

Florida Algebra I EOC Online Practice Test



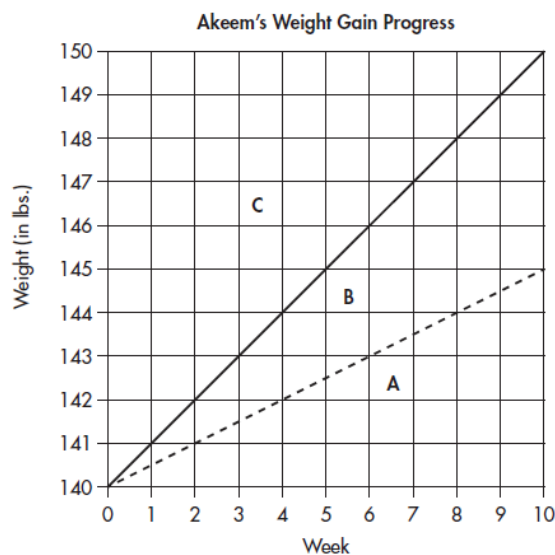
Directions: This practice test contains 65 multiple-choice questions. Choose the best answer for each question. Detailed answer explanations appear at the end of the test.

- 1** Sandi and Felipe are participating in a Walk for Life to raise money for charity. Sandi will raise \$30, plus \$2.50 for each mile she walks. Felipe will raise \$20, plus \$5 for each mile he walks. The total amount that each will raise can be calculated using the following expressions, where n stands for the number of miles walked:

$$\text{Sandi: } 30 + 2.5n \quad \text{Felipe: } 20 + 5n$$

After how many miles will Sandi and Felipe have raised the same amount of money?

- (A) 3.5
 (B) 4
 (C) 6.5
 (D) 8
- 2** Akeem weighs 140 pounds(lbs) and hopes to add weight in order to play football in the fall. He hopes to gain between 0.5 and 1.0 pound (lb) per week over the next 10 weeks. Akeem will record his progress on the graph below. On the graph, the solid line represents a weight-gain rate of exactly 1.0 pound per week. The dotted line represents a weight-gain rate of exactly 0.5 pound per week.



If Akeem gains more than 1 pound per week, which region on the graph will contain all possible points that could represent Akeem's weight-gain progress?

- (F) region A
 (G) region B
 (H) region C
 (I) regions B and C combined

Answers

1 (B)

To find the correct number of miles, n , solve the equation $30 + 2.5n = 20 + 5n$. Subtract $2.5n$ from each side to get $30 = 20 + 2.5n$. Now subtract 20 from each side to get $10 = 2.5n$. Then $n = \frac{10}{2.5} = 4$.

2 (H)

Region C represents all points greater than 1 pound per week.

- 3 Lena sells earrings from a booth at the arts fair. She pays \$200 to rent the booth. She makes \$5 from each pair of earrings she sells. Her profit, P , can be found using the following equation, where n is the number of pairs of earrings sold.

$$P = 5n - 200$$

How many pairs of earrings must Lena sell to earn a profit of \$450?

- (A) 100
(B) 130
(C) 140
(D) 150
- 4 Given the relation $\{(0, 5), (9, 2), (7, 1), (6, 3)\}$, what is the sum of all the elements in the range?

--	--	--	--	--	--	--	--

- 5 What is the value of x in the equation $-3x + 19 = 2x + 106$?

--	--	--	--	--	--	--	--

- 6 $\sqrt{243} - \sqrt{75} = \sqrt{n}$. What is the value of n ?

--	--	--	--	--	--	--	--

- 7 What is the solution of the system of equations shown below?

$$\begin{cases} y = 4x - 10 \\ y = 2x \end{cases}$$

- (A) (5, 10)
(B) (0, -10)
(C) (-2, -4)
(D) (6, 11)

Answers

3 (B)

To find the correct number of pairs of earrings, n , solve the equation $450 = 5n - 200$. Add 200 to each side to get $650 = 5n$. Then $n = \frac{650}{5} = 130$.

4 The correct answer is 11. The range is the set of all second members of each ordered pair. Thus, the range is $\{5, 2, 1, 3\}$. The sum of these numbers is 11.

5 The correct answer is -17.4 . Subtract $2x$ from each side to get $-5x + 19 = 106$. Next, subtract 19 from each side, which leads to $-5x = 87$. Then $x = \frac{87}{-5} = -17.4$.

6 The correct answer is 48. $\sqrt{243} = \sqrt{81} \times \sqrt{3} = 9\sqrt{3}$ and $\sqrt{75} = \sqrt{25} \times \sqrt{3} = 5\sqrt{3}$. Thus, $9\sqrt{3} - 5\sqrt{3} = 4\sqrt{3} = \sqrt{16} \times \sqrt{3} = \sqrt{48}$.

7 (A)

Substitute the expression for y from the second equation into the first equation. Then $y = 4x - 10$ becomes $2x = 4x - 10$. Subtract $4x$ from each side to get $-2x = -10$. Then $x = \frac{-10}{-2} = 5$. Using the second equation, $y = (2)(5) = 10$. Therefore, the solution is the point $(5, 10)$.

- 8 In her catering business, Maria prepares and serves Italian food. The amount of lasagna is prepared according to the following table.

Number of Guests	Pans of Lasagna
10	3
20	6
30	9
40	12

Based on the pattern in the table, how many pans of lasagna should be prepared for 250 guests?

--	--	--	--	--	--	--

- 9 Mrs. Sanchez writes the following table of x and y values on the chalkboard and asks the class to find an equation that fits the values in the table.

x	y
-2	-6
0	-2
2	2
4	6

Which of the following equations describes the relationship between x and y ?

- (A) $y = 2x - 2$
 (B) $y = -2x - 2$
 (C) $y = 4x + 2$
 (D) $y = 4x - 2$
- 10 Lamar works in the quality control section of a toy company. The factory is producing 3,000 Steel Man action figures. Lamar randomly chose 120 of them and had them examined for defects. Of these 120 figures, eight of them had defects. If this ratio held true for all 3,000 figures, how many additional figures of the remaining 2,880 figures would have defects?
- (F) 200
 (G) 192
 (H) 150
 (I) 125

Answers

- 8** The correct answer is 75. According to the table, there are 3 pans of lasagna for every 10 guests. Let x represent the required number of pans of lasagna for 250 guests. Then $\frac{10}{3} = \frac{250}{x}$. Cross-multiply to get $10x = 750$. Thus, $x = \frac{750}{10} = 75$.

- 9** (A)

For the equation $y = mx + b$, the slope is represented by m and the y -intercept is represented by b . Use the first two pairs of points, $(-2, -6)$ and $(0, -2)$. Then $m = \frac{-2 - (-6)}{0 - (-2)} = \frac{4}{2} = 2$. By definition, the value of b is given by the y -coordinate in the ordered pair $(0, -2)$, which is -2 . Thus, the required equation is $y = 2x - 2$.

- 10** (G)

Let x represent the expected number of figures with defects out of the total of 3,000 figures. Then $\frac{8}{120} = \frac{x}{3,000}$. Cross-multiply to get $120x = 24,000$. So, $x = \frac{24,000}{120} = 200$. This means that $200 - 8 = 192$ additional figures will have defects.

- 11** The height (h) of an object after t seconds is given by the equation $h = -2t^2 - 9t + 56$? In how many seconds will the object strike the ground?

--	--	--	--	--	--	--

- 12** A scale model of a rectangular plot of land is 13 inches long by 12 inches wide. If the actual length of this plot is 780 feet, what is its actual area, in square feet?

- (F) 9,360
(G) 121,680
(H) 406,080
(I) 561,600

- 13** Set A contains 20 elements, set B contains 15 elements, and set $A \cap B$ contains 6 elements. How many elements are contained in the set $A \cup B$?

--	--	--	--	--	--	--

- 14** In factoring the expression $12x^2y^3 + 20x^3y$, which of the following is the greatest common factor?

- (F) $8x^3y^3$
(G) $8x^2y$
(H) $4x^2y$
(I) $4xy$

- 15** Given the equation $A = B + C^2D$, which of the following is the correct expression for D ?

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

Answers

- 11** The correct answer is 3.5. Substitute $h = 0$ into the equation. Then $0 = -2t^2 - 9t + 56$. The right side can be factored so that $0 = -1(2t - 7)(t + 8)$. So, $2t - 7 = 0$ or $t + 8 = 0$. Use only the positive value of t . If $2t - 7 = 0$, then $2t = 7$. Thus, $t = 3.5$. (The other answer of $t = -8$ is rejected.)

- 12** (I)

Let x represent the actual width, in feet. Then $\frac{13}{12} = \frac{780}{x}$. Cross-multiply to get $13x = 9,360$. So $x = \frac{9,360}{13} = 720$. Thus, the actual area is given by $(780)(720) = 561,600$ square feet.

- 13** The correct answer is 29. The cardinality of any set X is denoted as $n(X)$. For any two sets A and B , $n(A \cup B) = n(A) + n(B) - n(A \cap B)$. By substitution, $n(A \cup B) = 20 + 15 - 6 = 29$.

- 14** (H)

$12 = 2^2 \times 3$ and $20 = 2^2 \times 5$. Their greatest common factor is $2^2 = 4$. For each of the variables, the greatest common factor is the lowest exponent in either expression. Then the greatest common factor for the variables x and y is x^2y . Thus, the greatest common factor for both terms is $4x^2y$.

- 15** (C)

The first step in solving for D is to subtract B from each side. Then $A - B = C^2D$. The second (and final step) is to divide each side by C^2 . Thus, $\frac{A - B}{C^2} = D$.

- 16 What are the coordinates of the x -intercept of the line that is represented by the equation $7x + 4y = 28$?

(F) (0, 4)
(G) (0, 7)
(H) (4, 0)
(I) (7, 0)

- 17 For the simplified form of the product of $(3x^2 + 7)(2x + 9)$, what is the sum of the coefficients of the x^2 term and the x term?

--	--	--	--	--	--	--

- 18 Which of the following is a sufficient condition to show that a graph of a equation does NOT represent a function?

(F) The domain is the set of all real numbers.
(G) A horizontal line intersects the graph at more than one point.
(H) There is exactly one y -intercept.
(I) A vertical line intersects the graph at more than one point.

- 19 What is the result of multiplying $6x^2yz^3$ by $8x^2y^4z^3$?

(A) $48x^2yz^3$
(B) $48x^2y^4z^6$
(C) $48x^3y^5z^9$
(D) $48x^3y^5z^6$

- 20 At a planetarium show, children's tickets cost \$10 apiece and adults' tickets cost \$20 apiece. These are the only two types of tickets sold. At a recent show, 29 tickets were sold for a total revenue of \$430. How many children's tickets were sold?

(F) 17
(G) 15
(H) 14
(I) 13

Answers

16 (H)

The x -intercept is found by setting y equal to 0, then solving for x . Then $7x + (4)(0) = 28$, which becomes $7x = 28$. Dividing each side by 7 leads to $x = 4$. Therefore the x -intercept is represented by $(4, 0)$.

17

The correct answer is 41. $(3x^2 + 7)(2x + 9) = 6x^3 + 27x^2 + 14x + 63$. The sum the x^2 and the x terms is $27 + 14 = 41$.

18 (I)

If a vertical line intersects the graph more than once, then this implies that there are at least two points for which the x value is identical and the y value is different. This would violate the definition of a function.

19 (D)

First multiply 6 by 8 to get 48. The rule for multiplication of terms with exponents is to add exponents of identical variables. Remember that x means x^1 . Then $(x^2yz^3)(xy^4z^3) = x^{2+1}y^{1+4}z^{3+3} = x^3y^5z^6$.

20 (G)

Let x represent the cost of a child's ticket and y represent the cost of an adult's ticket. The cost (in dollars) of all adult tickets is $10x$ and the cost (in dollars) of all children tickets is $20y$. Then we need to solve the following system of equations.

$$\begin{cases} 10x + 20y = 430 \\ x + y = 29 \end{cases}$$

In order to eliminate y , multiply the second equation by 20 to get $20x + 20y = 580$. Now subtract the first equation to get $10x = 580 - 430 = 150$. Thus, $x = \frac{150}{10} = 15$, which is the number of children's tickets. (Note that the number of adult tickets is $29 - 15$, which is 14.)

- 21** What is the solution for x in the inequality $-3x + 4 < 16$?
- (A) $x < -\frac{20}{3}$
- (B) $x > -4$
- (C) $x < -\frac{20}{3}$
- (D) $x < -4$
- 22** What are the coordinates of the y -intercept of the line that is represented by the equation $6x - 5y = 30$?
- (F) $(0, -6)$
- (G) $(0, -5)$
- (H) $(5, 0)$
- (I) $(6, 0)$
- 23** What is the value of x in the equation $5(2x - 3) + 2(7x + 2) = 37$?
- (A) 2
- (B) 3
- (C) 4
- (D) 5
- 24** A health club charges \$150 per month for each member, plus an hourly rate of \$5 for the use of the club's facilities. The function shown below can be used to determine the cost in dollars per month for the use of this health club's facilities.

$$f(h) = 150 + 5h.$$

Janine used the club's facilities in October, November, and December. If she paid \$300 in October, \$380 in November, and \$330 in December, how many total hours did she spend at the club during these three months?

--	--	--	--	--	--	--	--

- 25** What is the slope of the line that contains the points $(-2, -7)$ and $(-6, 4)$?

--	--	--	--	--	--	--	--

Answers

21 (B)

Subtract 4 from each side to get $-3x < 12$. The final step is to divide each side by -3 . When dividing (or multiplying) an inequality by a negative number, the inequality symbol must be reversed. This means that $<$ must change to $>$. So, $\frac{-3x}{-3} > \frac{12}{-3}$, which simplifies to $x > -4$.

22 (F)

The y -intercept is found by setting x equal to 0, then solving for y . Then $(6)(0) - 5y = 30$, which becomes $-5y = 30$. Dividing each side by -5 leads to $y = -6$. Therefore, the y -intercept is represented by $(0, -6)$.

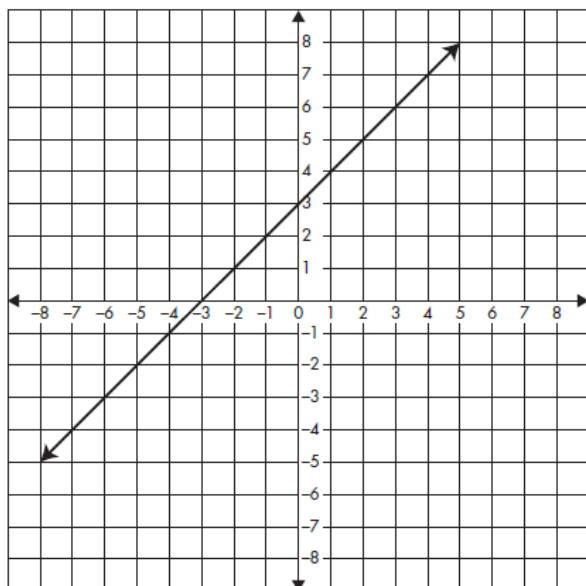
23 (A)

Using the Distributive Law of Addition over Multiplication, we get $10x - 15 + 14x + 4 = 37$. Combining like terms on the left side leads to $24x - 11 = 37$. Add 11 to each side to get $24x = 48$. Finally, divide each side by 24 to get the answer of $x = 2$.

24 The correct answer is 112. For October, the number of hours is found by solving the equation $300 = 150 + 5h$. Then $150 = 5h$, so $h = 30$. Similarly, the number of hours for November and December are found by solving the equations $380 = 150 + 5h$ and $330 = 150 + 5h$, respectively. For the equation $380 = 150 + 5h$, we can simplify it to $230 = 5h$, so $h = 46$. Also, the equation $330 = 150 + 5h$ can be simplified to $180 = 5h$, which means that $h = 36$. Thus, the total number of hours is $30 + 46 + 36 = 112$.

25 The correct answer is -2.75 . The slope is $\frac{4 - (-7)}{-6 - (-2)} = \frac{11}{-4} = -2.75$.

- 26 A line is shown on the coordinate grid below.



Which of the following represents an equation of the line?

- (F) $y = 3x + 1$
 (G) $y = 3x - 1$
 (H) $y = x + 3$
 (I) $y = x - 3$
- 27 $\frac{(6\sqrt{5})(3\sqrt{6})}{2\sqrt{10}}$ can be expressed as \sqrt{x} . What is the value of x ?

--	--	--	--	--	--	--

- 28 A function is defined as follows: $f(x) = -x^2 + 11x - 5$. If the domain is $\{0, 6, 8, 10\}$, what is the highest range value?
- (F) 10
 (G) 25
 (H) 35
 (I) 40

Answers

26 (H)

The y -intercept is $(0, 3)$, which is displayed only in answer choice (H). To verify the slope, choose two points on the graph, such as $(-3, 0)$ and $(0, 3)$. The corresponding slope is $\frac{3-0}{0-(-3)} = \frac{3}{3} = 1$. In the form $y = mx + b$, m represents the slope and b represents the y -coordinate of the y -intercept. Thus, the equation becomes $y = 1x + 3$, and $1x$ may be written as simply x .

27 The correct answer is 243. $\frac{(6\sqrt{5})(3\sqrt{6})}{2\sqrt{10}} = \frac{18\sqrt{30}}{2\sqrt{10}} = 9\sqrt{3}$. Since $9 = \sqrt{81}$, we can write $9\sqrt{3}$ as $(\sqrt{81})(\sqrt{3}) = \sqrt{243}$.

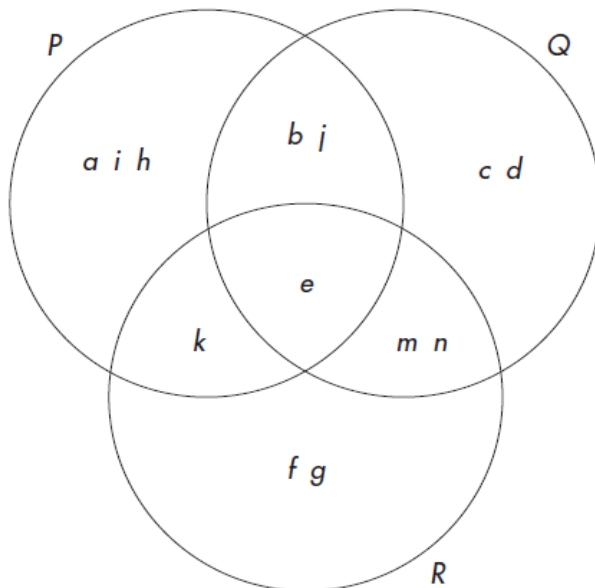
28 (G)

The corresponding range values are found by substituting each of 0, 6, 8, and 10 into $f(x) = -x^2 + 11x - 5$. Then $f(0) = -0^2 + 11(0) - 5 = -5$, $f(6) = -6^2 + 11(6) - 5 = -36 + 66 - 5 = 25$, $f(8) = -8^2 + 11(8) - 5 = -64 + 88 - 5 = 19$, and $f(10) = -10^2 + 11(10) - 5 = -100 + 110 - 5 = 5$. The highest (range) value among these is 25.

29 Which of the following is an equivalent expression for $\sqrt[3]{81x^4y^2z^{12}} + \sqrt[3]{24x^7y^2z^{27}}$?

- (A) $(3xz^4 + 2x^2z^9)(\sqrt[3]{3xy^2})$
 (B) $(18xz^4 + 8x^2z^9)(\sqrt[3]{3xy^2})$
 (C) $(3xz^8 + 2x^2z^{24})(\sqrt[3]{3xy^2})$
 (D) $(18xz^8 + 8x^2z^{24})(\sqrt[3]{3xy^2})$

30 Look at the Venn diagram shown below. The Universal set consists of only sets P , Q , and R .



Which set represents $(\sim P \cap R) - Q$?

- (F) $\{f, g, m, n\}$
 (G) $\{k, e, f, g\}$
 (H) $\{k, m, n\}$
 (I) $\{f, g\}$

31 What is the value, rounded off to the nearest tenth, of the larger root of the equation $3x^2 - 16x + 2 = 0$?

--	--	--	--	--	--	--

Answers

29 (A)

$$\sqrt[3]{81x^4y^2z^{12}} + \sqrt[3]{24x^7y^2z^{27}} = \sqrt[3]{(27)(3)(x^3)(x)(y^2)(z^{12})} + \sqrt[3]{(8)(3)(x^6)(x)(y^2)(z^{27})} = (3xz^4)(\sqrt[3]{3xy^2}) + (2x^2z^9)(\sqrt[3]{3xy^2}) = (3xz^4 + 2x^2z^9)(\sqrt[3]{3xy^2}).$$

30 (I)

$\sim P = \{c, d, f, g, m, n\}$ and $R = \{e, f, g, k, m, n\}$, so $(\sim P \cap R) = \{f, g, m, n\}$. $Q = \{b, c, d, e, j, m, n\}$. $(\sim P \cap R) - Q$ means all elements in $(\sim P \cap R)$ that are not in Q . Thus, $(\sim P \cap R) - Q = \{f, g\}$.

31

The correct answer is 5.2. Using the Quadratic equation, the solutions are given by $\frac{-(-16) \pm \sqrt{(-16)^2 - (4)(3)(2)}}{(2)(3)} = \frac{16 \pm \sqrt{256 - 24}}{6} = \frac{16 \pm \sqrt{232}}{6}$. Since $\sqrt{232} \approx 15.23$, the larger root is given by $\frac{16 + 15.23}{6} = \frac{31.23}{6} \approx 5.2$. (Note that the value of the smaller root is approximately 0.13.)

- 32** Nicky has a total of 89 coins in nickels, dimes, and quarters. He has 8 more dimes than nickels and two and one half times as many quarters as nickels. In dollars and cents, what is the total value of these coins?

--	--	--	--	--	--	--	--

- 33** What is the value of x in the following proportion? $\frac{7}{x-5} = \frac{15}{x+4}$.

--	--	--	--	--	--	--	--

For #34, 35, George is training for a marathon. The following chart shows his time (in hours) and distance run (in miles) for each of four days.

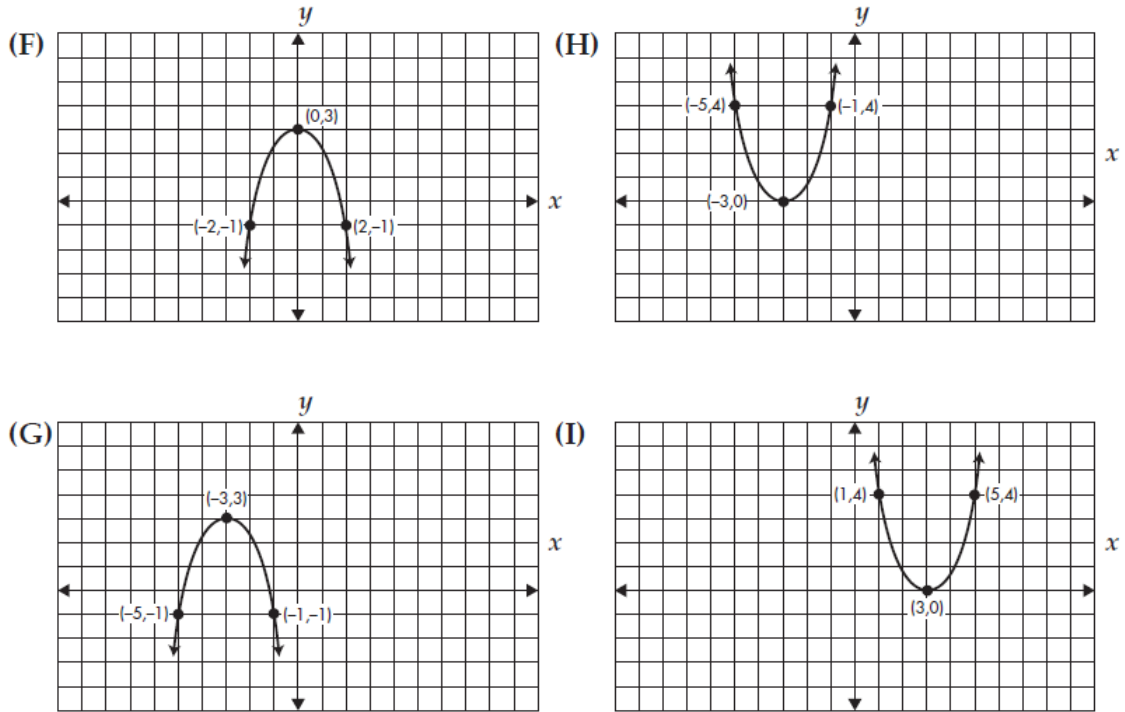
Day	Monday	Tuesday	Wednesday	Thursday
Time	1.5	2	3.5	0.6
Distance	12	15	26	5

- 34** On which day did George have the highest average speed?
- (F) Monday
 (G) Tuesday
 (H) Wednesday
 (I) Thursday
- 35** On Monday, George was not tired after completing his distance of 12 miles. If he had run an additional 3 miles at 9 miles per hour, which of the following equations would be the BEST representation of his distance in miles (Y) and his time in hours (X)?
- (A) $Y = 8.06X$
 (B) $Y = 8.18X$
 (C) $Y = 8.25X$
 (D) $Y = 8.33X$

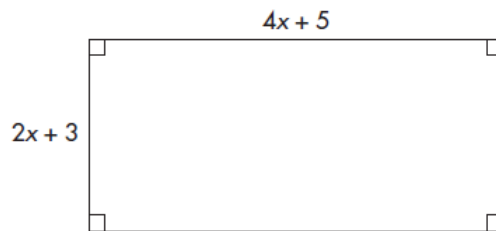
Answers

- 32** The correct answer is 14.75. Let n represent the number of nickels, $n + 8$ represent the number of dimes, and $2.5n$ represent the number of quarters. Then $n + (n + 8) + 2.5n = 89$. This equation simplifies to $4.5n + 8 = 89$. So $4.5n = 81$, which leads to $n = 18$ (number of nickels). This means that the number of dimes is 26 and the number of quarters is 45. The total value is $(18)(\$0.05) + (26)(\$0.10) + (45)(\$0.25) = \14.75 .
- 33** The correct answer is 12.875. Cross-multiply to get $(7)(x + 4) = (15)(x - 5)$, which becomes $7x + 28 = 15x - 75$. Subtract $7x$ from each side to get $28 = 8x - 75$. Adding 75 to each side leads to $103 = 8x$. Thus, $x = 12.875$.
- 34** (I)
The average speed is found by dividing the distance by the time. For Thursday, the average speed was $\frac{5}{0.6} \approx 8.33$ miles per hour. This rate exceeded that of any other day. (His speed in miles per hour for Monday, Tuesday, and Wednesday was 8.0, 7.5, and 7.43, respectively.)
- 35** (B)
By running an extra 3 miles, his total distance would have been 15 miles. His additional time would have been $\frac{3}{9} \approx 0.333$ hours. His total time would have been $1.5 + 0.333 \approx 1.833$ hours. Thus, his average speed would have been $\frac{15}{1.833} \approx 8.18$ miles per hour. Therefore, $Y = 8.18X$ is the best equation.

- 36 Which of the following is the graph of $y = x^2 + 6x + 9$?



- 37 Look at the following rectangle.



Which of the following represents the area?

- (A) $12x + 16$
- (B) $6x + 8$
- (C) $8x^2 + 15$
- (D) $8x^2 + 22x + 15$

Answers

36 (H)

Let $y = 0$. Then $0 = x^2 + 6x + 9$ and the right side can be factored as $(x + 3)^2$. The only solution to $0 = (x + 3)^2$ is $x = -3$. Thus, the point $(-3, 0)$ must lie on the graph. Only answer choice (H) satisfies this requirement. Notice that the other two named points on this graph also satisfy the equation. For $x = -5$, $y = (-5)^2 + (6)(-5) + 9 = 4$; for $x = -1$, $y = (-1)^2 + 6(-1) + 9 = 4$.

37 (D)

The area of a rectangle is its length times its width. For this diagram, the area is $(4x + 5)(2x + 3) = 8x^2 + 12x + 10x + 15 = 8x^2 + 22x + 15$.

38 What is the solution for the inequality $|-5x + 2| < 7$?

(F) $-1 < x < \frac{9}{5}$

(G) $-\frac{9}{5} < x < -1$

(H) $1 < x < \frac{9}{5}$

(I) $-\frac{9}{5} < x < 1$

39 What is the y value of the y -intercept of the line that contains the points $(-8, -5)$ and $(10, 67)$?

--	--	--	--	--	--	--

40 How many pounds of peanuts worth \$0.60 per pound should be mixed with 27 pounds of cashews worth \$0.90 per pound to create a 45-pound mixture worth \$0.78 per pound?

--	--	--	--	--	--	--

41 Which of the following is a factor of $2x^2 + 9x - 35$?

(A) $2x + 5$

(B) $2x - 7$

(C) $x - 5$

(D) $x + 7$

Answers

38 (F)

The inequality $|-5x + 2| < 7$ is equivalent to $-7 < -5x + 2 < 7$. Subtract 2 from each part to get $-9 < -5x < 5$. Now divide each part by -5 . But you must remember to change the direction of the inequality signs. Thus, $\frac{-9}{-5} > x > \frac{5}{-5}$, which can be written in simpler form as $-1 < x < \frac{9}{5}$.

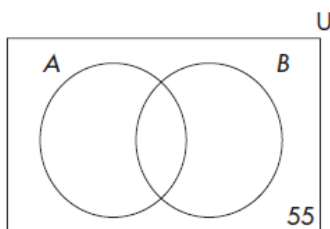
39 The correct answer is 27. The slope of the line is $\frac{67 - (-5)}{10 - (-8)} = \frac{72}{18} = 4$. Then $y = 4x + b$, where b is the y -intercept. Substituting $(10, 67)$ into this equation, we get $67 = 4(10) + b$. Thus, $b = 67 - 40 = 27$.

40 The correct answer is 18. Let x represent the number of pounds of peanuts. The value of the peanuts is $\$0.60x$ and the value of the cashews is $(27)(\$0.90) = \24.30 . Since the total value of both types of nuts is $(45)(\$0.78) = \35.10 , our equation becomes $0.60x + 24.30 = 35.10$. Subtract 24.30 from each side to get $0.60x = 10.80$. Thus, $x = \frac{10.80}{0.60} = 18$.

41 (D)

The initial stage of this trial-and-error factoring would appear as follows: $(2x \quad)(x \quad)$. We must fill in each blank with a number and a correct sign so that the cross-product yields $+9x$ and the end product yields -35 . The correct combination is $(2x - 5)(x + 7)$. Note that the cross-product is $(2x)(7) - (5)(x) = +9x$ and the end-product is $(-5)(7) = -35$.

- 42 Look at the following Venn diagram.



There are 55 elements that do not belong to either set A or set B but do belong to the Universal set U . Set A contains 72 elements, set B contains 51 elements, and U contains 168 elements. How many elements are there in the set $A \cap B$?

--	--	--	--	--	--	--

- 43 Danny wishes to solve the equation $x^2 + 7x + 10 = 4$. Which of the following would be a correct step in solving this equation?
- (A) $(x + 5)(x + 2) = 0$
- (B) $(x + 3)(x + 2) = 0$
- (C) $(x + 6)(x + 1) = 0$
- (D) $(x + 10)(x + 1) = 0$

- 44 Which of the following is equivalent to $\frac{m^9 p^{16} - m^6 p^{12}}{m^3 p^4}$?

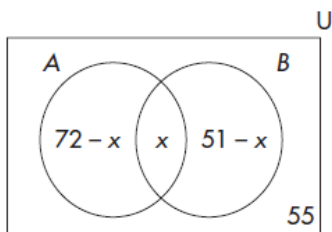
- (F) $m^3 p^4 - m^2 p^3$
- (G) $m^6 p^{12} - m^3 p^8$
- (H) mp
- (I) $m^{12} p^{24}$

- 45 Charlene will write the expression $\left(\frac{a^{-13} b^{-7}}{a^{-5} b^{10}}\right)^{-2}$ as $a^x b^y$, where x and y are positive integers. What is the sum of x and y ?

--	--	--	--	--	--	--

Answers

- 42** The correct answer is 10. Let x represent the number of elements in $A \cap B$. Then $72 - x$ represents the number of elements in A but not in $A \cap B$. Likewise, $51 - x$ represents the number of elements in B but not in $A \cap B$. With these substitutions, the Venn diagram would appear as follows.



Then $(72 - x) + x + (51 - x) + 55 = 168$. The left side of the equation can be simplified to $178 - x = 168$. Thus, $x = 10$.

- 43** (C)

By subtracting 4 from each side, Danny can write the given equation as $x^2 + 7x + 6 = 0$. Then, the left side factors as $(x + 6)(x + 1)$.

- 44** (G)

$\frac{m^9 p^{16} - m^6 p^{12}}{m^3 p^4} = \frac{m^9 p^{16}}{m^3 p^4} - \frac{m^6 p^{12}}{m^3 p^4}$. In dividing monomials with like bases, subtract the corresponding exponents. Thus, the answer is $m^6 p^{12} - m^3 p^8$.

- 45** The correct answer is 50. $\left(\frac{a^{-13} b^{-7}}{a^{-5} b^{10}}\right)^{-2} = \frac{a^{26} b^{14}}{a^{10} b^{-20}} = a^{26-10} b^{14-(-20)} = a^{16} b^{34}$. Then the sum of the exponents is 50.

- 46** You are given the Universal set of all natural numbers up through 30. Suppose M is the set of all multiples of 5 and N includes all even numbers between 11 and 21. For which of the following sets does ALL its elements belong to neither M nor N ?

(F) {15, 19, 21, 24, 26}

(G) {6, 8, 11, 22, 27}

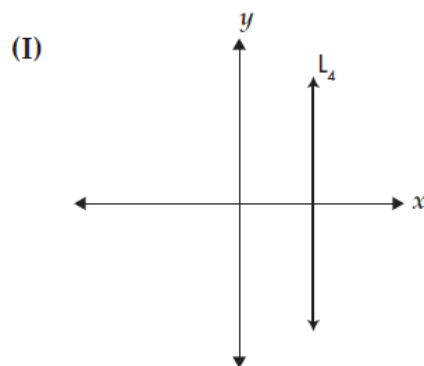
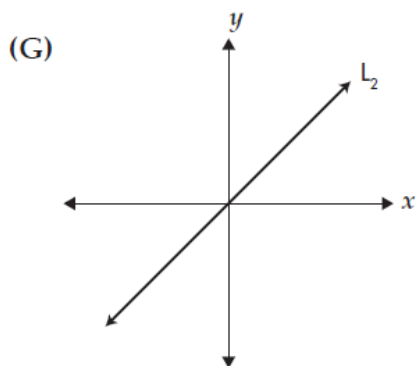
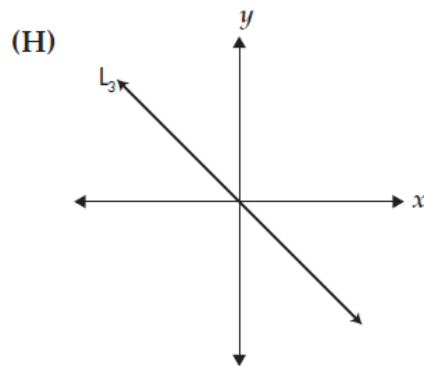
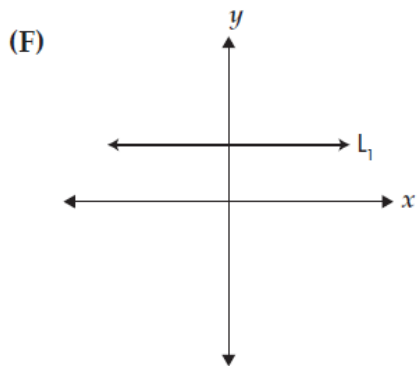
(H) {10, 16, 20, 25, 30}

(I) {2, 5, 14, 17, 29}

- 47** What is the slope of a line that is perpendicular to the line that contains the points (5, 4) and (-7, 9)?

--	--	--	--	--	--	--	--

- 48** Which of the following represents the graph of a line with an undefined slope?



Answers

46 (G)

$U = \{1, 2, 3, 4, \dots, 29, 30\}$, $M = \{5, 10, 15, 20, 25, 30\}$, and $N = \{12, 14, 16, 18, 20\}$. The set in choice (G) contains none of the elements of M or N . For the set in choice (F), the number 15 is an element of set M . For the set in choice (H), all its elements belong to either set M or set N . For the set in choice (I), the number 5 is an element of M and the number 14 is an element of N .

47 The correct answer is 2.4. The slope of the given line is $\frac{9-4}{-7-5} = -\frac{5}{12}$. The slope of a perpendicular line must be the negative reciprocal of $-\frac{5}{12}$, which is $\frac{12}{5} = 2.4$

48 (I)

A line with an undefined slope must be vertical. Its general formula is $x = k$, in which k is a constant.

Then, the left side factors as $(x + 6)(x + 1)$.

- 49** Pauline works as a sales representative for a book publishing company. Her monthly salary is calculated as follows: $S = \$2,000 + (0.18)(d - \$6,000)$. In this equation, S = her monthly salary and d = dollars of sales. (Pauline has always managed to sell at least \$6,000 worth of books each month.) Last month, her salary was \$2,594. How many dollars worth of sales did she have?

--	--	--	--	--	--	--

- 50** What is the reduced form of the fraction $\frac{x^2 - 7x - 30}{2x^2 + 7x + 3}$?
- (F) $\frac{x+3}{10}$
- (G) $\frac{x-10}{3}$
- (H) $\frac{x-10}{2x+1}$
- (I) $\frac{x+3}{2x+1}$
- 51** Consider the relation $\{(0, 7), (1, 7), (7, 1), (8, 2), (x, 9)\}$. How many different values could x assume so that this relation is NOT a function?
- (A) 1
- (B) 2
- (C) 3
- (D) 4
- 52** What is the simplified form for $\sqrt{12x} - 4\sqrt{27x} + 5\sqrt{192x}$?
- (F) $30\sqrt{3x}$
- (G) $6\sqrt{23x}$
- (H) $2\sqrt{23x}$
- (I) $59\sqrt{3x}$

Answers

- 49** The correct answer is 9300. Substitute 2,594 for S . Then $2,594 = 2,000 + (0.18)(d - 6,000)$. This equation simplifies to $2,594 = 2,000 + 0.18d - 1,080$. Then $0.18d = 2,594 - 2,000 + 1,080 = 1,674$. Thus, $d = \frac{1,674}{0.18} = 9,300$.

- 50** (H)
 $\frac{x^2 - 7x - 30}{2x^2 + 7x + 3} = \frac{(x+3)(x-10)}{(x+3)(2x+1)}$. Then cancel out the common factor of $(x + 3)$ in the numerator and denominator. The result is $\frac{x-10}{2x+1}$.

- 51** (D)
If x assumes any of the values 0, 1, 7, or 8, then this relation would contain two elements with the same x value but different y values. By definition, for any function, each given x value must correspond to exactly one y value.

- 52** (F)
 $\sqrt{12x} = (\sqrt{4})(\sqrt{3x}) = 2\sqrt{3x}$. Also, $4\sqrt{27x} = (4)(\sqrt{9})(\sqrt{3x}) = 12\sqrt{3x}$. In addition, $5\sqrt{192x} = (5)(\sqrt{64})(\sqrt{3x}) = 40\sqrt{3x}$. Thus, $2\sqrt{3x} - 12\sqrt{3x} + 40\sqrt{3x} = 30\sqrt{3x}$.

- 53** Given the equation $P = 3Q - \frac{\sqrt{R}}{4}$, which of the following is the correct expression for R ?

(A) $(4P - 3Q)^2$
(B) $(4P - 12Q)^2$
(C) $(3PQ - 4)^2$
(D) $(12PQ - 4)^2$

- 54** What is the sum of $(9x^2 - 2x + 3)$ and $(-6x^2 + 8x - 13)$, subtracted by $(3x^2 + 10x - 20)$?

(F) $-4x + 10$
(G) $-4x - 30$
(H) $6x^2 + 16x - 30$
(I) $-6x^2 - 4x - 10$

- 55** A Universal set U contains 20 elements. Sets M and N are subsets of U . Set M contains 8 elements, set N contains 5 elements, and set $M \cap N$ contains no elements. How many elements are in the Cartesian product $(\sim M \times N)$?

--	--	--	--	--	--	--	--

- 56** Two hot dogs and five soft drinks cost \$8.50. Five hot dogs and two soft drinks cost \$14.95. In dollars and cents, what is the cost of three hot dogs and three soft drinks?

--	--	--	--	--	--	--	--

Answers

53 (B)

Multiply each term by 4 to get $4P = 12Q - \sqrt{R}$. Next, subtract $12Q$ from each side to get $4P - 12Q = -\sqrt{R}$. Finally, square both sides to get $(4P - 12Q)^2 = (-\sqrt{R})^2 = R$.

54 (F)

$(9x^2 - 2x + 3) + (-6x^2 + 8x - 13) = 3x^2 + 6x - 10$. Then $(3x^2 + 6x - 10) - (3x^2 + 10x - 20) = (3x^2 + 6x - 10) + (3x^2 - 10x + 20) = -4x + 10$.

55

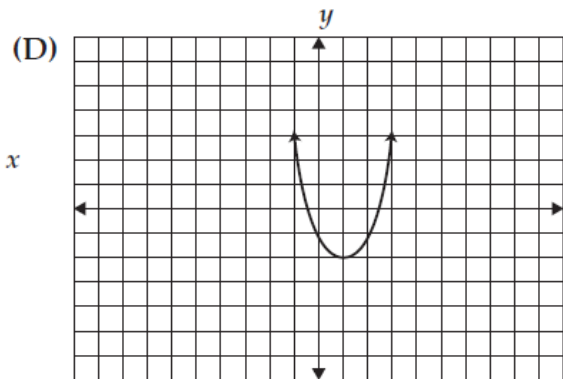
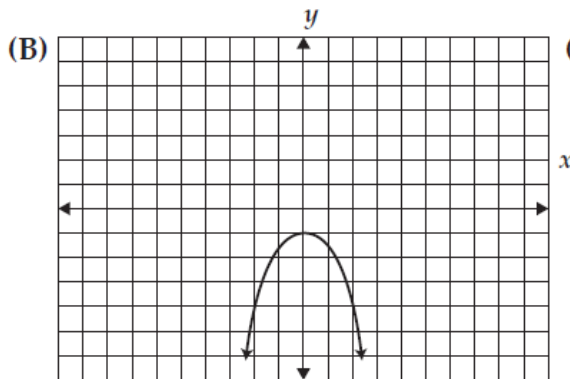
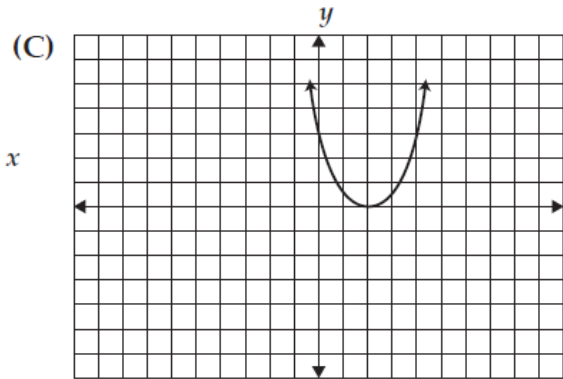
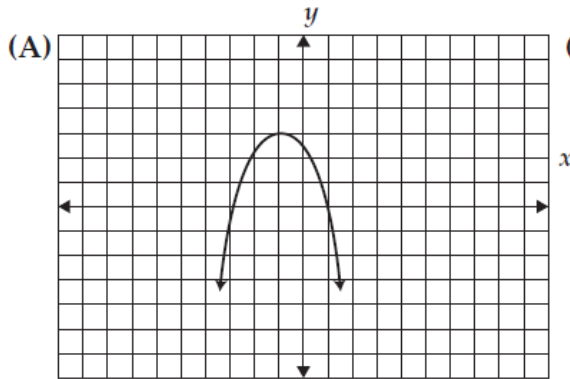
The correct answer is 60. The set $\sim M$ must contain $20 - 8 = 12$ elements. Since set N contains 5 elements, $(\sim M \times N)$ must contain $(12)(5) = 60$ elements. (Note that the statement that there are no common elements to M and N does not affect the answer.)

56

The correct answer is 10.05 Let x represent the cost of one hot dog and let y represent the cost of one soft drink. Then $2x + 5y = 8.50$ and $5x + 2y = 14.95$. Adding these equations, we get $7x + 7y = 23.45$. Divide this equation by 7 to get $x + y = 3.35$. This means that the cost of one hot dog and one soft drink is \$3.35. Thus, the cost of three hot dogs and three soft drinks is $(3)(\$3.35) = \10.05 .

$5\sqrt{192x} = (5)(\sqrt{64})(\sqrt{3x}) = 40\sqrt{3x}$. Thus, $2\sqrt{3x} - 12\sqrt{3x} + 40\sqrt{3x} = 30\sqrt{3x}$.

- 57** Which of the following represents the graph of $y = Ax^2 + Bx + C$, in which $A < 0$ and $C > 0$?



- 58** For the simplified form of $(9x^3 + x + 7) - 2x(5x^2 + 11x + 7)$, what is the sum of all the coefficients?

--	--	--	--	--	--	--

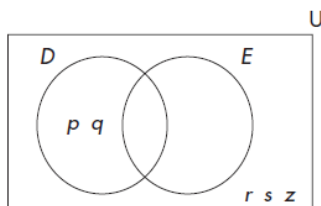
Answers

57 (A)

If $A < 0$, then the vertex of the graph must represent the highest point (maximum y value). Also, if $C > 0$, then the graph must intersect the y -axis above $(0, 0)$.

58 The correct answer is -29 . $(9x^3 + x + 7) - 2x(5x^2 + 11x + 7) = 9x^3 + x + 7 - 10x^3 - 22x^2 - 14x = -1x^3 - 22x^2 - 13x + 7$. Then $-1 - 22 - 13 + 7 = -29$.

- 59 In the Venn diagram shown below for sets D and E , the Universal set U consists of the elements $p, q, r, s, t, u, v, w, x, y$, and z . (Only the elements p, q, r, s , and z are shown in their proper regions.)



If $D \cap E = \{t, w, x, y\}$, which of the following represents the set of elements that belong to exactly one of D and E ?

- (A) $\{p, q, r, s, z\}$
 (B) $\{q, s\}$
 (C) $\{p, q, u, v\}$
 (D) $\{q, s, t, u, v, w, x, y\}$
- 60 The number $\left(\frac{2^{-3} \times 5^{-1}}{2 \times 5^{-2}}\right)^4$ is simplified to the form $2^m \times 5^n$. What is the value of mn ?

--	--	--	--	--	--	--	--

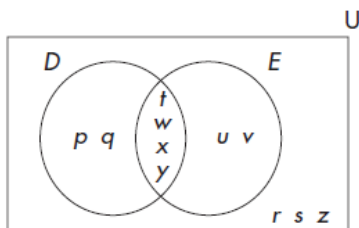
- 61 The equation of line L_1 is $x + 4y = -2$. Line L_2 is perpendicular to line L_1 . If L_2 contains the point $(5, 1)$, which of the following represents the equation of L_2 ?
- (A) $y = \frac{1}{4}x - \frac{1}{4}$
 (B) $y = -\frac{1}{4}x + \frac{9}{4}$
 (C) $y = 4x - 19$
 (D) $y = -4x + 21$

- 62 Which of the following sets contains NONE of the values of x that satisfy the inequality $-4 < 2x + 7 \leq 11$?
- (F) $\{-5, 0, 1\frac{1}{2}, 6\}$
 (G) $\{-8, -7\frac{1}{3}, 1, 2\}$
 (H) $\{-6\frac{1}{2}, -6, -5\frac{3}{4}, 2\frac{1}{5}\}$
 (I) $\{-9, -5\frac{1}{4}, 2\frac{7}{8}, 3\}$

Answers

59 (C)

There are a total of eleven elements in the Universal set. There are two elements that belong to only D , four elements that belong to both D and E , and three elements that belong to neither D nor E . This means that there are $11 - 2 - 4 - 3 = 2$ elements that belong to only E , namely u and v . Therefore, the set of elements that belong to exactly one of D and E is $\{p, q, u, v\}$. Here is the completed Venn diagram.



60 The correct answer is -64 . $\left(\frac{2^{-3} \times 5^{-1}}{2 \times 5^{-2}}\right)^{-4} = \frac{2^{12} \times 5^4}{2^{-4} \times 5^8} = 2^{12-(-4)} \times 5^{4-8} = 2^{16} \times 5^{-4}$. Thus, $mn = (16)(-4) = -64$.

61 (C)

Rewrite $x + 4y = -2$ in slope-intercept form. First subtract x from each side to get $4y = -x - 2$. Then divide each side by 4 to get $y = -\frac{1}{4}x - \frac{1}{2}$. Since the slope of L_1 is $-\frac{1}{4}$, the slope of a line perpendicular to L_1 must be the negative reciprocal of $-\frac{1}{4}$, which is 4. Then the equation for L_2 must be of the form $y = 4x + b$, where b is the y -intercept. Now substituting the point $(5, 1)$, we get $1 = (4)(5) + b$. Then $b = 1 - 20 = -19$. The equation for L_2 becomes $y = 4x - 19$.

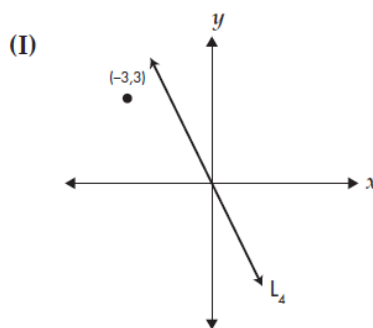
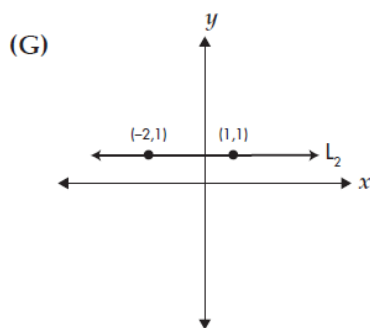
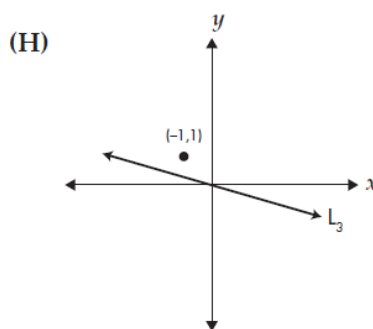
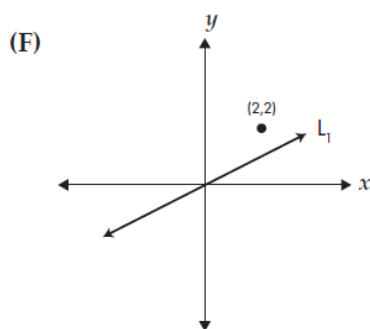
62 (H)

In order to solve $-4 < 2x + 7 \leq 11$, first subtract 7 from each part. Then $-11 < 2x \leq 4$. Now divide each part by 2 to get $-5\frac{1}{2} < x \leq 2$. For answer choice (H), none of the elements satisfy $-5\frac{1}{2} < x \leq 2$. For choice (F), each of -5 , 0 , and $1\frac{1}{2}$ satisfies $-5\frac{1}{2} < x \leq 2$. For choice (G), the number 2 satisfies $-5\frac{1}{2} < x \leq 2$. For choice (I), the number $-5\frac{1}{4}$ satisfies $-5\frac{1}{2} < x \leq 2$.

- 63 You are given the function $\{(-5, 8), (-3, 16), (-2, 7), (x, y)\}$, which contains four distinct elements. The highest value of the range is 16 and the lowest value of the domain is -5 . If x and y are both integers, what is the maximum value of $|x - y|$?

--	--	--	--	--	--	--	--

- 64 Which of the following represents the graph of a line whose slope has an absolute value greater than 1?



- 65 Bobby is given the function $f(x) = 2x^2 - x - 13$ and calculates the value of $f(6)$. Diane is then tasked to substitute the value of $f(6)$ for x in the function $g(x) = x^2 - 100$. What numerical value does Diane get?

--	--	--	--	--	--	--	--

- (G) $\{-8, -7\frac{1}{3}, 1, 2\}$
 (H) $\{-6\frac{1}{2}, -6, -5\frac{3}{4}, 2\frac{1}{5}\}$
 (I) $\{-9, -5\frac{1}{4}, 2\frac{7}{8}, 3\}$

Answers

- 63** The correct answer is 20. The largest possible y value is 16. The lowest possible x value is -4 . Note that x cannot be -5 because this would violate the basic rule of a function, which states that a single value of x cannot be assigned to two different y values. Then $16 - (-4) = 20$.
- 64** (I)
The line contains the point $(0, 0)$. For $x = -3$, let k represent the corresponding y value. Then the slope is $\frac{k-0}{-3-0} = -\frac{k}{3}$. Since this point lies above $(-3, 3)$, $k > 3$. Consequently, $-\frac{k}{3} < -1$, which implies that $\left|-\frac{k}{3}\right| > 1$. For choice (F), the line passes below $(2, 2)$ and contains $(0, 0)$, so its slope is a positive number less than 1. For choice (G), the slope of the line is zero. For choice (H), the line contains $(0, 0)$. The line passes below $(-1, 1)$, so for $x = -1$, the corresponding y value is a positive number less than 1. Then, its slope is some negative number between -1 and zero (a possible value would be $-\frac{1}{2}$). Therefore the absolute value of the slope would be less than 1.
- 65** The correct answer is 2709. By substitution, $f(6) = 2(6)^2 - 6 - 13 = (2)(36) - 6 - 13 = 53$. Now, using the function $g(x) = x^2 - 100$, substitute 53 for x . Then $g(53) = (53)^2 - 100 = 2709$.