{1}{2}$ cups of water.

(B) Cormac could use $1\frac{1}{2}$ cups of water and $\frac{1}{3}$ as much milk.

(C) Cormac could use $\frac{1}{3}$ cup of milk and $1\frac{1}{2}$ times as much water.

(D) Cormac could use $\frac{1}{3}$ cup of milk in a mixture with a total of $1\frac{1}{2}$ cups.

15. On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

$$2x - y \ge 6$$

$$x > 2$$
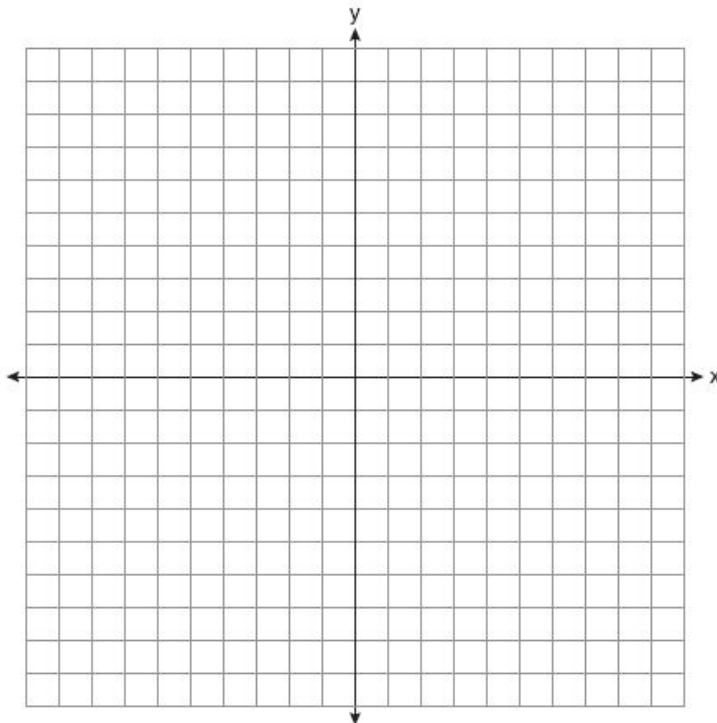
A1.2.1.1 Analyze and/or use patterns or relations.

1. Which relation is a function?
   (A) $xy = 7$ (B) $x = 7$ (C) $x^2 - y^2 = 7$ (D) $x^2 + y^2 = 7$

2. Shawn graphed the points listed below.

   (0, 0) (1, -1) (3, 0) (4, 4) (4, 5) (5, 4) (6, -2)

Which pair of points could be used to show that the points Shawn graphed do **not** represent a function?

   (A) (0, 0) and (3, 0)   (B) (1, -1) and (6, -2)
   (C) (4, 4) and (4, 5)   (D) (4, 4) and (5, 4)

3. The graph below shows the number of pages produced (y) by a printer based on the time (x), in minutes, since the printer has been turned on.
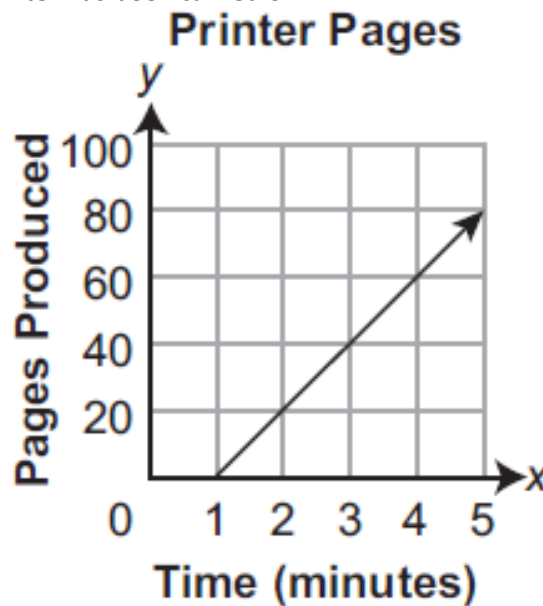
Printer Pages

What does the point (3, 40) on the graph represent?

   (A) The printer produced 3 pages every 40 minutes.
   (B) The printer produced 40 pages every 3 minutes.
   (C) The printer produced 3 pages in the first 40 minutes.
   (D) The printer produced 40 pages in the first 3 minutes.

4. Which relation is *not* a function?
   (A) {(1,5), (2,6), (3,6), (4,7)}   (B) {(4,7), (2,1), (−3,6), (3,4)}
   (C) {(−1,6), (1,3), (2,5), (1,7)}   (D) {(−1,2), (0,5), (5,0), (2,−1)}

5. For each of the last six weeks, Nate recorded how many days he went for a run and how many miles he ran. His data are shown in the graph below.

Nate's Running Data
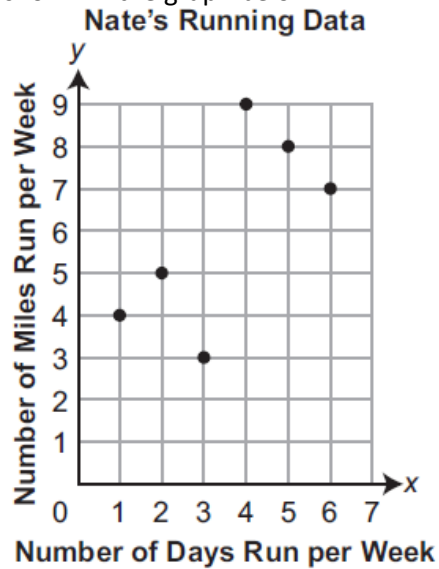
Which statement **best** explains whether Nate's data form a function?

(A) Nate's data form a function because he ran a different number of miles in each of the six weeks.

(B) Nate's data form a function because he ran a different number of days in each of the six weeks.

(C) Nate's data do not form a function, because the number of miles he ran each week is not proportional to the number of days he ran each week.

(D) Nate's data do not form a function, because the number of miles he ran each week did not increase as the number of days he ran each week increased.

6. Which graph represents a function?

(A)

(B)

(C)

(D)
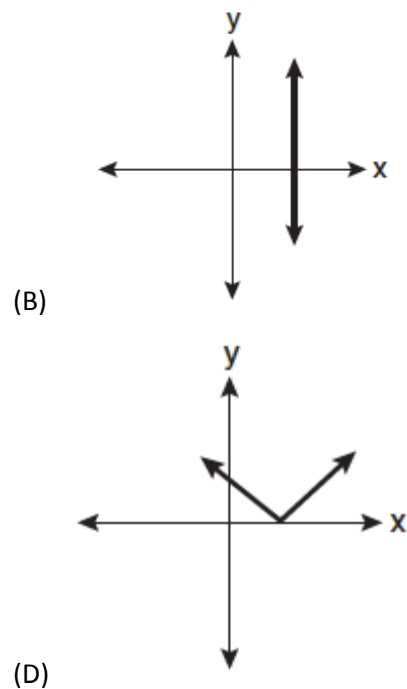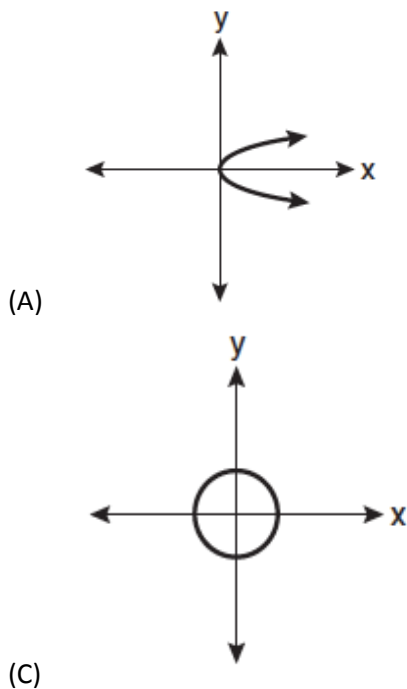
7. Which statement is true about the relation shown on the graph below?
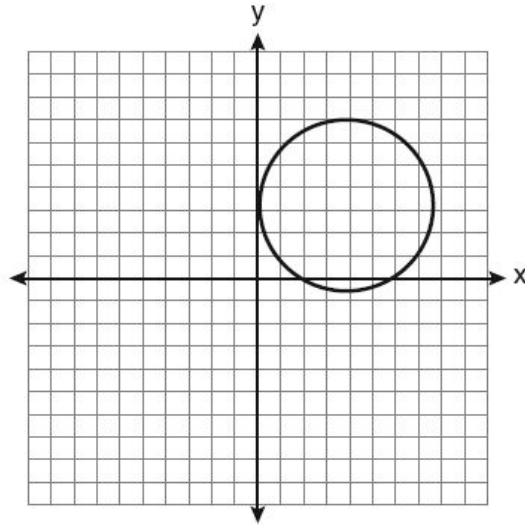
(A) It is a function because there exists one x-coordinate for each y-coordinate.
(B) It is a function because there exists one y-coordinate for each x-coordinate.
(C) It is not a function because there are multiple y-values for a given x-value.
(D) It is not a function because there are multiple x-values for a given y-value.

8. Kayla plotted points for the last eight weeks to show the number of hours she worked as a lifeguard each week and the number of hours she worked as a babysitter each week. Her graph is shown below.

Kayla's Hours Worked

Hours Worked as a Lifeguard
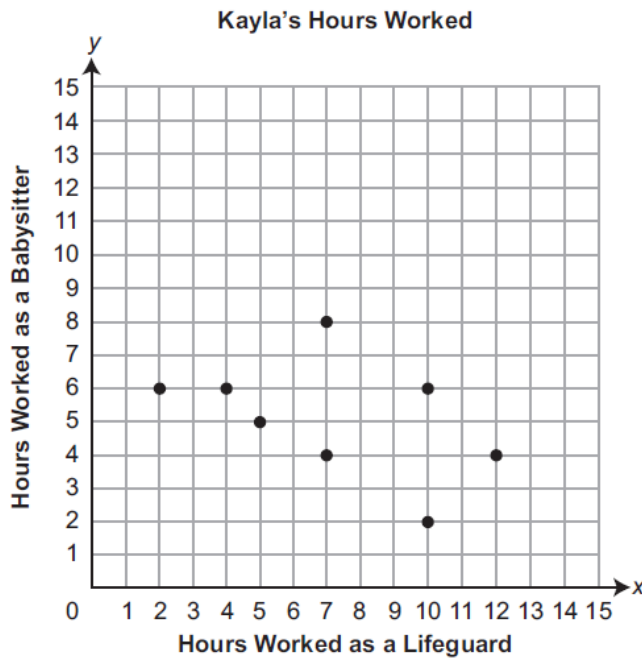
What is the **fewest** number of points Kayla could remove from her graph so that it represents a function?

(A) 2   (B) 3   (C) 4   (D) 5

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9. Martin plots the points listed below onto a coordinate plane.

(0, 4) (1, 4) (2, 5) (3, 6) (4, 7) (5, 5)

Which statement **best** explains whether Martin's points represent a function?

(A) Martin's points represent a function because any horizontal line drawn on the coordinate plane will intersect at most one point.
(B) Martin's points represent a function because any vertical line drawn on the coordinate plane will intersect at most one point.
(C) Martin's points do **not** represent a function, because a horizontal line can be drawn on the coordinate plane that intersects two points.
(D) Martin's points do **not** represent a function, because a vertical line can be drawn on the coordinate plane that intersects two points.

10. Which relation represents a function?
(A) {(0,3), (2,4), (0,6)}   (B) {(−7,5), (−7,1), (−10,3), (−4,3)}
(C) {(2,0), (6,2), (6,−2)}   (D) {(−6,5), (−3,2), (1,2), (6,5)}

11. Which graph represents a function?
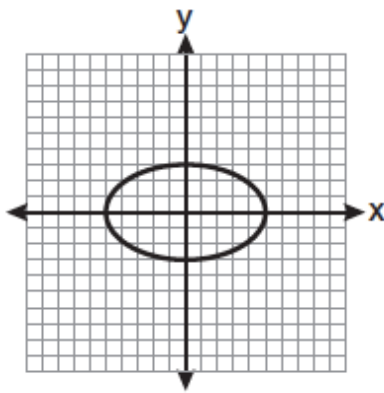
(A)
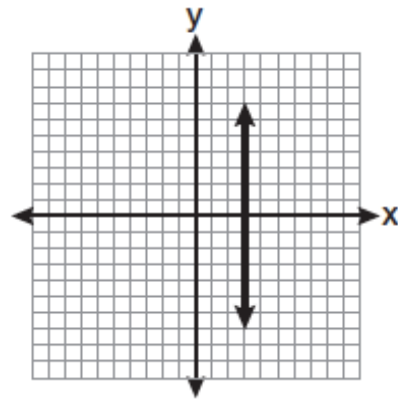
(B)
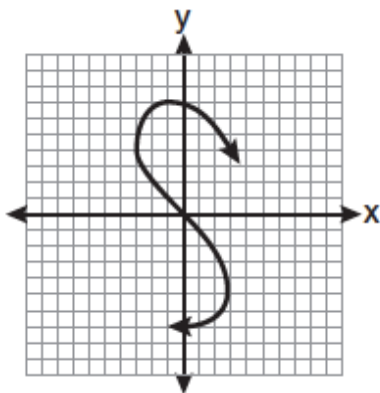
(C)
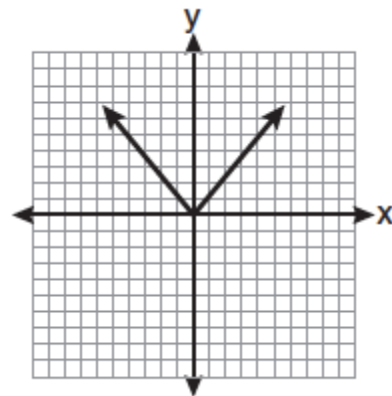
(D)

12. Esme recorded how many goals each of 8 soccer teams scored in the last 5 games. For each team, she also recorded how many goals the team allowed in the last 5 games. She made the graph below to represent her data.

Goals Scored and Allowed by 8 Soccer Teams
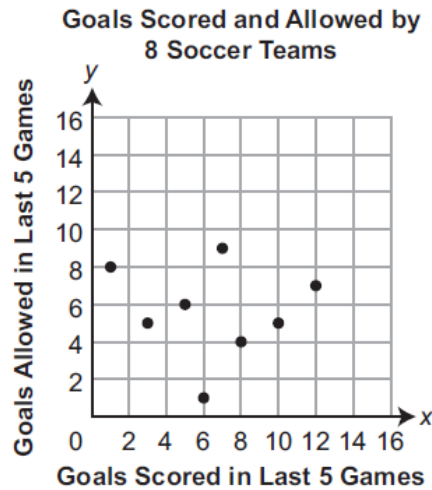
Which statement correctly explains whether Esme's data represents a function?

(A) Her data represents a function because there are exactly 8 different points.
(B) Her data does not represent a function because the points do not all lie on the same line.
(C) Her data represents a function because for each number of goals scored, there is exactly 1 corresponding number of goals allowed.
(D) Her data does not represent a function because for each number of goals allowed, there is more than 1 corresponding number of goals scored.

13. Ruth played a board game in which she captured pieces that belonged to her opponent. The graph below shows the number of pieces she captured and the number of moves she made.

Ruth's Board Game Moves and Captures
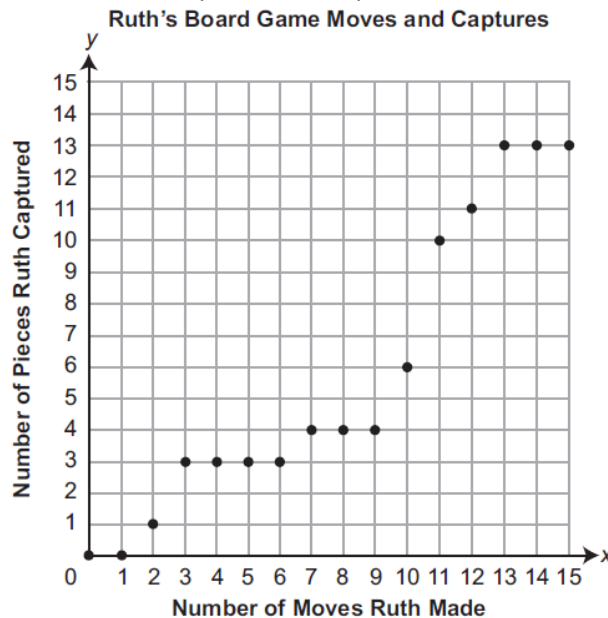
How many **different** values are in the range of Ruth's function?

(A) 8 (B) 13 (C) 15 (D) 16

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14. Which diagram represents a relation in which each member of the domain corresponds to only one member of its range?

(A)

(B)

(C)

(D)
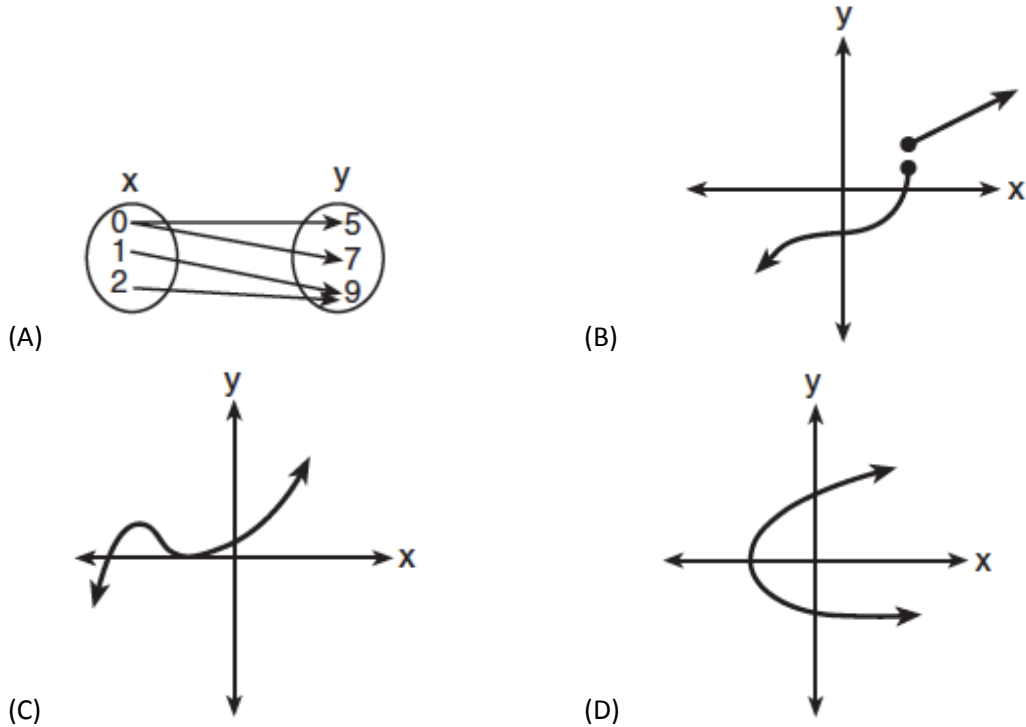
15. Five students all sold candles and flower bulbs to help raise money for a school trip. The table below shows the number of candles and the number of flower bulbs each student sold.

Items Sold for School Trip

Student	Candles Sold	Flower Bulbs Sold
Chen	3	9
Lori	3	7
Rob	4	6
Vicky	2	4
Will	9	2

The students made a graph based on the values in the table. One of the points on the graph was (4, 6). Which set lists the domain of the graph?

(A) {2, 4, 9}

(B) {2, 3, 4, 9}

(C) {2, 4, 6, 7, 9}

(D) {Chen, Lori, Rob, Vicky, Will}

16. The ordered pairs shown below represent a relation.

(3, 2) (5, 1) (6, 0) (4, 4) (5, 2)

Which number is **not** in the domain of the relation?

(A) 2   (B) 3   (C) 4   (D) 5

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17. Rick works as a mathematics tutor. He made the graph below to show the number of algebra students and the number of geometry students he helped in each of the last five weeks.

Rick's Students
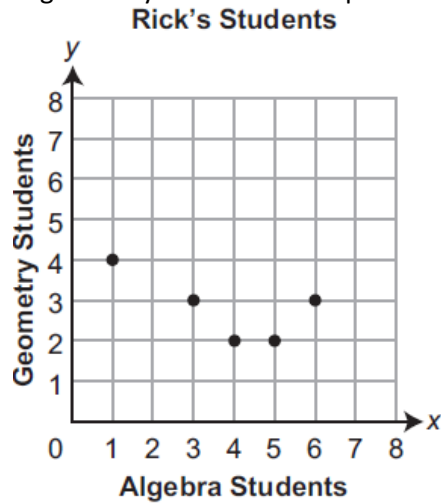
What is the range of the relation represented by Rick's graph?

(A) {2, 3, 4}   (B) {1, 2, 3, 4}   (C) {1, 3, 4, 5, 6}   (D) {1, 2, 3, 4, 5, 6}

18. The table shown below represents a function.

x	y
0	0
2	2
4	3
6	2
8	0

What is the range of the function represented in the table?

(A) {0, 2, 3}   (B) {0, 2, 4, 6, 8}
(C) All real numbers from 0 to 3.   (D) All real numbers from 0 to 8.

19. Carter went bowling. He recorded his score before his first turn and after each of his 10 turns using the ordered pairs shown below. In each ordered pair, the x-coordinate represents the number of turns he has taken and the y-coordinate represents his total score.

(0, 0) (1, 9) (2, 16) (3, 30) (4, 34) (5, 64) (6, 86) (7, 105) (8, 114) (9, 120) (10, 144)

What is the domain of Carter's set of ordered pairs?

(A) {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
(B) {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
(C) {9, 16, 30, 34, 64, 86, 105, 114, 120, 144}
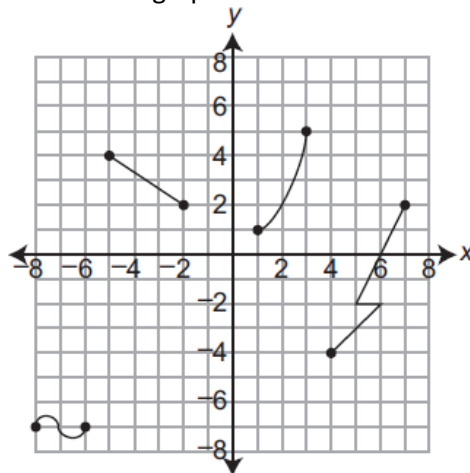(D) {0, 9, 16, 30, 34, 64, 86, 105, 114, 120, 144}

20. The accompanying graph shows the elevation of a certain region in New York State as a hiker travels along a trail.
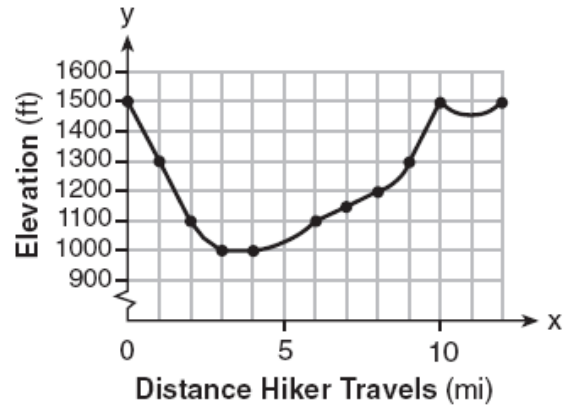
What is the domain of this function?

(A) $1{,}000 \le x \le 1{,}500$ (B) $1{,}000 \le y \le 1{,}500$
(C) $0 \le x \le 12$ (D) $0 \le y \le 12$

21. A relation of x and y is shown on the graph below.

Part A. State a value in the domain of the relation that illustrates that the relation is **not** a function.

Part B. State an interval of the domain where the relation can be described by a linear equation.

Part C. State a value that is in the range of the relation but **not** in the domain of the relation.

Part D. Give the coordinates of a point that can be added to the relation in the graph that will **not** change the domain or the range of the relation.

A1.2.1.2 Interpret and/or use linear functions and their equations, graphs, or tables.

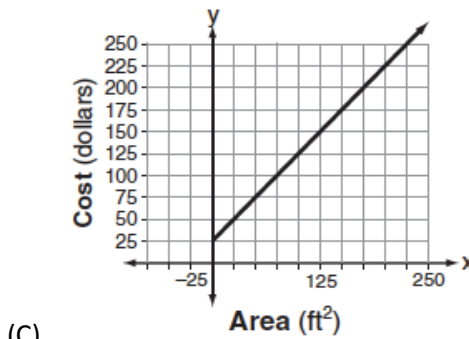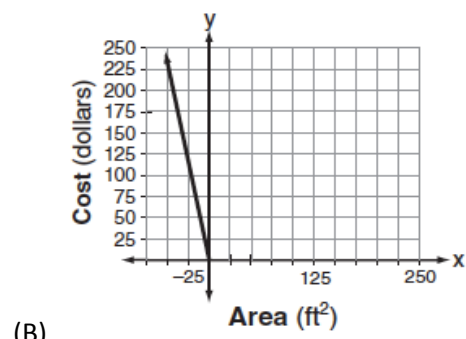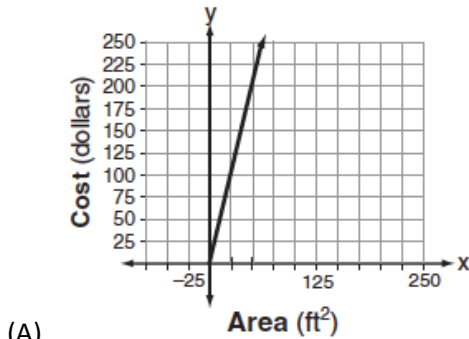1. Which equation expresses the relationship between x and y, as shown in the accompanying table?

x	0	1	2	3	4
y	2	5	8	11	14

(A) y = x +3   (B) y = 2x + 3   (C) y = 3x + 2   (D) y = x + 2

2. On the accompanying grid, draw the graph of the line whose slope is $\frac{2}{3}$ and whose *y*-intercept is -2.
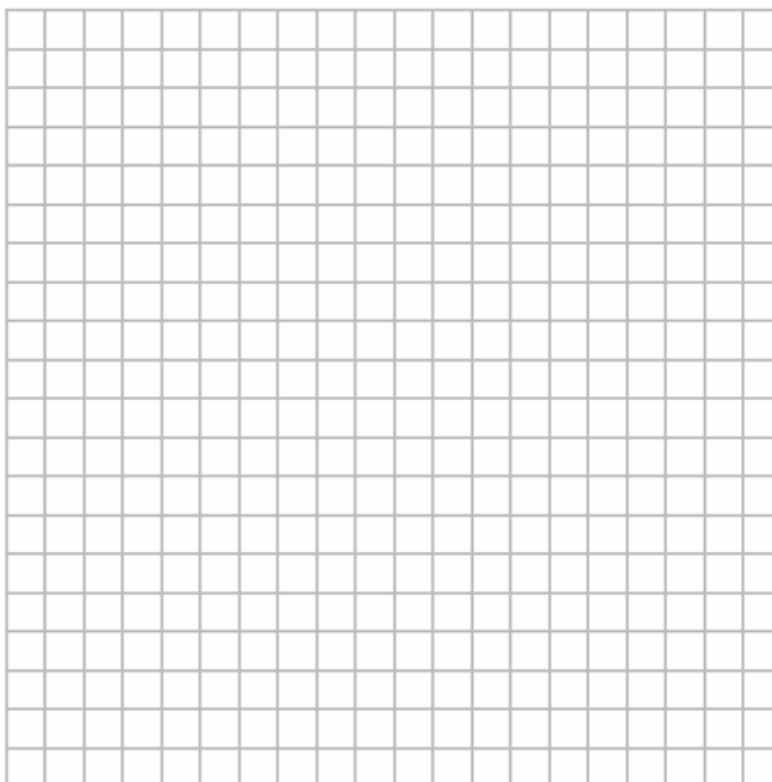
3. Super Painters charges $1.00 per square foot plus an additional fee of $25.00 to paint a living room. If x represents the area of the walls of Francesca's living room, in square feet, and y represents the cost, in dollars, which graph best represents the cost of painting her living room?

(A)

(B)

(C)

(D)
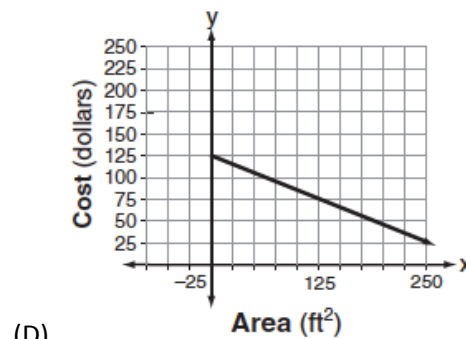
4. The table below shows a relationship between x and y.

| x	y
2	8
4	10
6	12
8	14
10	16

What equation represents the relationship between x and y ?

(A) $y = 2x$ (B) $y = 4x$ (C) $y = x + 6$ (D) $y = 2x + 2$

5. A line is graphed on the coordinate grid below.

Which equation describes the line?

(A) $y = \dfrac{x}{3} + \dfrac{1}{2}$

(B) $y = \dfrac{x}{3} + 15\dfrac{1}{2}$

(C) $y = \dfrac{x}{2} + \dfrac{1}{3}$

(D) $y = \dfrac{x}{2} + 15\dfrac{1}{2}$

6. Willa repairs lawnmowers. She charges $20 to identify the problem and $15 per hour to make the repairs. She uses the equation y = 15x + 20 to determine the total price (y), in dollars, for a lawnmower that takes her x hours to repair. Which graph represents the relationship between the total price, in dollars, and the number of hours it takes to repair a lawnmower?

Lawnmower Repairs

(A)

Lawnmower Repairs

(B)

Lawnmower Repairs

(C)

Lawnmower Repairs

(D)
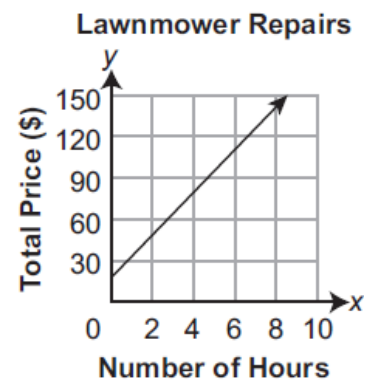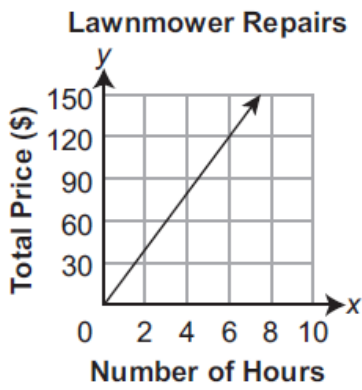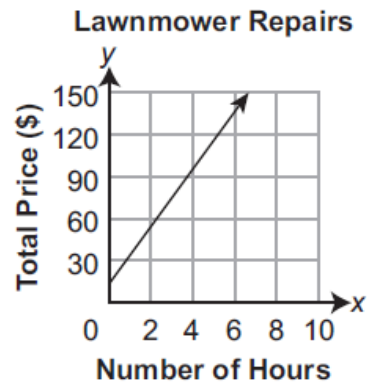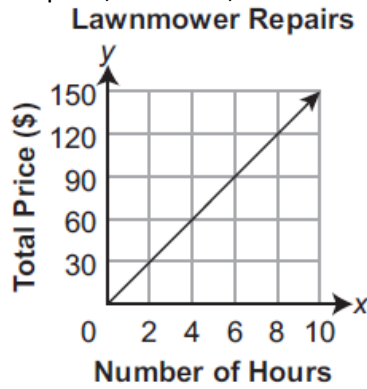
7. Mr. Jansen ordered calculators for his math class. He paid the same amount for each calculator and a fixed amount for shipping. His total costs for different numbers of calculators are shown in the table below.

Calculator Orders

Number of Calculators	Total Cost (dollars)
8	70.11
12	101.67
16	133.23

Which equation could be used to find the total cost (y), in dollars, for Mr. Jansen to order x calculators?

(A) y = 6.99x + 7.89   (B) y = 6.99x + 14.19   (C) y = 7.89x + 6.99   (D) y = 14.19x + 6.99

8. Kyle uses an internet service provider to store and show short videos he has made on a website. The internet service provider charges him a flat fee per month. The internet service provider also charges him a constant fee per hour of video he has stored on the website. The graph below shows Kyle's total monthly cost (y), in dollars, based on the numbers of hours of video (x) he has stored on the website.

Kyle's Monthly Website Costs
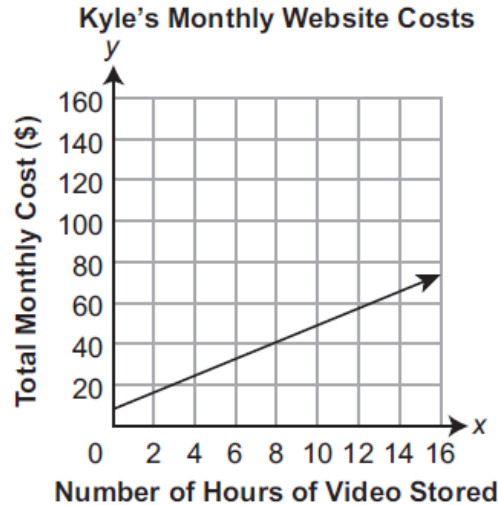
Which equation shows the relationship between the number of hours of video Kyle has stored on the website and his total monthly cost in dollars?

(A) $y = 0.25x + 10$ (B) $y = 4x + 10$ (C) $y = 10x + 0.25$ (D) $y = 10x + 4$

9. The table shown below represents a linear function.

x	y
10	515
20	430
30	345
40	260

Which equation describes the linear function shown in the table?

(A) $y = 8.5x - 600$ (B) $y = 8.5x + 600$ (C) $y = 8.5x - 600$ (D) $y = 8.5x + 600$

10. A game show's grand prize starts at a fixed amount and increases each time a contestant gives a correct answer. The table below shows the value of the grand prize after different numbers of correct answers are given.

Game Show Grand Prize Value

Number of Correct Answers Given	Value of Grand Prize
2	$6,250
4	$7,500
6	$8,750
8	$10,000

Which equation gives the value of the grand prize (y), in dollars, based on the number of correct answers given (x)?

(A) $y = 625x + 5{,}000$ (B) $y = 625x + 6{,}250$ (C) $y = 1{,}250x + 5{,}000$ (D) $y = 1{,}250x + 6{,}250$

11. A company is considering purchasing one of three different types of trucks. For each truck, the company considers the price to purchase the truck and the estimated cost per mile to operate the truck. They create a linear model for each truck. The table below shows the total cost for each truck for different numbers of miles driven.

Total Cost of Truck for Miles Driven

Truck	0 miles	100,000 miles	200,000 miles
Q	$22,500	$46,500	$70,500
R	$32,000	$50,000	$68,000
S	$24,000	$49,000	$74,000

A. What is the estimated cost per mile to drive truck Q?

B. Write an equation that describes the total cost (y), in dollars, of truck R after driving x miles.

C. After how many miles will the total cost of truck Q be the same as the total cost of truck R?

D. Based on the information in the table, explain why the total cost for truck S will never be less than the total cost for truck Q.

12. Luisa works in her grandfather's jewelry shop. She deposits her earnings in a savings account. Her savings account balances for five of the last six weeks are shown in the function table below.

LUISA'S SAVINGS ACCOUNT

Week (w)	Savings Balance (b)
1	$510
2	$620
3	$730
4	$840
5	?
6	$1,060

Part A

According to the data in the function table, write a function rule that shows how much money Luisa saves each week.

Part B

Based on the table, how much money is in Luisa's savings account in week 5?

13. The table below represents the number of hours a student worked and the amount of money the student earned.

Number of Hours (h)	Dollars Earned (d)
8	$50.00
15	$93.75
19	$118.75
30	$187.50

Write an equation that represents the number of dollars, d, earned in terms of the number of hours, h, worked.

Using this equation, determine the number of dollars the student would earn for working 40 hours.

14. The function table below follows a function rule.

x	y
0.5	2
1	1
2	0.5
4	0.25
5	
10	

Part A

Complete the table by filling in the two missing numbers.

Part B

Based on the table, write a function rule that represents the relationship between *x* and *y*.

Rule _____

15. Tom reads books that he borrows from the library. After borrowing books for a while, he began recording at the beginning of each month the total number of books he has borrowed so far. The data for the first 5 months he recorded are shown below.

Books Borrowed by Month

Month	1	2	3	4	5
Number of Books	40	47	54	61	68

The total number of books he borrows continues to grow at the same rate. Which equation represents the number of books (*y*) Tom has borrowed so far based on the number of months (*x*) he has been recording data?

(A) $y = 7x + 33$ (B) $y = 7x + 40$ (C) $y = 33x + 7$ (D) $y = 40x + 7$

16. A table of values is shown below.

x	45	60	75
y	8	9	10

Which equation describes the linear relationship shown in the table of values?

(A) $y = \dfrac{x}{15} + 5$ (B) $y = \dfrac{x}{15} + 8$ (C) $y = 15x + 5$ (D) $y = 15x + 8$

A1.2.2.1 Describe, compute, and/or use the rate of change (slope) of a line.

1. The equation describing a line is shown below.

    $$y - 8 = 6(x - 4)$$

    What is the slope of the line described by the equation?

   (A) $\dfrac{-3}{2}$ (B) $\dfrac{-4}{3}$ (C) 2   (D) 6

2. Jack bought 3 slices of cheese pizza and 4 slices of mushroom pizza for a total cost of $12.50. Grace bought 3 slices of cheese pizza and 2 slices of mushroom pizza for a total cost of $8.50. What is the cost of one slice of mushroom pizza?
    (A) $1.50   (B) $2.00   (C) $3.00   (D) $3.50

3. Parking charges at Superior Parking Garage are $5.00 for the first hour and $1.50 for each additional 30 minutes. If Margo has $12.50, what is the maximum amount of time she will be able to park her car at the garage?

    (A) $2\frac{1}{2}$ hours   (B) $3\frac{1}{2}$ hours   (C) 6 hours   (D) $6\frac{1}{2}$ hours

4. The gas tank in a car holds a total of 16 gallons of gas. The car travels 75 miles on 4 gallons of gas. If the gas tank is full at the beginning of a trip, which graph represents the rate of change in the amount of gas in the tank?

(A)

(B)

(C)

(D)

63
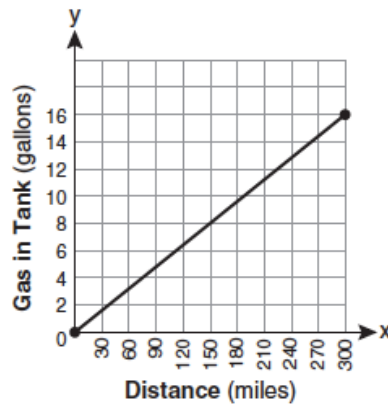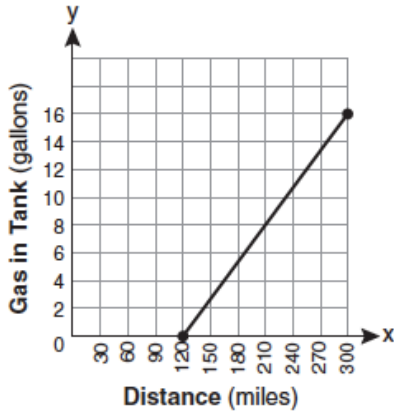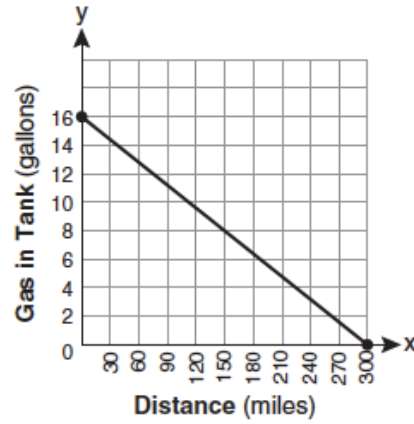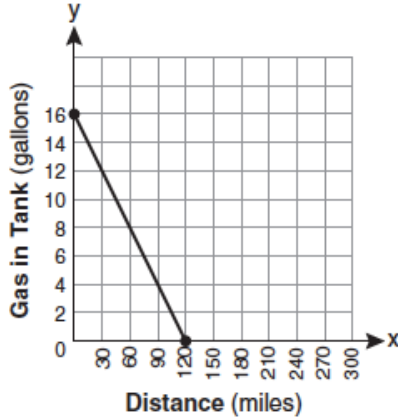
5. Mario paid $44.25 in taxi fare from the hotel to the airport. The cab charged $2.25 for the first mile plus $3.50 for each additional mile. How many miles was it from the hotel to the airport?
   (A) 10   (B) 11   (C) 12   (D) 13

6. Every month, Omar buys pizzas to serve at a party for his friends. In May, he bought three more than twice the number of pizzas he bought in April. If Omar bought 15 pizzas in May, how many pizzas did he buy in April?

7. Julio's wages vary directly as the number of hours that he works. If his wages for 5 hours are $29.75, how much will he earn for 30 hours?

8. Using only 32-cent and 20-cent stamps, Charlie put $3.36 postage on a package he sent to his sister. He used twice as many 32-cent stamps as 20-cent stamps. Determine how many of each type of stamp he used.

9. A contractor needs 54 square feet of brick to construct a rectangular walkway. The length of the walkway is 15 feet more than the width.

   Write an equation that could be used to determine the dimensions of the walkway. Solve this equation to find the length and width, in feet, of the walkway.

10. Kimberly rides her bicycle from her home to school at an average rate of 12 miles per hour. If it takes her 20 minutes to get to school, how many miles is her home from her school?

11. Thelma and Laura start a lawn-mowing business and buy a lawnmower for $225. They plan to charge $15 to mow one lawn. What is the minimum number of lawns they need to mow if they wish to earn a profit of at least $750?

12. An online music club has a one-time registration fee of $13.95 and charges $0.49 to buy each song. If Emma has $50.00 to join the club and buy songs, what is the maximum number of songs she can buy?
    (A) 74   (B) 130   (C) 131   (D) 73

13. Sofia advertises her business online. She pays a fixed amount to the advertising company and also pays based on how many times her advertisement is displayed. In March, Sofia paid a fixed fee of $24 and a total fee of $80. Her advertisement was displayed a total of 800 times. What is the rate, in dollars per time her advertisement is displayed, that Sofia is charged?
    (A) $0.03   (B) $0.07   (C) $0.10   (D) $0.13

14. Sam and Odel have been selling frozen pizzas for a class fundraiser. Sam has sold half as many pizzas as Odel. Together they have sold a total of 126 pizzas. How many pizzas did Sam sell?

(A) 21   (B) 42   (C) 63   (D) 84

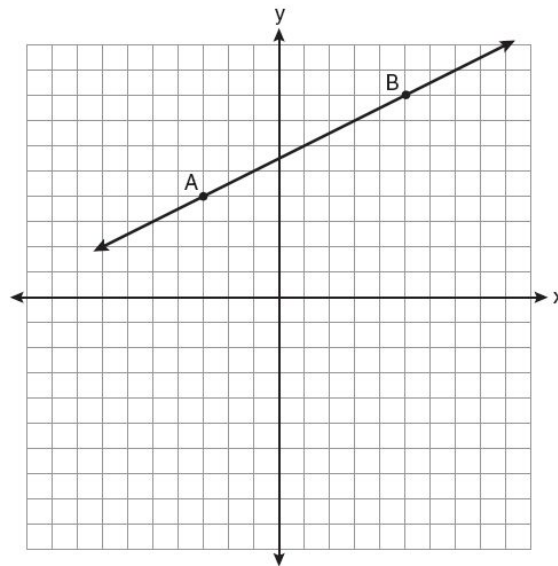15. What is the slope of the line passing through the points A and B, as shown on the graph below?
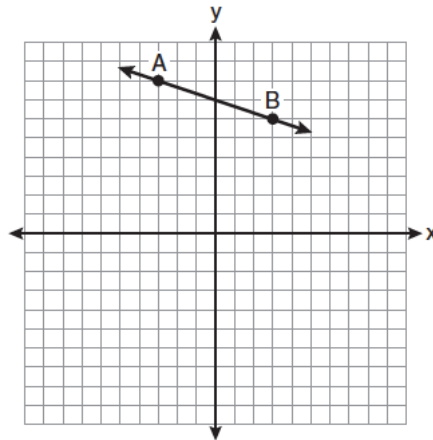
(A) −3   (B) $-\frac{1}{3}$ (C) 3   (D) $\frac{1}{3}$

16. Nicole has saved $120 toward the purchase of a new bike. She gets a job that pays $12 an hour. She saves 25% of her hourly wage to purchase the new bike. She uses the equation $y = (0.25)(12)x + 120$ to determine how much money she has saved toward the purchase of the new bike. What is the slope of the line represented by Nicole's equation?

(A) 0.25   (B) 3   (C) 12   (D) 120

17. In the diagram below, what is the slope of the line passing through points *A* and *B*?

(A) −2   (B) 2   (C) $-\frac{1}{2}$ (D) $\frac{1}{2}$

18. What is the slope of the line that passes through the points (- 6,1) and (4,- 4)?

(A) −2   (B) 2   (C) $-\dfrac{1}{2}$ (D) $\dfrac{1}{2}$

19. The chart below compares two runners.

Runner	Distance, in miles	Time, in hours
Greg	11	2
Dave	16	3

Based on the information in this chart, state which runner has the faster rate. Justify your answer.

20. The cost of 3 markers and 2 pencils is $1.80. The cost of 4 markers and 6 pencils is $2.90. What is the cost of *each* item? Include appropriate units in your answer.

21. An equation of the line that has a slope of 3 and a y-intercept of −2 is

(A) x = 3y − 2   (B) y = 3x − 2   (C) y = $-\dfrac{2}{3}x$ (D) y = −2x + 3

22. Alex rode a bike 60 miles in 4 hours. For 5 minutes of the ride, he rode the bike at 12 miles per hour. Which number related to Alex's bike ride represents a constant rate of change?
(A) 4   (B) 5   (C) 12   (D) 60

23. A function of x is graphed on the coordinate plane below.
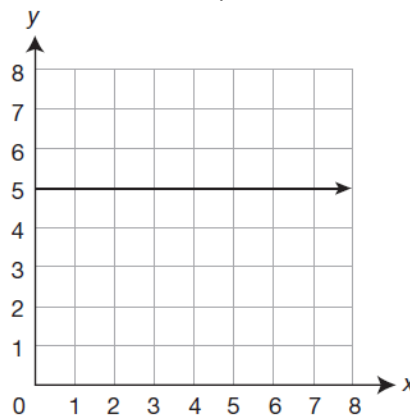
What is the slope of the graph?

(A) 0   (B) 1/5   (C) 5   (D) undefined

24. A plumber charges a fixed fee of $50 plus $60 per hour for repairs. The plumber makes repairs for 6 hours. What is the constant rate in this situation?
   (A) the $410 total the plumber charges
   (B) the $60 per hour the plumber charges
   (C) the $50 fixed fee the plumber charges
   (D) the 6 hours the plumber makes repairs

25. Stephen helps people recover data from damaged computers. Which description represents a constant rate of change Stephen could use to determine how much to charge his customers?
   (A) a cost per megabyte of data recovered
   (B) a fixed cost to assess the damage to the computer
   (C) the length of time it takes Stephen to recover the data
   (D) the amount of data, in megabytes, that Stephen recovers

26. A line is shown on the coordinate grid below.
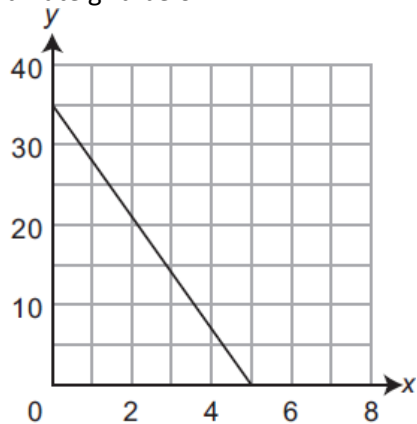
What is the slope of the line?

   (A) -7   (B) $\dfrac{-7}{5}$ (C) $\dfrac{7}{5}$ (D) 7^7

27. What is an equation of the line that passes through the point (3,−1) and has a slope of 2?
   (A) y = 2x +5   (B) y = 2x −1   (C) y = 2x − 4   (D) y = 2x − 7

28. What is an equation of the line that passes through the points (3,-3) and (-3,-3)?

   (A) y = 3   (B) x = −3   (C) y = −3   (D) x = y

29. What is an equation of the line that passes through the point (4,−6) and has a slope of −3?
   (A) y = −3x +6   (B) y = −3x −6   (C) y = −3x + 10   (D) y = −3x + 14

30. Kayla is shoveling snow at a constant rate. She has been shoveling snow for $\dfrac{1}{2}$ hour and has removed $\dfrac{2}{5}$ of the snow from the school sidewalk. How much time, in hours, will it take Kayla to shovel all of the snow from the school sidewalk?

31. Lao is driving home at a constant speed. He was 240 miles from home when he had driven 1.5 hours. He was 210 miles from home when he had driven 2 hours. How much time, in hours, will it take Lao to drive home? Show or explain all your work.

32. Mark and Nancy each started a trading card collection at the same time. They add cards to their collections at constant rates. Mark started with 200 trading cards in his collection and adds 15 new trading cards to his collection each week. Nancy had 300 trading cards in her collection at the end of the first week and 360 trading cards at the end of the fifth week. Explain why Mark will always have fewer trading cards in his collection than Nancy has in her collection.

33. What is an equation of the line that passes through the points (1,3) and (8,5)?

(A) $y + 1 = \frac{2}{7}(x + 3)$

(B) $y - 5 = \frac{2}{7}(x - 8)$

(C) $y - 1 = \frac{2}{7}(x + 3)$

(D) $y + 5 = \frac{2}{7}(x - 8)$

34. Which equation represents the line that passes through the points (−3,7) and (3,3)?

(A) $y = \frac{2}{3}x + 1$ (B) $y = \frac{2}{3}x + 9$ (C) $y = -\frac{2}{3}x + 5$ (D) $y = -\frac{2}{3}x + 9$

35. The line 3x − 2y = 12 has

(A) a slope of $\frac{3}{2}$ and a y-intercept of −6 (B) a slope of $-\frac{3}{2}$ and a y-intercept of 6
(C) a slope of 3 and a y-intercept of −2 (D) a slope of −3 and a y-intercept of −6

36. A line passes through the points (4, 440) and (6, 560) on a coordinate grid. What is the equation of the line?

(A) $y = 2x + 120$ (B) $y = 60x + 200$ (C) $y = 120x + 2$ (D) $y = 200x + 60$

37. A line is described by the equation $ax + by = c$, where $a, b,$ and c are constants.

A. Write an equation describing the line that passes through (3, 18) and (5, 11).

B. Write an equation describing the line with a slope of $\dfrac{2}{7}$ that passes through the point (6, 1).

C. Write an expression describing the slope of this line, and write an expression describing the y-intercept of this line.

slope: _____ y-intercept: _____

38. John and Sara both walked 3 miles from their school to the park. John started walking to the park at a constant rate before Sara started walking to the park at a constant rate. The graph below show the distance (y), in miles, John and Sara were from the school x minutes since John started walking to the park.

Distance from School
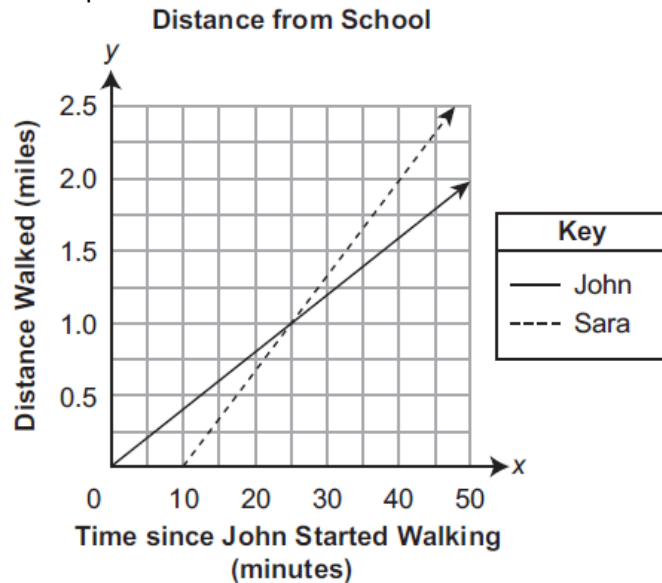
A. What is the constant rate, in **miles per hour**, at which John walked?

B. How many minutes after John started walking to the park did Sara start walking to the park?

C. Describe the significance of the point (25, 1.0) in the context of the distance that John and Sara had walked

D. How many minutes earlier will Sara arrive at the park than John?

39. A line has a slope of $\frac{1}{4}$. The line passes through the point (4, 6). The line also passes through the point (12, k). What is the value of k?

(A) 8 (B) 9 (C) 14 (D) 18

40. Write an equation that represents the line that passes through the points (5,4) and (-5,0).

41. Two lines are represented by the equations $-\frac{1}{2}y$ = 6x + 10 and y = mx. For which value of m will the lines be parallel?

(A) −12 (B) −3 (C) 3 (D) 12

1. Segment RS is parallel to segment TU. If the slope of $\overline{RS} = \frac{5}{8}$ and the slope of $\overline{TU} = \frac{x}{24}$, the value of **x** is

(A) 20 (2) 15 (3) 10 (4) 5

2. Which equation represents a line parallel to the line whose equation is 2y − 5x = 10?

(A) 5y − 2x = 25 (B) 5y + 2x = 10 (C) 4y − 10x = 12 (D) 2y + 10x = 8

3. Which equation represents a line that is parallel to the line y = - 4x + 5?

(A) y = − 4x + 3 (B) y = $-\frac{1}{4}x$ + 5 (C) y = $\frac{1}{4}x$ + 3 (D) y = 4x + 5

4. Which equation represents a line parallel to the x-axis?

(A) x = 5 (B) y = 10 (C) $x = \frac{1}{3}y$ (D) y = 5x + 17

5. Which equation represents a line parallel to the y-axis?

(A) x = y (B) x = 4 (C) y = 4 (D) y = x + 4

6. The graphs of the equations y = 2x − 7 and y − kx = 7 are parallel when k equals

(A) −2 (B) 2 (C) −7 (D) 7

7. Which equation represents a line parallel to the x-axis?

(A) y = −5 (B) y = −5x (C) x = 3 (D) x = 3y

8. Find an equation of the line passing through the point (6,5) and perpendicular to the line whose equation is 2y + 3x = 6.

70

9. The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are
   (A) parallel   (B) perpendicular
   (C) the same line   (D) neither parallel nor perpendicular

10. What is the equation of a line that passes through the point (-3, -11) and is parallel to the line whose equation is $2x - y = 4$?

   (A) $Y = 2X+5$ (B) $y = 2x - 5$ (C) $y = \frac{1}{2}x + \frac{25}{2}$ (D) $y = -\frac{1}{2}x - \frac{25}{2}$

11. What is an equation of the line that passes through the point (−2,5) and is perpendicular to the line whose equation is $y = \frac{1}{2}x + 5$?
   (A) $y = 2x + 1$ (B) $y = -2x + 1$ (C) $y = 2x + 9$ (D) $y = -2x - 9$

12. Write an equation of a line that is perpendicular to the line $y = \frac{2}{3}x + 5$ and that passes through the point (0,4).

13. Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?
   (A) $6y = -4x + 12$ (B) $2y = 3x + 6$ (C) $2y = -3x + 6$ (D) $3y = -2x + 12$

14. Find an equation of the line passing through the point (5,4) and parallel to the line whose equation is $2x + y = 3$.

15. What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?
   (A) $x + y = 5$ (B) $2x + y = -2$ (C) $y - x = -1$ (D) $y - 2x = 3$

16. What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

   (A) $-\frac{3}{2}$ (B) $-\frac{2}{3}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$

17. Write an equation of the line that passes through the point (6,−5) and is parallel to the line whose equation is $2x - 3y = 11$.

18. What is the slope of a line that is perpendicular to the line whose equation is $3x + 4y = 12$?

   (A) $\frac{3}{4}$ (B) $-\frac{3}{4}$ (C) $\frac{4}{3}$ (D) $-\frac{4}{3}$

19. Which equation represents a line that is parallel to the line $y = 3 - 2x$?
    (A) $4x + 2y = 5$ (B) $2x + 4y = 1$ (C) $y = 3 - 4x$ (D) $y = 4x - 2$

20. Which equation represents a line parallel to the graph of $2x - 4y = 16$?

    (A) $y = \dfrac{1}{2}x - 5$ (B) $y = -\dfrac{1}{2}x + 4$ (C) $y = -2x + 6$ (D) $y = 2x + 8$

21. What is the slope of a line perpendicular to the line whose equation is $y = 3x + 4$?

    (A) $\dfrac{1}{3}$ (B) $-\dfrac{1}{3}$ (C) 3   (D) -3

A1.2.2.2 Analyze and/or interpret data on a scatter plot.

1. The equation of the line of best fit representing the data on a scatter plot is $y = 3.2x + 25$. Based on the line of best fit, which prediction is most reasonable for the difference in y-values when the x-values are 20 and 35?
   (A) 33   (B) 48   (C) 73   (D) 88

2. The line of best fit for a scatter plot is described by the equation $y = 9.55x + 99.4$. What is the predicted y-value when the x-value is 10?
   (A) 3.9   (B) 9.4   (C) 95.5   (D) 99.85

3. Copies of a particular book were ordered by 8 bookstores last month. The scatter plot below shows the number of hardcover copies and the number of softcover copies that were ordered by each of the 8 bookstores last month.

Copies of Book Ordered
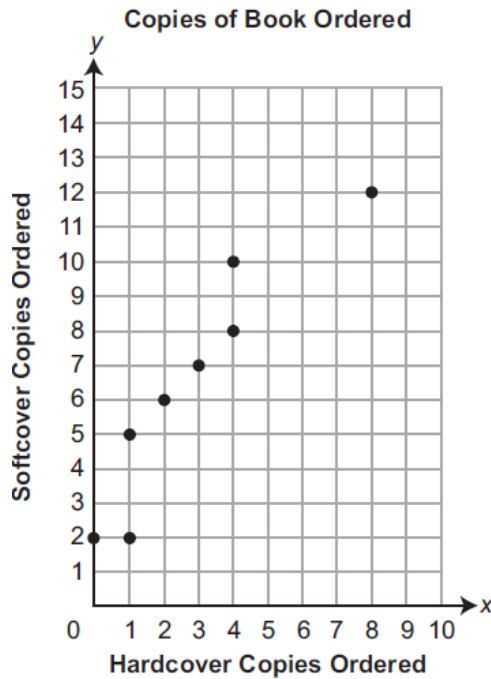
What is the mean number of copies of the book ordered by each bookstore?

   (A) 2.875   (B) 6.5   (C) 9   (D) 9.375

4. Joan delivers small loads of firewood and large loads of firewood to a campground. The scatter plot below shows the number of small loads of firewood and the number of large loads of firewood she delivered on each of the last ten days.

Joan's Daily Firewood Deliveries
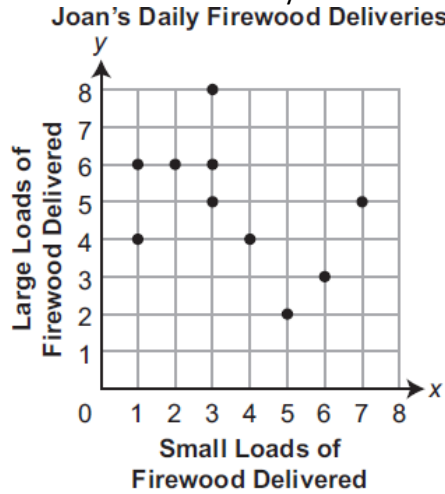
On how many of the last ten days did Joan deliver more than twice as many large loads of firewood as small loads of firewood?

(A) 1   (B) 2   (C) 4   (D) 5

5. The number of hours spent on math homework each week and the final exam grades for twelve students in Mr. Dylan's algebra class are plotted below.

Mr. Dylan's Class
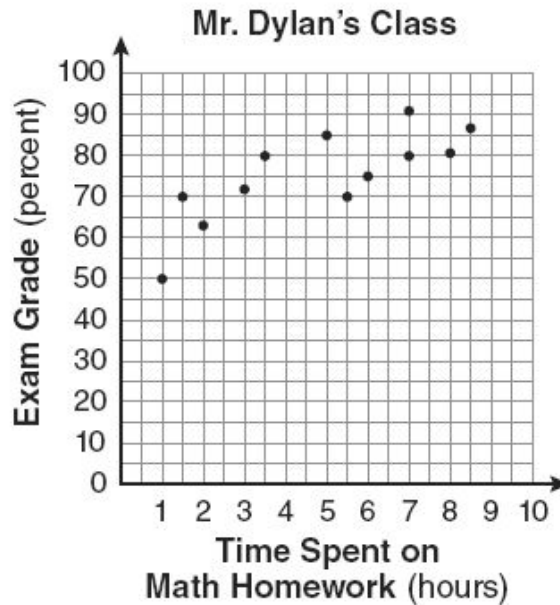
Based on a line of best fit, which exam grade is the best prediction for a student who spends about 4 hours on math homework each week?

(A) 62   (B) 72   (C) 82   (D) 92

6. Megan and Bryce opened a new store called the Donut Pit. Their goal is to reach a profit of $20,000 in their 18th month of business. The table and scatter plot below represent the profit, P, in thousands of dollars, that they made during the first 12 months.

t (months)	1	2	3	4	5	6	7	8	9	10	11	12
P (profit, in thousands of dollars)	3.0	2.5	4.0	5.0	6.5	5.5	7.0	6.0	7.5	7.0	9.0	9.5

Donut Pit Profits
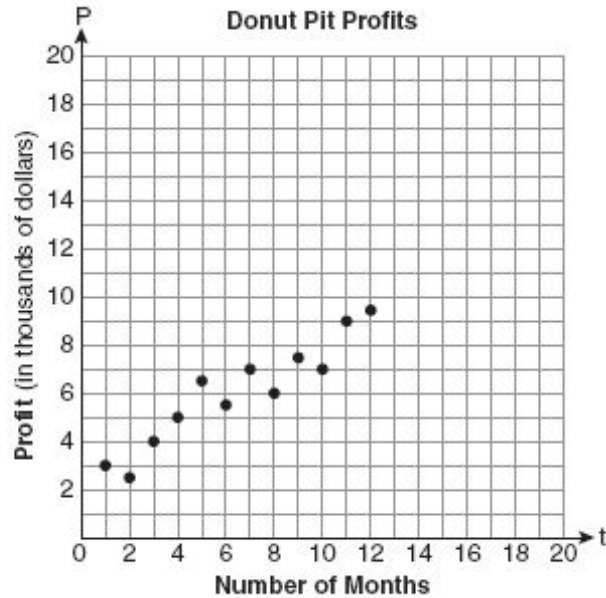
Draw a reasonable line of best fit.

Using the line of best fit, predict whether Megan and Bryce will reach their goal in the 18th month of their business.

Justify your answer.

7. Which equation most closely represents the line of best fit for the scatter plot below?

Money Earned from Babysitting
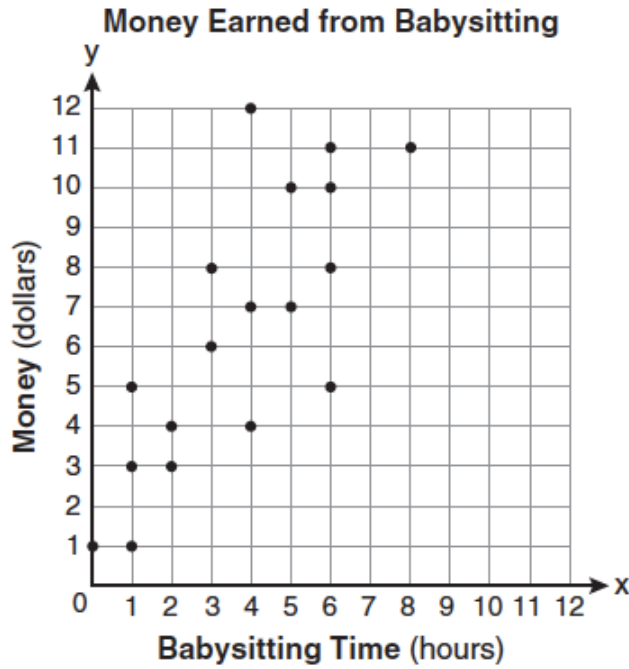
(A) $y = x$

(B) $y = \dfrac{2}{3}x + 1$

(C) $y = \dfrac{3}{2}x + 4$

(D) $y = \dfrac{3}{2}x + 1$

8. A store owner buys baseball cards in bulk. The owner recorded the amount (y), in dollars, she paid for each of the last 10 collections she bought based on x thousand cards in each collection. She used that data to calculate the line of best fit with the equation shown below.

$$y = 39.94x + 3.84$$

Based on the store owner's line of best fit, what amount should she expect to pay for a collection that has 1,500 cards?

(A) $45.28

(B) $45.70

(C) $59.91

(D) $63.75

9. A game is played by attempting to toss balls through a basket. Elizabeth played the game 10 times. The scatter plot below shows the percent of her tosses that successfully went into the basket.

Elizabeth's Tosses
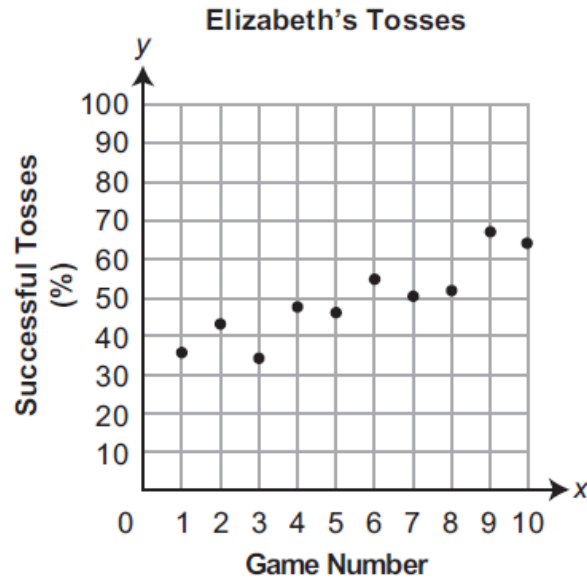
Elizabeth described the pattern shown in the scatter plot as a "strong negative linear correlation."

Part A. Draw the line of best fit for the scatter plot.

**Part B.** Write an equation that describes the line of best fit you drew for **part A**.

Part C. Identify the error in Elizabeth's description.

Part D. Based on the line of best fit, predict the percentage of successful tosses that Elizabeth will have the 15th time she plays the game.

10. The school store did a study comparing the cost of a sweatshirt with the number of sweatshirts sold. The price was changed several times and the numbers of sweatshirts sold were recorded. The data are shown in the table below.

Cost of Sweatshirt	$10	$25	$15	$20	$5
Number Sold	9	6	15	11	14

Which scatter plot represents the data?

(A)

(B)

(C)

(D)
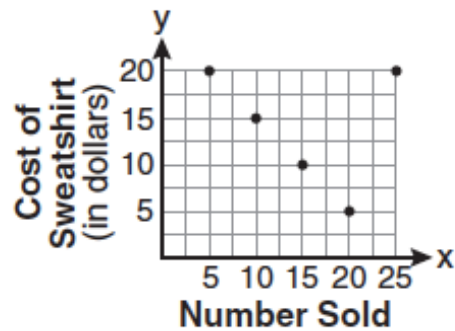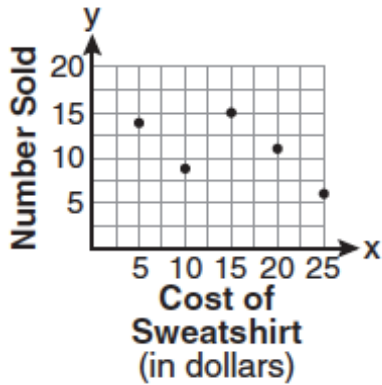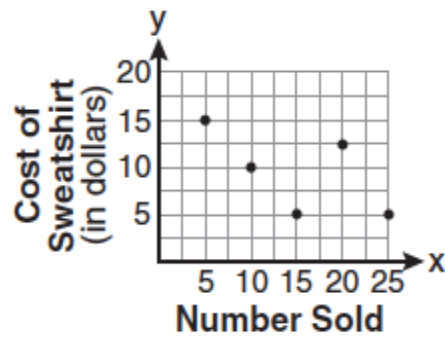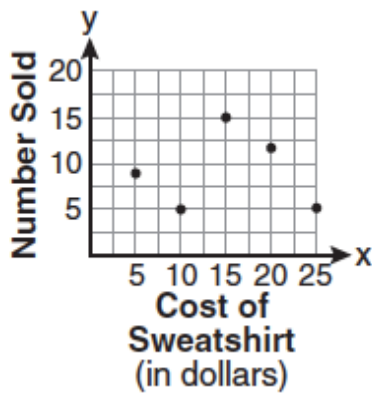
11. Which scatter plot shows the relationship between *x* and *y* if *x* represents a student score on a test and *y* represents the number of incorrect answers a student received on the same test?

(A)
Number of Incorrect Answers
Test Scores

(B)
Number of Incorrect Answers
Test Scores

(C)
Number of Incorrect Answers
Test Scores

(D)
Number of Incorrect Answers
Test Scores
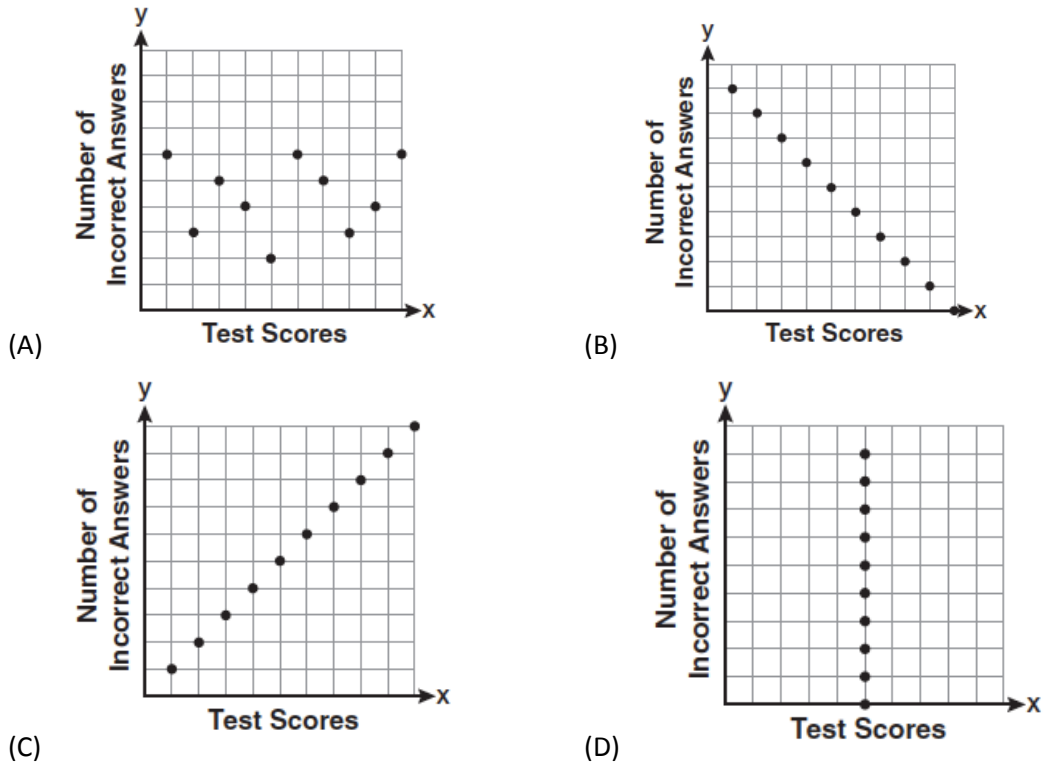
12. The table below shows the number of prom tickets sold over a ten-day period.

Prom Ticket Sales

Day (x)	1	2	5	7	10
Number of Prom Tickets Sold (y)	30	35	55	60	70

Plot these data points on the coordinate grid below. Use a consistent and appropriate scale. Draw a reasonable line of best fit and write its equation.

13. The height, in inches, of a plant is measured at the end of each day. The results are shown in the scatter plot below.
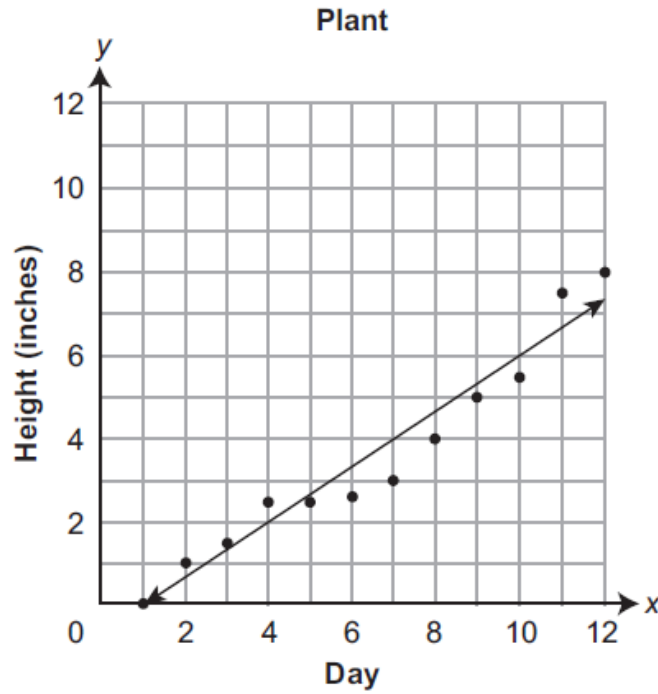
Plant

Based on the line of best fit shown in the scatter plot, which estimate is **closest** to the height, in inches, of the plant after 18 days?

(A) 8

(B) $11\frac{1}{3}$

(C) $12\frac{2}{3}$

(D) 14

14. Lily works at a company that makes shirts by hand. She recorded the number of shirts (y) each of eight employees made in one day based on the number of months (x) each employee has been working at the company. She made the scatter plot below to display her data.
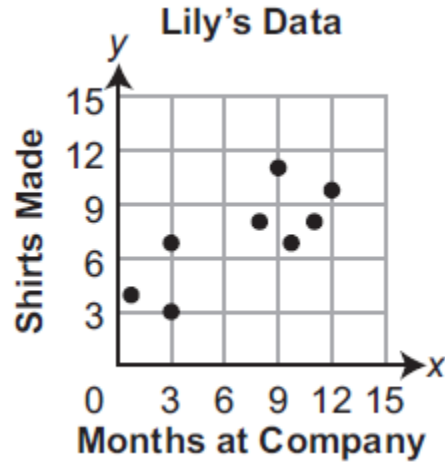
Lily's Data

Which graph shows a line of best fit for Lily's data?

Lily's Data

(A)

Lily's Data

(B)

Lily's Data


(C)

Lily's Data

(D)
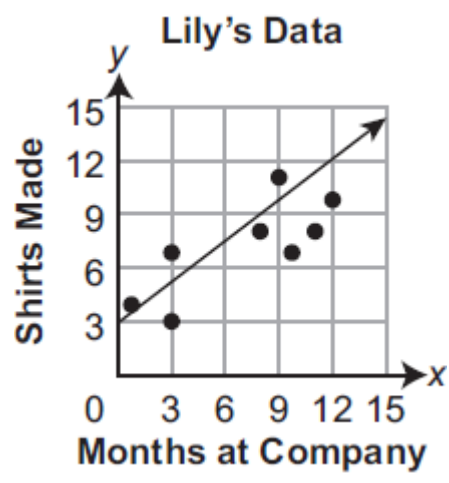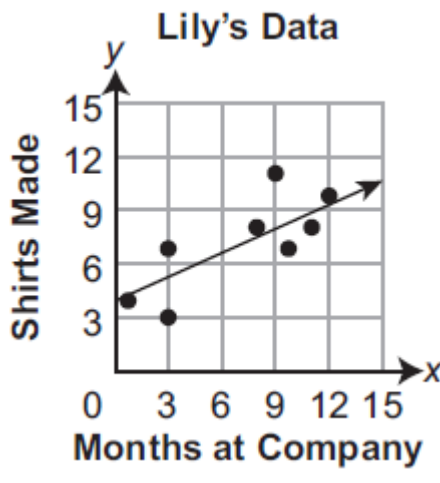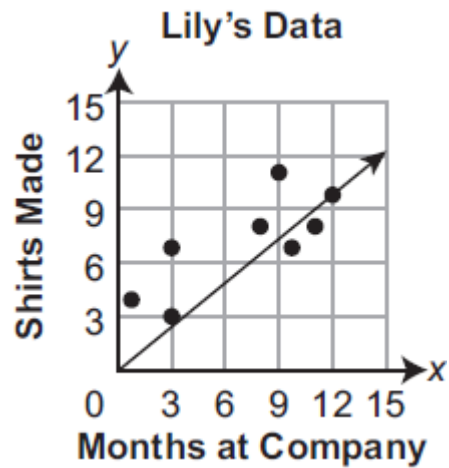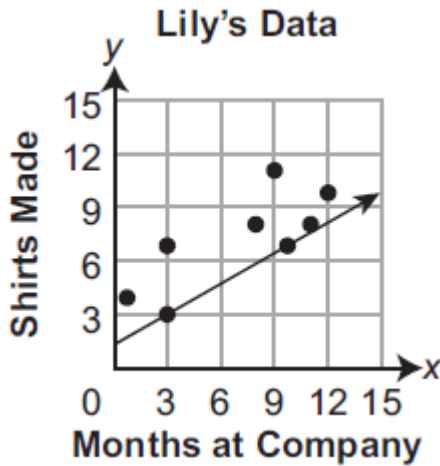
15. Camila was filling a barrel with sand. She poured the new sand through a funnel and into the barrel at a constant rate. The barrel already had some sand in it. She used the graph below to mark the total volume, in cubic feet, of sand in the barrel at different times after she began filling the barrel.

Sand Poured into Barrel
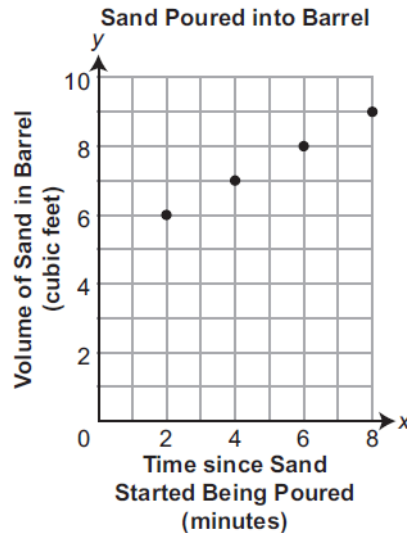
Which equation represents the volume (y), in cubic feet, of sand x minutes after Camila started filling the barrel?

(A) $y = \dfrac{x}{2}x + 5$

(B) $y = \dfrac{x}{2}x + 6$

(C) $y = 2x + 5$

(D) $y = 2x + 6$

16. Keith is hiring a contractor to do some work on his house. He asks eight contractors to provide an estimate of their total time to complete the work and the total amount of money they will charge. The results are shown in the graph below.

Keith's Time and Cost Estimates
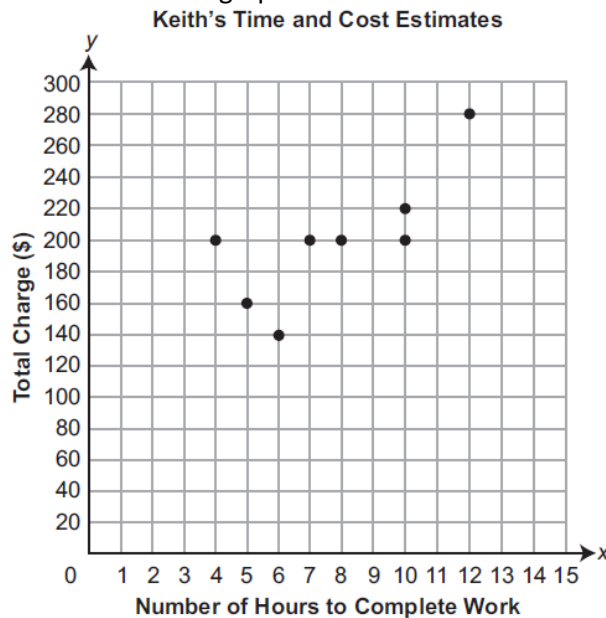
Which equation **most closely** matches the line of best fit for Keith's time and cost estimates?

(A) $y = 10x + 160$

(B) $y = 10x + 115$

(C) $y = 15x + 50$

(D) $y = 200$

17. There is a negative correlation between the number of hours a student watches television and his or her social studies test score. Which scatter plot below displays this correlation?

(A)

(B)

(C)

(D)
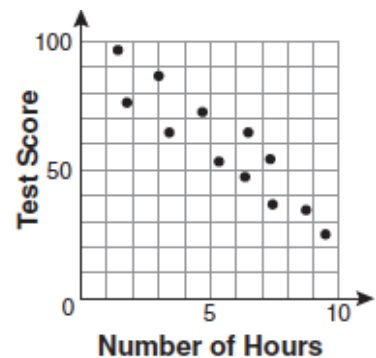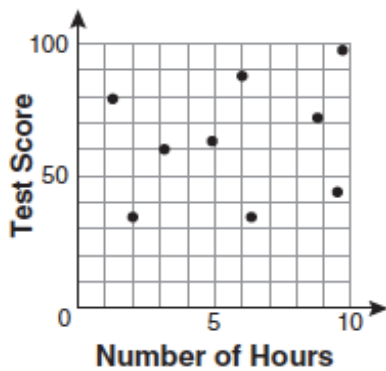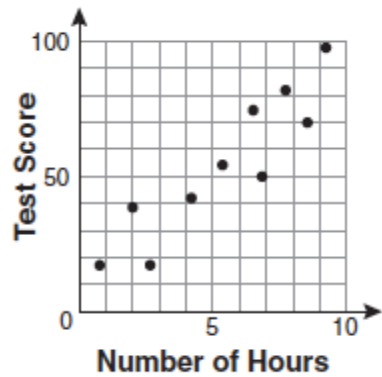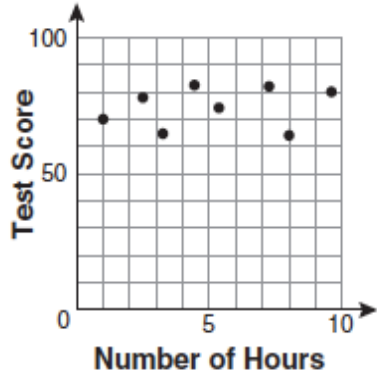
18. Joaquin takes the bus to and from school each day. He recorded the number of people on the bus when he got on the bus each morning and the number of people on the bus when he got off the bus each afternoon for 5 days. His data is shown on the coordinate plane below.

Joaquin's Bus Passenger Data
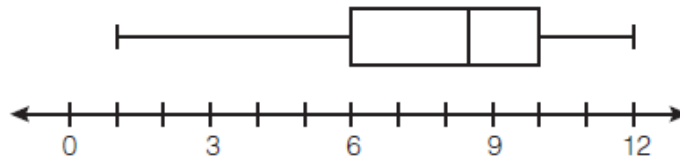
19.
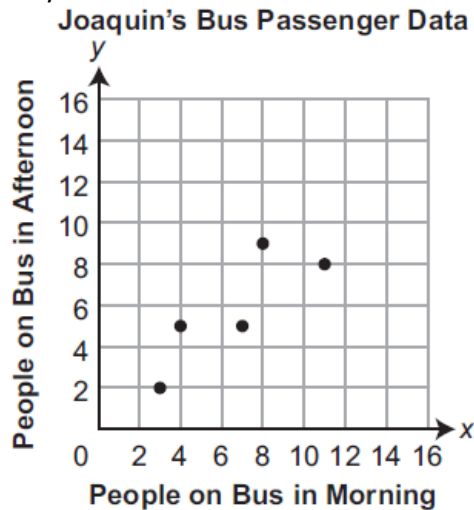
20. Which equation describes the line of best fit for Joaquin's data?

(A) $y = 0.7x + 1.1$ (B) $y = 0.8x - 0.3$ (C) $y = 1.0x + 1.0$ (D) $y = 1.0x + 5.0$
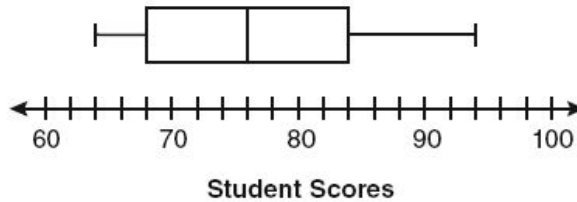
A1.2.3.1 Use measures of dispersion to describe a set of data.

1. What is the value of the third quartile shown on the box-and-whisker plot below?

   (A) 6   (B) 8.5   (C) 10   (D) 12

2. The box-and-whisker plot below represents students' scores on a recent English test.

Student Scores

What is the value of the upper quartile?

   (A) 68   (B) 76   (C) 84   (D) 94

3. Everyone in Sebastian's class was assigned the same novel to read. A week after the assignment was given, Sebastian asked 8 classmates how many chapters of the novel they had read. His data are shown below.

        0 2 3 4 4 6 10 14

What is the third quartile of Sebastian's data?

   (A) 3   (B) 6   (C) 8   (D) 10

4. A soccer coach recorded how many hours, rounded to the nearest hour, each of 12 soccer players practiced for last week. The first quartile of the data was 7.5. Which statement must be true?
   (A) Exactly 3 of the 12 soccer players practiced for at least 7.5 hours last week.
   (B) Exactly 3 of the 12 soccer players practiced for between 7 and 8 hours last week.
   (C) Exactly 9 of the 12 soccer players practiced for at least 7.5 hours last week.
   (D) Exactly 9 of the 12 soccer players practiced for between 7 and 8 hours last week.

5. The box-and-whisker plot below represents the math test scores of 20 students.
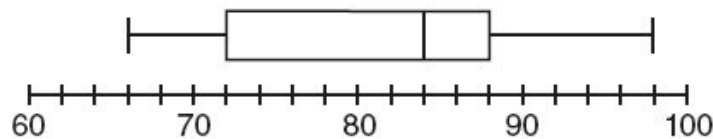
What percentage of the test scores are *less than* 72?

   (A) 25   (B) 50   (C) 75   (D) 100

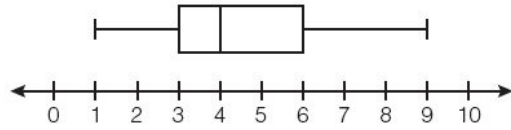6. A movie theater recorded the number of tickets sold daily for a popular movie during the month of June. The box-and-whisker plot shown below represents the data for the number of tickets sold, in hundreds.

Which conclusion can be made using this plot?

(A) The second quartile is 600.
(B) The mean of the attendance is 400.
(C) The range of the attendance is 300 to 600.
(D) Twenty-five percent of the attendance is between 300 and 400.

7. Drew works at a Laundromat. Every day for two weeks, he records the total number of loads of laundry washed at the Laundromat. The first quartile of his data is 60. The median of his data is 82. On how many of the next 200 days should Drew expect there to be at least 60 but no more than 82 loads of laundry washed at the Laundromat?

(A) 25 (B) 50 (C) 100 (D) 175

8. A data set is shown below.

   104 108 111 114 114 120 122 126 127 134

What is the first quartile value of the data set?

(A) 111 (B) 117 (C) 118 (D) 124

9. Isabella participated in a quiz competition that had a total of 150 participants. Isabella's score in the competition was equal to the third quartile of all the scores. Nobody else in the competition had the same score that Isabella had. How many people in the competition had a higher score than Isabella had?

(A) 37 (B) 50 (C) 100 (D) 147

10. The freshman class held a canned food drive for 12 weeks. The results are summarized in the table below.

Canned Food Drive Results

Week	1	2	3	4	5	6	7	8	9	10	11	12
Number of Cans	20	35	32	45	58	46	28	23	31	79	65	62

Which number represents the second quartile of the number of cans of food collected?

(A) 29.5 (B) 30.5 (C) 40 (D) 60

11. The number of songs fifteen students have on their MP3 players is:
    120, 124, 132, 145, 200, 255, 260, 292, 308, 314, 342, 407, 421, 435, 452

    State the values of the minimum, 1st quartile, median, 3rd quartile, and maximum.

    Using these values, construct a box-and-whisker plot using an appropriate scale on the line below.

A1.2.3.2 Use data displays in problem solving settings and/or to make predictions.

1. The accompanying circle graph shows how Joan invested her money.

Joan's Investments

4%
Savings
account

13%
CDs

33%
Stocks

50%
Mutual
funds
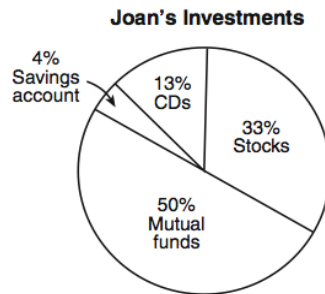
If she invested a total of $12,000, how much money did she invest in CDs?

(A) $1,560   (B) $9,230   (C) $15,600   (D) $92,308

2. The accompanying table represents the number of cell phone minutes used for one week by 23 users.

Number of Minutes	Number of Users
71–80	10
61–70	7
51–60	2
41–50	3
31–40	1

Which interval contains the median?

(A) 41–50   (B) 51–60   (C) 61–70   (D) 71–80

3. The test scores for 10 students in Ms. Sampson's homeroom were 61, 67, 81, 83, 87, 88, 89, 90, 98, and 100. Which frequency table is accurate for this set of data?

(A)

Interval	Frequency
61–70	2
71–80	2
81–90	7
91–100	10

(B)

Interval	Frequency
61–70	2
71–80	2
81–90	8
91–100	10

(C)

| Interval	Frequency
61–70	2
71–80	0
81–90	8
91–100	10

(D)

Interval	Frequency
61–70	2
71–80	0
81–90	6
91–100	2

4. The population growth of Boomtown is shown in the accompanying graph.
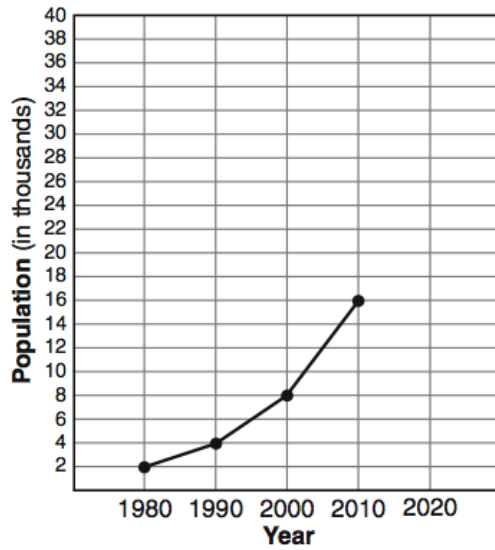
If the same pattern of population growth continues, what will the population of Boomtown be in the year 2020?

(A) 20,000   (B) 32,000   (C) 40,000   (D) 64,000

5. Derek did yard work for 12 weeks last summer to earn extra money. He earned $12 per hour. He worked a different number of hours each week. He recorded the number of hours he worked each week and used the data to make the box-and-whisker plot shown below.

Hours Derek Worked Each Week Last Summer
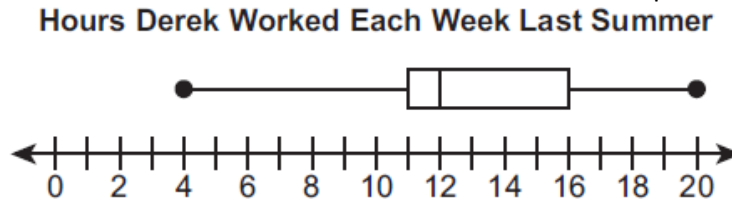
In how many of the 12 weeks last summer did Derek earn more than $192?

(A) 0   (B) 3   (C) 6   (D) 9

6. The graph below shows the change in water temperature of a glass of tap water placed into a freezer.

CHANGE IN WATER TEMPERATURE
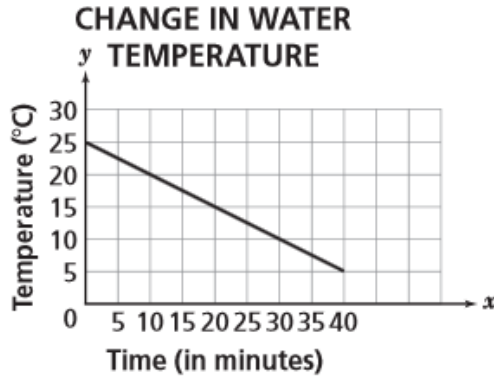
Use the information in the graph to determine how many **total minutes** it takes the water to reach 0°C.

On the lines below, explain how you determined your answer.

_____

_____

_____

_____

_____

Answer _____ minutes

7. A school newspaper took a survey of 100 students. The results of the survey showed that 43 students are fans of the Buffalo Bills, 27 students are fans of the New York Jets, and 48 students do not like either team. How many of the students surveyed are fans of *both* the Buffalo Bills and the New York Jets?
   (A) 16   (B) 18   (C) 52   (D) 70

8. In his first three years coaching baseball at High Ridge High School, Coach Batty's team won 7 games the first year, 16 games the second year, and 4 games the third year. How many games does the team need to win in the fourth year so that the coach's average will be 10 wins per year?
   (A) 13   (B) 10   (C) 3   (D) 9

9. Trent measured the humidity outside his house every day at noon for 20 days. These were his results:

33 21 39 49 44
28 18 41 50 48
26 31 44 52 41
28 32 51 47 39

Which is a correct stem-and-leaf plot for Trent's measures?

(A)
```
1 | 8
2 | 1 6 8
3 | 1 2 3 9
4 | 1 4 7 8 9
5 | 0 1 2
```

(B)
```
1 | 18
2 | 21 26 28
3 | 31 32 33 39
4 | 41 44 47 48 49
5 | 50 51 52
```

(C)
```
1 | 18
2 | 21 26 28 28
3 | 31 32 33 39 39
4 | 41 41 44 44 47 48 49
5 | 50 51 52
```

(D)
```
1 | 8
2 | 1 6 8 8
3 | 1 2 3 9 9
4 | 1 1 4 4 7 8 9
5 | 0 1 2
```
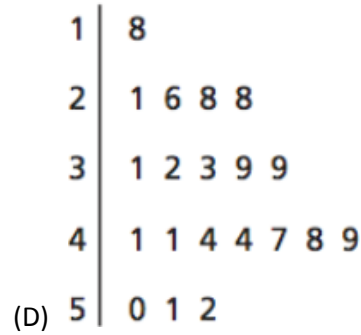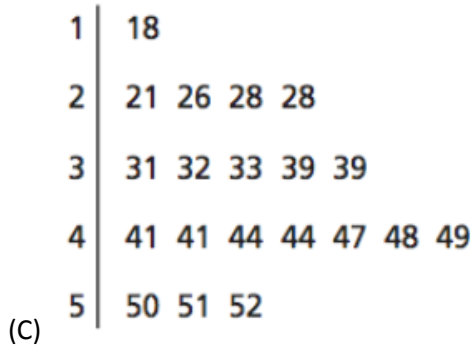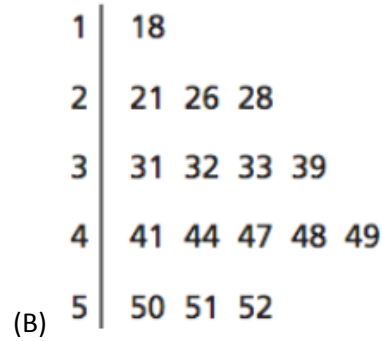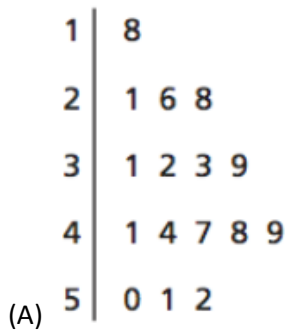
10. The cast of a play put on 12 performances. They sold more tickets for each performance than they sold for the performance immediately before it. The box-and-whisker plot below shows some information about the number of tickets sold for each performance.

Tickets Sold per Performance

112 116 120 124 128 132 136 140

Number of Tickets Sold
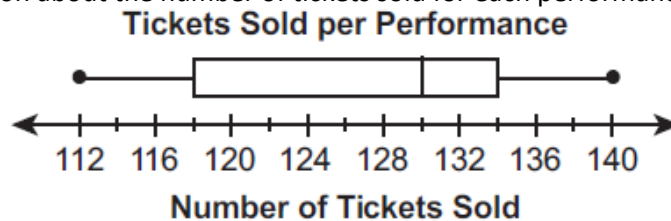
For their first 3 performances, the cast sold 112, 114, and 116 tickets. How many tickets did they sell for their fourth performance?

(A) 118   (B) 120   (C) 124   (D) 130

11. The test scores from Mrs. Gray's math class are shown below.

72, 73, 66, 71, 82, 85, 95, 85, 86, 89, 91, 92

Construct a box-and-whisker plot to display these data.
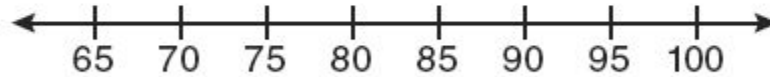

12. Talia recorded how long it took her to run 400 meters in each of her last 8 races. Her times, rounded to the nearest tenth of a second, are listed below.

62.1   60.9   60.4   60.2   60.0   58.5   57.4   57.4

What is the **median**, in seconds, of Talia's times?

(A) 59.6   (B) 60.0   (C) 60.1   (D) 60.2

13. The students in a college class all read four books by a certain author. The professor asked 25 of the 125 students in the class to pick their favorite of the four books. The circle graph below displays the results.
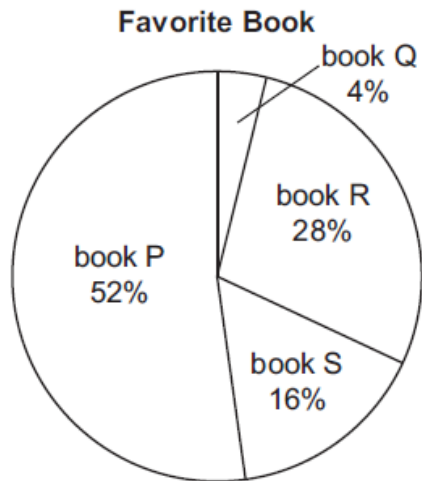
Favorite Book

Based on the circle graph, how many of the 125 students in the class would be expected to pick book Q as their favorite?

(A) 4   (B) 5   (C) 20   (D) 50

91

14. A restaurant owner recorded the amount of money spent per person for the 30 most recent customers. The owner calculated the measures of central tendency shown below.
    - mean: $16.11
    - median: $19.72

    Based on the data, what is the total amount of money the restaurant owner should expect the next 30 customers to spend at the restaurant?

    (A) $108.30   (B) $295.80   (C) $483.30   (D) $591.60

15. Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?
    (A) median < mode < mean   (B) mean < mode < median
    (C) mode < median < mean   (D) mean < median < mode

16. Lara asked 20 people how many coins each person had in his or her pockets. She used this data to calculate the measures of central tendency shown below.

    - mean: 8.4

    - median: 3.5

    Which statement about the people Lara surveyed is **most likely** true?

    (A) Nobody had more than 12 coins in his or her pockets.
    (B) Exactly 10 people had more than 8 coins in their pockets.
    (C) The person who had the most coins in his or her pockets had at least 14 coins.
    (D) The same number of people had exactly 3 coins in their pockets as had exactly 4 coins in their pockets.

17. Ms. Mosher recorded the math test scores of six students in the table below.

Student	Student Score
Andrew	72
John	80
George	85
Amber	93
Betty	78
Roberto	80

    Part A: Determine the mean of the student scores, to the *nearest tenth*.

    Part B: Determine the median of the student scores.

    Part C: Describe the effect on the mean and the median if Ms. Mosher adds 5 bonus points to each of the six students' scores.

18. This year, John played in 10 baseball games. In these games he had hit the ball 2, 3, 0, 1, 3, 2, 4, 0, 2, and 3 times. In the first 10 games he plays next year, John wants to increase his average (mean) hits per game by 0.5. What is the total number of hits John needs over the first 10 games next year to achieve his goal?
    (A) 5   (B) 2   (C) 20   (D) 25

19. TOP Electronics is a small business with five employees. The mean (average) weekly salary for the five employees is $360. If the weekly salaries of four of the employees are $340, $340, $345, and $425, what is the salary of the fifth employee?

20. On the first six tests in her social studies course, Jerelyn's scores were 92, 78, 86, 92, 95, and 91. Determine the median and the mode of her scores. If Jerelyn took a seventh test and raised the mean of her scores *exactly* 1 point, what was her score on the seventh test?

21. The two box-and-whisker plots below show the number of cans the members of the sophomore and junior classes collected for a fundraiser.

NUMBER OF CANS COLLECTED
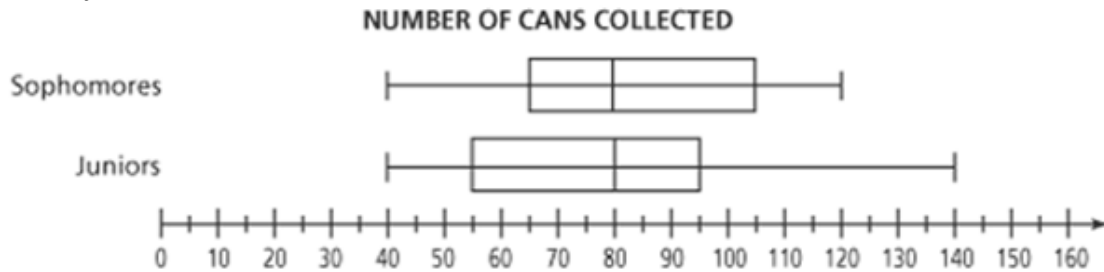
What statement about the data in the two plots must be true?

    (A) The sophomores and juniors collected the same number of cans.
    (B) The median number collected was the same for both classes.
    (C) The mean number collected was the same for both classes.
    (D) The upper extreme value was the same for both classes.

22. What is the mean of the data in the accompanying table?

Scores (x_i)	Frequency (f_i)
25	3
20	2
11	5
10	4

    (A) 11   (B) 14.5   (C) 15   (D) 16

23. Which statement is true about the data set 3, 4, 5, 6, 7, 7, 10?
   (A) mean = mode   (B) mean > mode   (C) mean = median   (D) mean < median

24. A survey was conducted asking people how many magazine articles they read last month. A random sample of the number of magazine articles read from the data set is shown below.

    3   6   6   10   20   23   27   28

    A total of 200 people responded to the magazine survey.

    Part A. Draw a box-and-whisker plot to represent the random sample over the number line given below.

    ## Magazine Survey
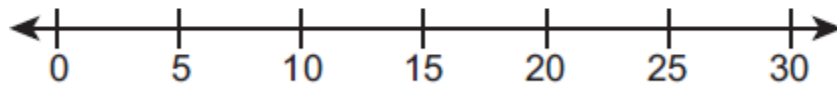
    Number of Articles Read

    Part B. Use the **mean** of the random sample to predict the total number of magazine articles that were read last month by all the people who responded to the survey. Show or explain all your work.

25. The prices of seven race cars sold last week are listed in the table below.

Price per Race Car	Number of Race Cars
$126,000	1
$140,000	2
$180,000	1
$400,000	2
$819,000	1

    What is the mean value of these race cars, in dollars? _____

    What is the median value of these race cars, in dollars? _____

    State which of these measures of central tendency best represents the value of the seven race cars. Justify your answer.

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26. Artie has a book of short stories. The number of each type of short story is shown below.
    - 6 science-fiction stories
    - 4 adventure stories
    - 3 historical stories
    - 2 sports stories

He selects one short story at random. What is the probability that the story Artie selects is either a science-fiction story or an adventure story?

(A) $\dfrac{1}{3}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{2}{3}$ (D) $\dfrac{2}{1}$

27. At a baseball game, 45% of the fans are wearing jackets. Also, 30% of the fans are wearing baseball caps. Whether a fan is wearing a jacket is independent of whether the fan is wearing a baseball cap. What is the probability that a randomly selected fan is **not** wearing a jacket and is wearing a baseball cap?

(A) 13.5%   (B) 16.5%   (C) 75%   (D) 85%

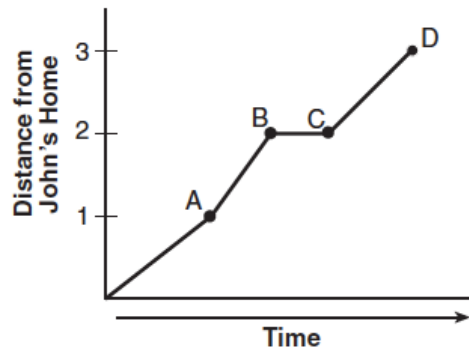28. The accompanying stem-and-leaf plot represents Ben's test scores this year.

6	5	8				
7	2	3	3	3	3	9
8	1	3	3	6	7	
9	6	9	9			

Key: 7 | 2 = 72

What is the median score for this set of data?

(A) 73   (B) 79   (C) 80   (D) 81

29. John left his home and walked 3 blocks to his school, as shown in the accompanying graph.

What is one possible interpretation of the section of the graph from point B to point C?

(A) John arrived at school and stayed throughout the day.
(B) John waited before crossing a busy street.
(C) John returned home to get his mathematics homework.
(D) John reached the top of a hill and began walking on level ground.

A1.2.3.3 Apply probability to practical situations.

1. The probability that Jinelle's bus is on time is $\frac{2}{3}$, and the probability that Mr. Corney is driving the bus is $\frac{4}{5}$. What is the probability that on any given day Jinelle's bus is on time and Mr. Corney is the driver?

   (A) $\frac{2}{15}$
   (B) $\frac{8}{15}$
   (C) $\frac{10}{12}$
   (D) $\frac{6}{8}$

2. Pam is playing with red and black marbles. The number of red marbles she has is three more than twice the number of black marbles she has. She has 42 marbles in all. How many red marbles does Pam have?

   (A) 13
   (B) 15
   (C) 29
   (D) 33

3. A spinner is divided into eight equal regions as shown in the diagram below.
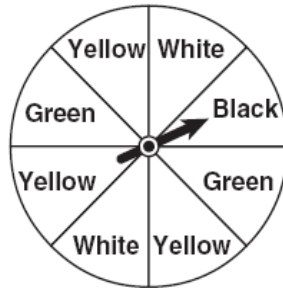
   Which event is most likely to occur in one spin?

   (A) The arrow will land in a green or white area.
   (B) The arrow will land in a green or black area.
   (C) The arrow will land in a yellow or black area.
   (D) The arrow will land in a yellow or green area.

4. A box contains 3 pens, 2 markers, and 1 highlighter. Tara selects one item at random and does not return it to the box. She then selects a second item at random. What is the probability that Tara selects 1 pen and then 1 marker?

   (A) $\frac{5}{36}$
   (B) $\frac{27}{30}$
   (C) $\frac{6}{30}$
   (D) $\frac{6}{36}$

5. Eric's mother wants to help him with his math homework. She puts 24 cookies in a cookie jar. Twelve of the cookies are chocolate chip, 8 are oatmeal, and 4 are peanut butter. She then has Eric select a cookie from the jar without looking. Next, without replacing the first cookie, Eric picks a second cookie without looking in the jar. What is the probability Eric will pick an oatmeal cookie first and a chocolate chip cookie second?

   (A) $\frac{1}{6}$
   (B) $\frac{4}{23}$
   (C) $\frac{5}{6}$
   (D) $\frac{59}{69}$

6. The probability that a planted watermelon seed will sprout is $\frac{3}{4}$. If Peyton plants seven seeds from a slice of watermelon, find, to the *nearest ten thousandth*, the probability that *at least* five will sprout.

7. Clayton has three fair coins. Find the probability that he gets two tails and one head when he flips the three coins.

8. The faces of a cube are numbered from 1 to 6. If the cube is tossed once, what is the probability that a prime number or a number divisible by 2 is obtained?

   (A) $\frac{6}{6}$ (B) $\frac{5}{6}$ (C) $\frac{4}{6}$ (D) $\frac{1}{6}$

9. Brianna is using the two spinners shown below to play her new board game. She spins the arrow on each spinner once. Brianna uses the first spinner to determine how many spaces to move. She uses the second spinner to determine whether her move from the first spinner will be forward or backward.
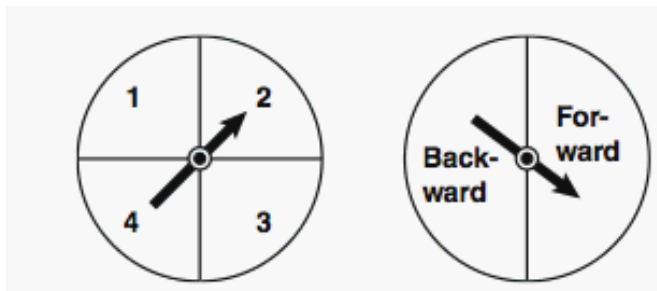
   Find the probability that Brianna will move *fewer than* four spaces *backward*.

10. Mack, Nina, Samuel, and Tara play a board game. Each of them is equally likely to go first in the game. Also, each of them is equally likely to win the game. Winning the game is independent of going first. What is the probability Samuel goes first and wins the game?
    (A) 0   (B) 0.0625   (C) 0.25   (D) 0.5

11. There are 14 boys and 6 girls in Emily's class. One student in Emily's class is chosen each day to hand out calculators to all the students. Also, one student in Emily's class is chosen each day to collect calculators at the end of class. The same student can be chosen for each job. Each student is equally likely to be chosen. What is the probability a girl is selected to do both jobs on Monday?

    (A) $\frac{3}{38}$ (B) $\frac{9}{100}$ (C) $\frac{107}{190}$ (D) $\frac{3}{5}$

12. Maria is doing a probability experiment. She has a bag containing marbles of different colors. The probability of selecting each color of marble is given in the table below.

Marble Probabilities

Color	Probability of Selecting
blue	$\frac{1}{2}$
green	$\frac{1}{8}$
red	$\frac{5}{16}$
yellow	$\frac{1}{16}$

What is the probability that Maria randomly selects a green marble, replaces the marble, and then randomly selects a red marble?

(A) $\frac{5}{128}$ (B) $\frac{1}{4}$ (C) $\frac{7}{16}$ (D) $\frac{5}{8}$

13. There are 5 red marbles, 3 blue marbles, and 2 green marbles in a bag.

All marbles are returned to the bag.

All marbles are returned to the bag.

All marbles are returned to the bag.

A. When 1 marble is selected at random from the bag, what is the probability that the marble is green?

B. When 2 marbles are selected at the same time and at random from the bag, what is the probability that **neither** of the marbles are blue?

C. When 2 marbles are selected at the same time and at random from the bag, what is the probability that exactly 1 of the marbles is red?

D. Describe an event with selecting marbles at random from this bag where the probability is $\frac{1}{6}$.