

Select the best answer.

1. What are the solutions to the equation $\frac{x}{4} = \frac{9}{2x}$?

- a. $\pm 2\sqrt{3}$
- b. ± 4.5
- c. ± 18
- d. $\pm 3\sqrt{2}$
- e. ± 6

2. Which of the following expressions represents the product of four less than three times x and two more than x ?

- a. $3x^2 - 2x - 8$
- b. $3x^2 - 2x + 8$
- c. $3x^2 + 2x + 8$
- d. $3x^2 + 2x - 8$
- e. $3x^2 + 10x - 8$

3. If $2x + 3$, $4x - 2$, and $3x + 11$ represent 3 test scores, which of the following represents the average score?

- a. $3x + 4$
- b. 80
- c. $24x - 66$
- d. 92
- e. $9x + 12$

4. What is the equation of the line that contains the points (3,5) and (6,-2)?

- a. $y = -\frac{7}{3}x - 6$
- b. $y = -\frac{7}{3}x + 12$
- c. $y = -\frac{3}{7}x + 5$
- d. $y = -\frac{3}{4}x - 7$
- e. $y = -\frac{3}{4}x - \frac{7}{3}$

5. For all $x \neq \pm 6$, which of the following is equivalent to $\frac{x^2 - x - 42}{x^2 - 36}$?
- $\frac{x - 7}{x + 6}$
 - $\frac{x + 6}{x - 6}$
 - $\frac{x + 7}{x + 6}$
 - $\frac{x + 7}{x - 6}$
 - $\frac{x - 7}{x - 6}$
6. A board 79 inches long is cut into 3 pieces. The second piece is 5 inches longer than the first. The third piece is twice as long as the second. If x represents the length of the first piece, then which equation [below] can be used to determine the length of the first piece?
- $79 = 5x + 15$
 - $79 = x + (x+5) + 2x$
 - $79 = 3x + 12$
 - $79 = x + (x+5) + 2(x+5)$
 - $79 = 4x + 12$
7. Given the definition: $a * b = 3a^2 - b$, what is $2 * 6$?
- 12
 - 6
 - 8
 - 106
 - 10
8. Write an equation to solve: The sum of 3 consecutive odd integers is 21.
- $(x) + (x + 1) + (x + 2) = 21$
 - $(x) + (x + 1) + (x + 3) = 21$
 - $(x) + (x) + (x) = 21$
 - $(x) + (x + 2) + (x + 4) = 21$
 - $(x) + (2x) + (3x) = 21$
9. The statement “any integer evenly divisible by two is even” is:
- Always true
 - Never true
 - True for positive integers only
 - True for negative integers only
 - True only if the integer is a perfect square.
10. If it takes Jane 3 hours to travel 180 miles, how long should she plan for a 420 mile trip?
- $6\frac{1}{2}$ hours
 - 6 hours
 - 7 hours
 - 8 hours
 - $7\frac{1}{2}$ hours

11. If $x = -2$, what is the value of $3x^2 + 4x - 2$?

- a. -22
- b. -6
- c. 32
- d. 2
- e. -4

12. Simplify: $(5x^3 + 2x^2 - x + 4) - (7x^3 - x^2 - 3x + 2)$

- a. $-2x^3 + x^2 - 4x + 6$
- b. $2x^3 + 3x^2 + 4x + 6$
- c. $-2x^3 + 3x^2 + 2x + 2$
- d. $2x^3 - x^2 - 2x - 2$
- e. $12x^3 + x^2 + 2x + 6$

13. Which of the following is a factor of $3x^2 + 10x - 8$?

- a. $3x + 2$
- b. $3x + 4$
- c. $3x - 2$
- d. $x - 2$
- e. $x - 4$

14. Which of these is the product of $(x - y)$ and $(2x + y)$?

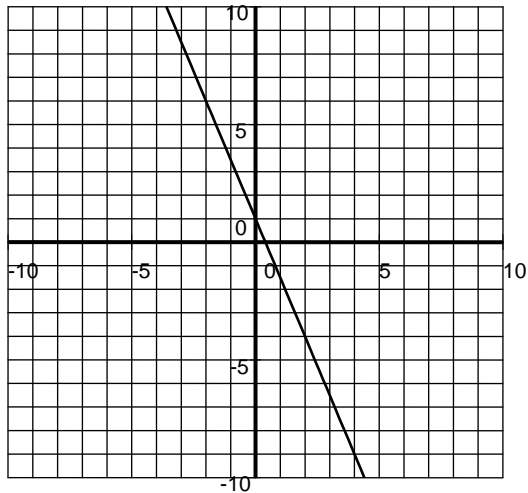
- a. $-x - 2y$
- b. $2x^2 - xy - y^2$
- c. $\frac{2x + y}{x - y}$
- d. $\frac{x - y}{2x + y}$
- e. $2x^2 - y^2$

15. A 10% fungicide solution is mixed with a 30% fungicide solution, to get 10 quarts of an 18% solution. How much of the 10% solution and how much of the 30% solution were used?

- a. 4 quarts 10%, 6 quarts 30%
- b. 5 quarts 10%, 5 quarts 30%
- c. 0 quarts 10%, 10 quarts 30%
- d. 1 quarts 10%, 9 quarts 30%
- e. 6 quarts 10%, 4 quarts 30%

16. If $x = -3$ and $y = 5$, what is the value of $\frac{2(x + 3y)}{x - y}$?

- a. -1
- b. -4
- c. 18
- d. -13
- e. -3



17. Which of the following equations is graphed above?

a. $y = -\frac{5}{2}x + 1$

b. $y = \frac{5}{2}x + 1$

c. $y = -\frac{2}{5}x + 1$

d. $y = \frac{2}{5}x + 1$

e. $y = -\frac{5}{2}x - 1$

18. If $\frac{1}{2} - \frac{5}{4} = x + \frac{1}{4}$, then $x =$

a. $x = -1$

b. $x = \frac{7}{4}$

c. $x = -4$

d. $x = 1$

e. $x = -\frac{3}{4}$

19. A car salesman received a weekly salary of W dollars plus a 6% commission on his total sales S . Which expression best describes his weekly pay?

a. $W + S$

b. $(W + S)(0.6)$

c. $.06W + S$

d. $W + .06S$

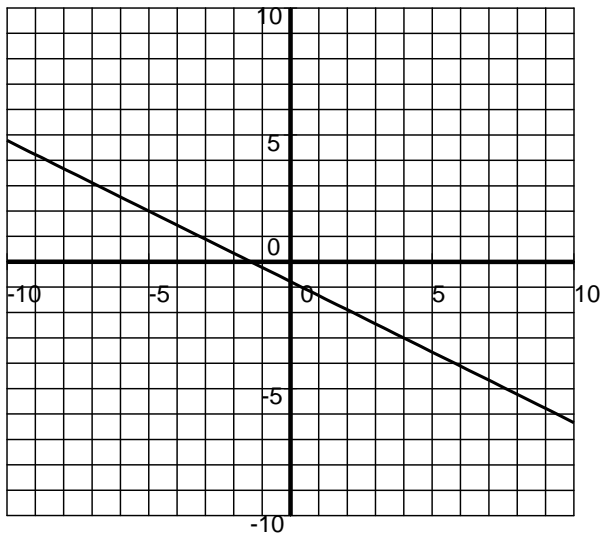
e. $W + 6S$

20. Which of these expressions is the product of $(y - 5)(2y^2 + 2y + 3)$?

- a. $2y^3 - 8y^2 - 7y - 15$
- b. $2y^2 + 3y - 2$
- c. $2y^3 - 10y + 3$
- d. $2y^2 + y + 8$
- e. $2y^3 + 2y^2 + 3y$

21. Solve for x : $-2x + 11 \geq 17$

- a. $x \leq -3$
- b. $x \geq -3$
- c. $x \geq 3$
- d. $x \geq -\frac{5}{2}$
- e. $x \leq 8$



22. On the graph shown above, what is the distance from the point $(-5, 2)$ to the point $(4, -3)$?

- a. 14
- b. 106
- c. $\sqrt{106}$
- d. $\sqrt{14}$
- e. 10

23. John can complete a job alone in 2 hours, and it takes Tim 3 hours to do the same job alone. How long will it take them if they work together?

- a. 1 hour
- b. $1\frac{1}{5}$ hours
- c. 5 hours
- d. $2\frac{1}{2}$ hours
- e. $\frac{5}{6}$ hour

24. Rationalize the denominator and simplify : $\sqrt{\frac{45}{x}}$

- a. $\frac{5\sqrt{3}}{x}$
- b. $\frac{5\sqrt{3x}}{x}$
- c. $\frac{3\sqrt{5x}}{x}$
- d. $3\sqrt{5x}$
- e. $\frac{45}{x}$

25. The graph of the equation $y = -2x + 1$ will lie in which quadrants of the coordinate plane?

- a. I and II
- b. I and IV
- c. I, II, and III
- d. I, II, and IV
- e. I, II, III, and IV

26. Subtract: $\frac{2}{x^2 + x - 6} - \frac{1}{x^2 - 9}$

- a. $\frac{1}{(x+3)(x-2)(x-3)}$
- b. $x^2 - x - 12$
- c. $\frac{x-4}{(x+3)(x-2)(x-3)}$
- d. $\frac{1}{(x^2 + x - 6)(x^2 - 9)}$
- e. $\frac{1}{x+3}$

27. Multiply: $\frac{x^2 + 6x + 9}{x^2 + x - 2} \cdot \frac{x^2 - 4}{x^2 + 2x - 3}$

- a. $\frac{(x+3)(x-2)}{(x-1)^2}$
- b. $(x+3)(x-2)$
- c. $\frac{(x+3)^2}{(x+1)(x-3)}$
- d. -5
- e. 1

28. Solve this equation: $2(3x + 1) - 3(x - 3) = 4(2x + 1) + 2$
- a. $x = -1$
 - b. $x = -\frac{13}{5}$
 - c. $x = 1$
 - d. $x = \frac{3}{5}$
 - e. $x = 0$
29. Multiply and write your answer in $a + bi$ form: $3i(5 - 2i)$
- a. $15 - 6i$
 - b. $0 + 9i$
 - c. $6 - 15i$
 - d. $6 + 15i$
 - e. $-1 + 0i$
30. Which of the following lines is perpendicular to $y = \frac{2}{3}x + 4$?
- a. $y = -\frac{3}{2}x - 1$
 - b. $y = \frac{2}{3}x + 5$
 - c. $y = -\frac{2}{3}x + 4$
 - d. $y = \frac{3}{2}x - 2$
 - e. $y = 4x + \frac{2}{3}$
31. How many ounces of a 50% alcohol solution must be mixed with 20 ounces of a 20% solution, to make a 40% solution?
- a. 40 ounces
 - b. 20 ounces
 - c. 50 ounces
 - d. 25 ounces
 - e. 30 ounces
32. Multiply and write your answer in $a + bi$ form: $(2 + 3i)(4 - 5i)$
- a. $8 - 13i$
 - b. $23 + 2i$
 - c. $10 + 12i$
 - d. $8 - 15i$
 - e. $8 + 15i$
33. Solve for x : $x^2 - x = 12$
- a. $x = 4, x = -3$
 - b. $x = -4, x = 3$
 - c. $x = -6, x = 2$
 - d. $x = 6, x = -2$
 - e. $x = 0, x = 1$

34. Solve for x: $2x^2 + 9x + 10 = 0$

- a. $x = -10, x = -\frac{19}{2}$
- b. $x = -1, x = -5$
- c. $x = -\frac{5}{2}, x = 1$
- d. $x = -\frac{5}{2}, x = -2$
- e. $x = \frac{5}{2}, x = 2$

35. What is the sum of the solutions to $x^2 - 7x + 12 = 0$?

- a. -12
- b. 12
- c. 8
- d. -7
- e. 7

36. The graph of $5x - 3y = 15$ has an x-intercept of:

- a. (3, 0)
- b. (0, 3)
- c. (3, 5)
- d. (0, 5)
- e. (-3, 0)

37. The formula for the area of a trapezoid is $A = \frac{h}{2}(b_1 + b_2)$, where h is the height and b_1 and b_2 are the lengths of the bases. If the area is 72 inches, and the bases are 14 inches and 10 inches, what is the height?

- a. 5 inches
- b. 6 inches
- c. 144 inches
- d. 12 inches
- e. 36 inches

38. Multiply: $(2 + \sqrt{8})(5 - \sqrt{18})$

- a. -2
- b. $-12 + 10\sqrt{2}$
- c. $10 - \sqrt{12}$
- d. $-2 + 4\sqrt{2}$
- e. $10 - 6\sqrt{2}$

39. Solve for x: $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$

- a. yz
- b. $z - y$
- c. $-yz$
- d. $\frac{y - z}{yz}$
- e. $\frac{yz}{y - z}$

40. Rationalize the denominator: $\frac{\sqrt{x+1}}{\sqrt{x-3}}$

a. $\frac{x+4\sqrt{x}+3}{x-9}$

b. $\frac{x-2\sqrt{x}-3}{x+9}$

c. $\frac{x+1}{x-9}$

d. $\frac{x-1}{x-9}$

e. $\frac{x+\sqrt{x}}{x-3\sqrt{x}}$

41. Multiply: $\sqrt[3]{a^2b} \sqrt[3]{a^5b^2}$

a. $a^3 \sqrt[3]{ab^2}$

b. a^7b^3

c. $a^2b\sqrt{a}$

d. $a^2b \sqrt[3]{a}$

e. $a \sqrt[6]{ab^3}$

42. Simplify: $\sqrt{27a^4b^6c^3}$

a. $3ab^2c\sqrt{a}$

b. $9a^2b^3c$

c. $3abc$

d. $9ab^2c$

e. $3a^2b^3c\sqrt{3c}$

43. For a large body of water, the amount of evaporation can be modeled by: $E = \frac{w}{20\sqrt{a}}$. E is measured in inches per day, w is the average wind speed of the air over the water, in miles per hour, and a is the surface area of the water, in square miles. If evaporation is $\frac{1}{4}$ inch per day, and the average wind speed of the air over the water is 15 miles per hour, what is the surface area of the water?

a. 19.3 square miles

b. 240 square miles

c. 144 square miles

d. 9 square miles

e. .9 square miles

44. Simplify: $\frac{(5a^{-1}b^3)^{-2}}{a^5b}$

a. $\frac{-10}{a^3b^7}$

b. $\frac{1}{25a^3b^7}$

c. $\frac{-10b^5}{a^3}$

d. $\frac{-25}{a^3b^7}$

e. $-25a^{-7}b^5$

45. $|2x-1| < 5$

a. $x < 3$

b. $x = -2, x = 3$

c. $x < 3, x < -2$

d. $-2 < x > 3$

e. $-2 < x < 3$

46. Simplify: $8^{\frac{2}{3}}$

a. 4

b. 3.4

c. 12

d. $\frac{16}{3}$

e. 22.6

47. Find the length of the longest side (hypotenuse) of a right triangle with legs equal to 4 and 5.

a. 9

b. $4\sqrt{5}$

c. 10

d. $\sqrt{41}$

e. 3

48. Solve the system of equations:

$$2x + y = 1$$

$$3x - 2y = 12$$

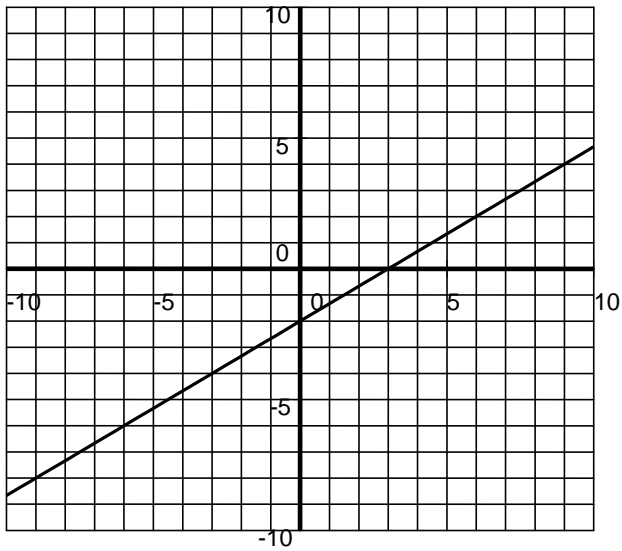
a. $x = -1, y = 3$

b. $x = 2, y = -3$

c. $x = 5, y = -9$

d. $x = -2, y = -9$

e. $x = 1, y = -1$



49. Which of the following equations is graphed above?

- a. $2x + 3y = 6$
- b. $3x + 2y = 6$
- c. $3x - 2y = 6$
- d. $2x - 3y = 6$
- e. $2x - 3y = -6$

50. Simplify: $\frac{\frac{x^2 + 2x - 3}{x + 2}}{\frac{x - 1}{x^2 - 4}}$

- a. $(x^2 - 3)(x - 4)$
- b. $(x - 3)(x^2 - 4)$
- c. $\frac{1}{(x + 2)^2}$
- d. $(x - 3)(x - 2)$
- e. $(x - 2)(x + 3)$

51. Simplify: $\frac{(4.0 \times 10^{-3})(2.1 \times 10^8)}{7.0 \times 10^2}$

- a. -9×10^2
- b. 1.2×10
- c. 1.2×10^3
- d. 1.31×10^4
- e. 1.2×10^{-12}

52. Ten times the reciprocal of a number is 3 less than the original number. Which equation can be used to solve for the original number?

a. $10 \cdot \frac{1}{x} = 3 - x$

b. $10 \cdot \frac{1}{x} = x - 3$

c. $10 \cdot x = 3 \cdot \frac{1}{x}$

d. $10 \cdot x - 3 = x$

e. $10 \cdot \frac{1}{x} - 3 = x$

53. What is the slope of the line $2x + 3y = 6$?

a. $-\frac{2}{3}$

b. -2

c. $\frac{2}{3}$

d. 2

e. $-\frac{3}{2}$

54. The formula for the surface area of a cylinder is $A = 2\pi r^2 + 2\pi r h$, where r is the radius and h is the height. Which of the following is a formula for the height in terms of the area and the radius?

a. $A - 2\pi r^2 - 2\pi r$

b. $A r$

c. $\frac{A}{2\pi r^2 + 2\pi r}$

d. $\frac{A}{r^2 + r}$

e. $\frac{A - 2\pi r^2}{2\pi r}$

Answers to the Algebra COMPASS Review

1. d
2. d
3. a
4. b
5. e
6. d
7. b
8. d
9. a
10. c
11. d
12. c
13. c
14. b
15. e
16. e
17. a
18. a
19. d
20. a
21. a
22. c
23. b
24. c
25. d
26. c
27. a
28. c
29. d
30. a
31. a
32. b
33. a
34. d
35. e
36. a
37. b
38. d
39. e
40. a
41. d
42. e
43. d
44. b
45. e
46. a
47. d
48. b
49. d
50. e
51. c
52. b
53. a
54. e

Solutions to the Algebra COMPASS Review

1. What are the solutions to the equation $\frac{x}{4} = \frac{9}{2x}$?

Answer: d

$$2x^2 = 36$$

$$\frac{2x^2}{2} = \frac{36}{2}$$

$$x^2 = 18$$

$$x = \pm\sqrt{18}$$

$$x = \pm\sqrt{9 \cdot 2}$$

$$x = \pm 3\sqrt{2}$$

2. Which of the following expressions represents the product of four less than three times x and two more than x ?

Answer: d

“four less than 3 times x ” is written as $3x - 4$.

“two more than x ” is written as $x + 2$.

“product” means to multiply.

The result of all this is $(3x - 4)(x + 2)$.

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

$$3x^2 + 6x - 4x - 8$$

$$3x^2 + 2x - 8$$

3. If $2x + 3$, $4x - 2$, and $3x + 11$ represent 3 test scores, which of the following represents the average score?

Answer: a

$$\frac{(2x + 3) + (4x - 2) + (3x + 11)}{3}$$

$$\frac{9x + 12}{3}$$

$$\frac{3(3x + 4)}{3}$$

$$3x + 4$$

4. What is the equation of the line that contains the points $(3,5)$ and $(6,-2)$?

Answer: b

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 5}{6 - 3} = \frac{-7}{3}$$

Method 1

Substitute the slope and one of the ordered pairs into the point-slope formula, $y - y_1 = m(x - x_1)$.

$$y - 5 = \frac{-7}{3}(x - 3)$$

$$y - 5 = \frac{-7}{3}x - \frac{-7}{3}(3)$$

$$y - 5 = \frac{-7}{3}x + 7$$

$$y = \frac{-7}{3}x + 7 + 5$$

$$y = \frac{-7}{3}x + 12$$

Method 2

Use the slope of $-\frac{7}{3}$ in $y = mx + b$.

Find b , by substituting 3 for the x and 5 for the y .

$$5 = -\frac{7}{3}(3) + b$$

$$5 = -7 + b$$

$$12 = b$$

Now substitute both the m value and the b value into $y = mx + b$.

$$y = -\frac{7}{3}x + 12$$

5. For all $x \neq \pm 6$, $\frac{x^2 - x - 42}{x^2 - 36} =$

Answer: e

Factor both the numerator and the denominator, and then cancel any common factors:

$$\frac{x^2 - x - 42}{x^2 - 36}$$
$$\frac{(x - 7)(x + 6)}{(x - 6)(x + 6)}$$
$$\frac{x - 7}{x - 6}$$

6. A board 79 inches long is cut into 3 pieces. The second piece is 5 inches longer than the first. The third piece is twice as long as the second. If x represents the length of the first piece, then which equation [below] can be used to determine the length of the first piece?

Answer: d

Let x = length of the first piece.

Let $x + 5$ = length of the second piece.

Let $2(x + 5)$ = length of the third piece.

Since all three pieces add up to 79:

$$(x) + (x + 5) + 2(x + 5) = 79$$

7. Given the definition: $a * b = 3a^2 - b$, what is $2 * 5$?

Answer: b

$$a * b = 3a^2 - b$$

$$2 * 6 = 3(2^2) - 6$$

$$= 3(4) - 6$$

$$= 6$$

8. Write an equation to solve: The sum of 3 consecutive odd integers is 21.

Answer: d

An example of 3 consecutive integers would be 3, 5, and 7. Another example would be 11, 13, and 15. Note that the second number in the set is 2 more than the first, and the third number in the set is 4 more than the first.

The algebraic interpretation is:

Let x = the first number.

Let $x + 2$ = the second number.

Let $x + 4$ = the third number.

“sum” means to add.

$$(x) + (x + 2) + (x + 4) = 21$$

9. The statement “any integer evenly divisible by two is even” is:

Answer: a

The statement represents the definition of an even integer, and therefore it is always true.

10. If it takes Jane 3 hours to travel 180 miles, how long should she plan for a 420 mile trip?

Answer: c

$$\frac{3}{180} = \frac{x}{420}$$

$$(3)(420) = (180)(x)$$

$$\frac{(3)(420)}{180} = x$$

$$7 = x$$

Jane should expect her 420 mile trip to take 7 hours.

11. If $x = -2$, what is the value of $3x^2 + 4x - 2$?

Answer: d

$$3x^2 + 4x - 2$$

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

$$3(4) - 8 - 2$$

$$12 - 8 - 2$$

$$2$$

12. Simplify: $(5x^3 + 2x^2 - x + 4) - (7x^3 - x^2 - 3x + 2)$

Answer: c

$$(5x^3 + 2x^2 - x + 4) - (7x^3 - x^2 - 3x + 2)$$

$$5x^3 + 2x^2 - x + 4 - 7x^3 + x^2 + 3x - 2$$

$$-2x^3 + 3x^2 + 2x + 2$$

13. Which of the following is a factor of $3x^2 + 10x - 8$?

Answer: c

Method 1

Start with $3x$ and x at the beginning of the parentheses: $(3x \quad)(x \quad)$.

Try different pairs of factors of -8 for the 2nd number in the parentheses. Then decide which will FOIL out correctly. The pairs of factors are:

-1 and 8

1 and -8

-2 and 4

2 and -4

Of those choices, -2 and 4 give the correct factorization: $(3x - 2)(x + 4)$.

Therefore, $3x - 2$ is a factor.

Method 2

Multiply the **a** and the **c**: 3 times $-8 = -24$.

Listing the pairs of factors of -24 results in:

-1 and 24 1 and -24

-2 and 12 2 and -12

-3 and 8 3 and -8

-4 and 6 4 and -6

Choose the pair that adds to $+10$: -2 and 12 .

Rewrite the equation like this:

$$3x^2 + 10x - 8$$

$$3x^2 - 2x + 12x - 8 \quad \text{Do factoring by grouping.}$$

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

Factor out $(3x - 2)$ to yield: $(3x - 2)(x + 4)$.

Therefore, $3x - 2$ is a factor.

14. What is the product of $(x - y)$ and $(2x + y)$?

Answer: b

“product” means to multiply.

$$(x - y)(2x + y)$$

$$2x^2 + xy - 2xy - y^2$$

$$2x^2 - xy - y^2$$

15. A 10% fungicide solution is mixed with a 30% fungicide solution, to get 10 quarts of an 18% solution. How much of the 10% solution and how much of the 30% solution were used?

Answer: e

Let x = the amount of 10% solution.

Let $10 - x$ = the amount of 30% solution.

$$(.10)x + (.30)(10 - x) = (.18)(10)$$

$$.10x + 3 - .30x = 1.8$$

$$-.20x = 1.8 - 3$$

$$\frac{-.20x}{-.20} = \frac{-1.2}{-.20}$$

$$x = 6$$

There are 6 quarts of the 10% solution, which leaves 4 quarts as the amount of the 30% solution.

16. If $x = -3$ and $y = 5$, what is the value of $\frac{2(x + 3y)}{x - y}$?

Answer: e

$$\frac{2(-3 + 3 \cdot 5)}{-3 - 5}$$

$$\frac{2(-3 + 15)}{-8}$$

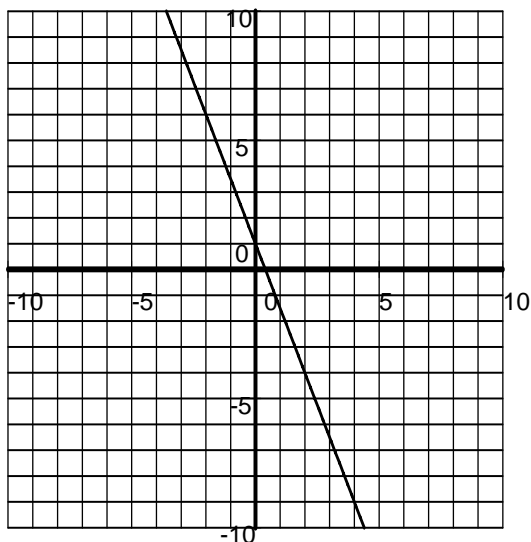
$$\frac{24}{-8}$$

$$-3$$

$$-3$$

$$-3$$

$$-3$$



17. Which equation is graphed above?

Answer: a

Method 1

Note that the y-intercept is (0,1).

Move down and right to another ordered pair, such as (2, -4), to discover that the slope is $\frac{-5}{2}$. Substitute these

values into $y = mx + b$, to get $y = \frac{-5}{2}x + 1$.

Method 2

Choose any two ordered pairs, such as (0,1) and (2, -4).

First determine the slope with the $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 1}{2 - 0} = \frac{-5}{2}$.

Use one ordered pair and the slope of $\frac{-5}{2}$ with the point-slope formula, $y - y_1 = m(x - x_1)$.

$$y - 1 = \frac{-5}{2}(x - 0)$$

$$y = \frac{-5}{2}x + 1$$

18. If $\frac{1}{2} - \frac{5}{4} = x + \frac{1}{4}$, $x =$

Answer: a

$$4 \left(\frac{1}{2} - \frac{5}{4} = x + \frac{1}{4} \right)$$

$$2 - 5 = 4x + 1$$

$$-3 = 4x + 1$$

$$-4 = 4x$$

$$-1 = x$$

19. A car salesman received a weekly salary of W dollars plus a 6% commission on his total sales S . Which expression best describes his weekly pay?

Answer: d

The salesman will receive W dollars, plus whatever he makes on commission.

His commission is $(.06)(S)$.

Adding these together results in: $W + .06S$.

20. Expand: $(y - 5)(2y^2 + 2y + 3)$?

Answer: a

$$(y - 5)(2y^2 + 2y + 3)$$

Multiply y by each of the terms in $2y^2 + 2y + 3$, and

then multiply -5 by each of the terms in $2y^2 + 2y + 3$.

$$2y^3 + 2y^2 + 3y - 10y^2 - 10y - 15$$

$$2y^3 - 8y^2 - 7y - 15$$

21. Solve for x : $-2x + 11 \geq 17$

Answer: a

$$-2x + 11 \geq 17$$

$$-2x \geq 17 - 11$$

$$-2x \geq 6$$

$$\frac{-2x}{-2} \leq \frac{6}{-2} \quad \text{Note that dividing by a negative value reverses the inequality sign.}$$

$$x \leq -3$$

22. What is the distance from the point $(-5, 2)$ to the point $(4, -3)$?

Answer: c

Use the Distance Formula, $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ with the two ordered pairs.

$$d = \sqrt{(4 - (-5))^2 + (-3 - 2)^2}$$

$$d = \sqrt{9^2 + (-5)^2}$$

$$d = \sqrt{81 + 25}$$

$$d = \sqrt{106}$$

23. John can complete a job alone in 2 hours, and it takes Tim 3 hours to do the same job alone. How long will it take them if they work together?

Answer: b

Since John can complete the job in 2 hours, he would get $\frac{1}{2}$ of the job done in 1 hour.

Since Tim can complete the job in 3 hours, he would get $\frac{1}{3}$ of the job done in 1 hour.

Let x stand for the time it takes them to complete the job together. Then $\frac{1}{x}$ of the job could get finished in 1 hour.

$$\frac{1}{2} + \frac{1}{3} = \frac{1}{x}$$

$$6x\left(\frac{1}{2} + \frac{1}{3}\right) = 6x\left(\frac{1}{x}\right)$$

$$3x + 2x = 6$$

$$5x = 6$$

$$x = \frac{6}{5} \text{ hours to complete the job together.}$$

24. Rationalize the denominator and simplify : $\sqrt{\frac{45}{x}}$

Answer: c

$$\sqrt{\frac{45}{x}}$$

$$\frac{\sqrt{45}}{\sqrt{x}}$$

$$\frac{\sqrt{45}}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}}$$

$$\frac{\sqrt{45x}}{x}$$

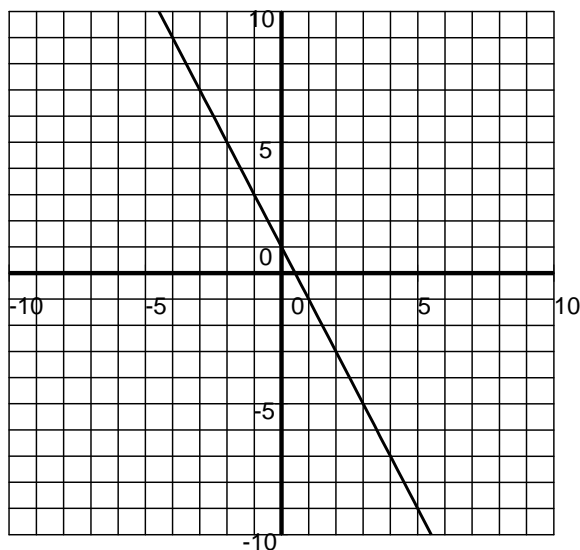
$$\frac{3\sqrt{5x}}{x}$$

25. The graph of the equation $y = -2x + 1$ will lie in which quadrants of the coordinate plane?

Answer: e

$y = -2x + 1$ has a y-intercept of 1, and a slope of $-\frac{2}{1}$, so it is graphed as indicated below.

Remember that Quadrant I is the upper right, Quadrant II is the upper left, Quadrant III is the lower left, and Quadrant IV is the lower right.



26. Subtract: $\frac{2}{x^2 + x - 6} - \frac{1}{x^2 - 9}$

Answer: c

$$\frac{2}{x^2 + x - 6} - \frac{1}{x^2 - 9}$$

$$\frac{2}{(x+3)(x-2)} - \frac{1}{(x-3)(x+3)}$$

Note that the least common denominator is $(x+3)(x-2)(x-3)$.

Multiply the numerator and denominator of each fraction by the missing factor. Then, each fraction will have the least common denominator as its denominator.

$$\frac{x-3}{x-3} \cdot \frac{2}{(x+3)(x-2)} - \frac{x-2}{x-2} \cdot \frac{1}{(x-3)(x+3)}$$

$$\frac{(2x-6) - (x-2)}{(x+3)(x-2)(x-3)}$$

$$\frac{x-4}{(x+3)(x-2)(x-3)}$$

27. Multiply: $\frac{x^2 + 6x + 9}{x^2 + x - 2} \cdot \frac{x^2 - 4}{x^2 + 2x - 3}$

Answer: a

$$\frac{(x+3)(x+3)}{(x+2)(x-1)} \cdot \frac{(x-2)(x+2)}{(x+3)(x-1)}$$

Cancel factors as appropriate.

$$\frac{(x+3)}{(x-1)} \cdot \frac{(x-2)}{(x-1)}$$

$$\frac{(x+3)(x-2)}{(x-1)^2}$$

28. Solve this equation: $2(3x + 1) - 3(x - 3) = 4(2x + 1) + 2$

Answer: c

$$2(3x + 1) - 3(x - 3) = 4(2x + 1) + 2$$

$$6x + 2 - 3x + 9 = 8x + 4 + 2$$

$$3x + 11 = 8x + 6$$

$$5 = 5x$$

$$1 = x$$

29. Multiply and write your answer in a + bi form: $3i(5 - 2i)$

Answer: d

$$3i(5 - 2i)$$

$$15i - 6i^2$$

$$15i - 6(-1)$$

$$15i + 6$$

$$6 + 15i$$

30. Which line is perpendicular to $y = \frac{2}{3}x + 4$?

Answer: a

The slope of the given line is $\frac{2}{3}$. A line perpendicular to the given line will have a slope that is the negative reciprocal, $-\frac{3}{2}$. The only line with a slope of $-\frac{3}{2}$ is $y = -\frac{3}{2}x - 1$.

31. How many ounces of a 50% alcohol solution must be mixed with 20 ounces of a 20% solution, to make a 40% solution?

Answer: a

Let x = the amount of 50% solution.

Let $x + 20$ = the amount of the final 40% solution.

$$(.50)x + (.20)(20) = (.40)(x + 20)$$

$$.50x + 4 = .40x + 8$$

$$.10x = 4$$

$$\frac{.10x}{.10} = \frac{4}{.10}$$

$x = 40$ ounces of the 50% solution

32. Multiply and write your answer in $a + bi$ form: $(2 + 3i)(4 - 5i)$

Answer: b

$$(2 + 3i)(4 - 5i)$$

$$8 - 10i + 12i - 15i^2$$

$$8 + 2i - 15(-1)$$

$$23 + 2i$$

33. Solve for x : $x^2 - x = 12$

Answer: a

$$x^2 - x = 12$$

$$x^2 - x - 12 = 0$$

$$(x - 4)(x + 3) = 0$$

$$x - 4 = 0, x + 3 = 0$$

$$x = 4, x = -3$$

34. Solve for x : $2x^2 + 9x + 10 = 0$

Answer: d

$$2x^2 + 9x + 10 = 0$$

$$(2x + 5)(x + 2) = 0$$

$$2x + 5 = 0, x + 2 = 0$$

$$x = -\frac{5}{2}, x = -2$$

35. What is the sum of the solutions to $x^2 - 7x + 12 = 0$?

Answer: e

$$x^2 - 7x + 12 = 0$$

$$(x - 3)(x - 4) = 0$$

$$x = 3, x = 4$$

The sum of the solutions, 3 and 4, is 7.

36. The graph of $5x - 3y = 15$ has an x-intercept of:

Answer: a

At the x-intercept, the y value will be zero.

$$5x - 3(0) = 15$$

$$5x = 15$$

$$x = 3$$

The ordered pair is (3, 0), since the x value is 3, and the y value is 0.

37. The formula for the area of a trapezoid is $A = \frac{h}{2}(b_1 + b_2)$, where h is the height and b_1 and b_2 are the lengths of the bases. If the area is 72 inches, and the bases are 14 inches and 10 inches, what is the height?

Answer: b

$$A = \frac{h}{2}(b_1 + b_2)$$

$$72 = \frac{h}{2}(14 + 10)$$

$$72 = \frac{h}{2}(24)$$

$$72 = 12h$$

$$6 = h$$

The height of the trapezoid is 6 inches.

38. Multiply: $(2 + \sqrt{8})(5 - \sqrt{18})$

Answer: d

$$(2 + \sqrt{8})(5 - \sqrt{18})$$

$$(2 + 2\sqrt{2})(5 - 3\sqrt{2})$$

$$10 - 6\sqrt{2} + 10\sqrt{2} - 6 \cdot 2$$

$$10 + 4\sqrt{2} - 12$$

$$-2 + 4\sqrt{2}$$

39. Solve for x: $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$

Answer: e

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$

$$xyz\left(\frac{1}{x} + \frac{1}{y}\right) = xyz\left(\frac{1}{z}\right)$$

$$yz + xz = xy$$

$$xz - xy = -yz$$

$$x(z - y) = -yz$$

$$x = \frac{-yz}{z - y} \quad \text{or} \quad x = \frac{yz}{y - z}$$

40. Rationalize the denominator: $\frac{\sqrt{x+1}}{\sqrt{x-3}}$

Answer: a

$$\frac{\sqrt{x+1}}{\sqrt{x-3}}$$

$$\frac{\sqrt{x+1}}{\sqrt{x-3}}$$

$$\frac{x+3\sqrt{x}+\sqrt{x}+3}{x-9}$$

$$\frac{x+4\sqrt{x}+3}{x-9}$$

41. Multiply: $\sqrt[3]{a^2b} \sqrt[3]{a^5b^2}$

Answer: d

$$\sqrt[3]{a^2b} \sqrt[3]{a^5b^2}$$

$$\sqrt[3]{a^7b^3}$$

$$\sqrt[3]{a^6ab^3}$$

$$a^2b \sqrt[3]{a}$$

42. Simplify: $\sqrt{27a^4b^6c^3}$

Answer: d

$$\sqrt{3^2 \cdot 3 \cdot a^2 \cdot a^2 \cdot b^2 \cdot b^2 \cdot b^2 \cdot c^2 \cdot c}$$

$$3 \cdot a \cdot a \cdot b \cdot b \cdot b \cdot c \sqrt{3c}$$

$$3a^2b^3c\sqrt{3c}$$

43. For a large body of water, the amount of evaporation can be modeled by: $E = \frac{w}{20\sqrt{a}}$. E is measured in inches per day, w is the average wind speed of the air over the water, in miles per hour, and a is the surface area of the water, in square miles. If evaporation is $\frac{1}{4}$ inch per day, and the average wind speed of the air over the water is 15 miles per hour, what is the surface area of the water?

Answer: d

$$E = \frac{w}{20\sqrt{a}}$$

$$\frac{1}{4} = \frac{15}{20\sqrt{a}}$$

$$20\sqrt{a} = (4)(15)$$

$$\sqrt{a} = \frac{60}{20}$$

$$\sqrt{a} = 3$$

$$(\sqrt{a})^2 = 3^2$$

$$a = 9$$

44. Simplify: $\frac{(5a^{-1}b^3)^{-2}}{a^5b}$

Answer: b

$$\frac{(5a^{-1}b^3)^{-2}}{a^5b}$$

$$\frac{5^{-2}a^2b^{-6}}{a^5b}$$

$$\frac{a^2}{5^2a^5bb^6}$$

$$\frac{1}{25a^3b^7}$$

45. $|2x - 1| < 5$

Answer: e

$$|2x - 1| < 5$$

$$-5 < 2x - 1 < 5$$

$$-4 < 2x < 6$$

$$-2 < x < 3$$

46. Simplify: $8^{\frac{2}{3}}$

Answer: a

$$8^{\frac{2}{3}}$$

$$\left(8^{\frac{1}{3}}\right)^2 \quad \text{Remember that } 8^{\frac{1}{3}} \text{ means } \sqrt[3]{8}, \text{ which is } 2.$$

$$(2)^2$$

$$4$$

47. Find the length of the longest side (hypotenuse) of a right triangle with legs equal to 4 and 5.

Answer: d

$a^2 + b^2 = c^2$ is the Pythagorean Theorem. a and b are the lengths of the legs, and c is the length of the hypotenuse, the side opposite the right angle.

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

$$4^2 + 5^2 = c^2$$

$$16 + 25 = c^2$$

$$41 = c^2$$

$$\sqrt{41} = c$$

48. Solve the system of equations: $2x + y = 1$
 $3x - 2y = 12$

Answer: b

Use elimination: Multiply the top equation by 2 on both the left and right sides, with the intent of eliminating the y when this equation is added to the other.

$$\begin{array}{r} 2(2x + y) = 1(2) \quad 4x + 2y = 2 \\ 3x - 2y = 12 \\ \hline 7x = 14 \end{array}$$

$x = 2$ Substitute this x -value into one of the two original equations, to find y .

$$2(2) + y = 1$$

$$y = -3$$

The solution is: $x = 2, y = -3$.

49. Which equation is graphed?

Answer: d

Method 1

The y -intercept is -2 . Count up and to the right from that point, $(0, -2)$ to another point, such as $(3, 0)$. The slope is $\frac{2}{3}$. Substitute these two values into the slope-intercept form, $y = mx + b$, to get $y = \frac{2}{3}x - 2$.

Put this equation into standard form, since the choices are all in standard form.

$$3(y) = 3\left(\frac{2}{3}x - 2\right)$$

$$3y = 2x - 6$$

$$-2x + 3y = -6$$

$$2x - 3y = 6$$

Method 2

Use the two intercepts $(3, 0)$, and $(0, -2)$, to find the slope, using $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 0}{0 - 3} = \frac{2}{3}$.

Substitute this slope and one of the ordered pairs into the in the point-slope form, $y - y_1 = m(x - x_1)$, to get

$$y - 0 = \frac{2}{3}(x - 3)$$

$$y = \frac{2}{3}x - 2$$

Now change the form of the problem to standard form as in Method 1 above.

50. Simplify: $\frac{\frac{x^2 + 2x - 3}{x + 2}}{\frac{x - 1}{x^2 - 4}}$

Answer: e

Factor all polynomials. Rewrite the complex fraction as a division problem and then as multiplication. Factor the polynomials and cancel any common factors.

$$\frac{x^2 + 2x - 3}{\frac{x + 2}{\frac{x - 1}{x^2 - 4}}}$$

$$\frac{x^2 + 2x - 3}{x + 2} \div \frac{x - 1}{x^2 - 4}$$

$$\frac{x^2 + 2x - 3}{x + 2} \cdot \frac{x^2 - 4}{x - 1}$$

$$\frac{(x + 3)(x - 1)}{x + 2} \cdot \frac{(x - 2)(x + 2)}{x - 1}$$

$$\frac{(x + 3) \cdot (x - 2)}{1 \cdot 1}$$

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

51. Simplify: $\frac{(4.0 \times 10^{-3})(2.1 \times 10^8)}{7.0 \times 10^2}$

Answer: c

$$\frac{(4.0)(2.1)}{7.0} \times \frac{10^{-3}(10^8)}{10^2}$$

$$1.2 \times \frac{10^5}{10^2}$$

$$1.2 \times 10^3$$

52. Ten times the reciprocal of a number is 3 less than the original number. Which equation can be used to solve for the original number?

Answer: b

Let x = the original number. Then, $\frac{1}{x}$ = the reciprocal of the original number.

“Ten times the reciprocal of a number” will be written as $10 \cdot \frac{1}{x}$.

“3 less than the original number” will be written as $x - 3$.

The equation becomes $10 \cdot \frac{1}{x} = x - 3$.

53. What is the slope of the line $2x + 3y = 6$?

Answer: a

$2x + 3y = 6$ Put the equation into $y = mx + b$ form, to find m .

$$3y = -2x + 6$$

$$y = \frac{-2x + 6}{3}$$

$$y = \frac{-2}{3}x + 2$$

The slope is $\frac{-2}{3}$.

54. The formula for the surface area of a cylinder is $A = 2\pi r^2 + 2\pi r h$, where r is the radius and h is the height. What is the formula for the height in terms of the area and the radius?

Answer: e

$$A = 2\pi r^2 + 2\pi r h$$

Solve for h .

$$A - 2\pi r^2 = 2\pi r h$$

$$\frac{A - 2\pi r^2}{2\pi r} = h$$

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