1-3 Solving Equations

Write an algebraic expression to represent each verbal expression.

1. the product of 12 and the sum of a number and negative 3

ANSWER:

$12[x+(-3)]$

Write a verbal sentence to represent each equation.

3. $5x+7=18$

ANSWER:

The sum of five times a number and 7 equals 18.

5. $5y-y^3=12$

ANSWER:

The difference between five times a number and the cube of that number is 12.

Name the property illustrated by each statement.

7. $(8x-3)+12=(8x-3)+12$

ANSWER:

Reflexive Property

Solve each equation. Check your solution.

9. $z-19=34$

ANSWER:

53

11. $-y=8$

ANSWER:

–8

13. $5x-3=-33$

ANSWER:

–6

15. $3(2a+3)-4(3a-6)=15$

ANSWER:

3

17. $-3(-2x+20)+8(x+12)=92$

ANSWER:

4

Solve each equation or formula for the specified variable.

19. $8r - 5q = 3$, for q

ANSWER:

$q = \frac{8r - 3}{5}$

21. **MULTIPLE CHOICE** If $\frac{y}{5} + 8 = 7$, what is the value of $\frac{y}{5} - 2$?

A –10
B –3
C 1
D 5

ANSWER:

B

Write an algebraic expression to represent each verbal expression.

23. the product of the square of a number and 8

ANSWER:

$8x^2$

25. five more than the quotient of a number and 4

ANSWER:

$\frac{x}{4} + 5$

Write a verbal sentence to represent each equation.

27. $\frac{x + 3}{4} = 5$

ANSWER:

The quotient of the sum of 3 and a number and 4 is 5.

29. **BASEBALL** During a recent season, Miguel Cabrera and Mike Jacobs of the Florida Marlins hit a combined total of 46 home runs. Cabrera hit 6 more home runs than Jacobs. How many home runs did each player hit? Define a variable, write an equation, and solve the problem.

ANSWER:

n = number of home runs Jacobs hit; $n + 6$ = number of home runs Cabrera hit; $2n + 6 = 46$; Jacobs: 20 home runs, Cabrera: 26 home runs.

Name the property illustrated by each statement.

31. If $y = -3$, then $7y = 7(-3)$

ANSWER:

Subst.

33. If $-y = 13$, then $-(-y) = -13$

ANSWER:
Mult. (=)

Solve each equation. Check your solution.

35. $3y + 4 = 19$

ANSWER:
5

37. $7y - 2y + 4 + 3y = -20$

ANSWER:
–3

39. $5(-2x - 4) - 3(4x + 5) = 97$

ANSWER:
–6

41. $\frac{2}{3}(6c - 18) + \frac{3}{4}(8c + 32) = -18$

ANSWER:
–3

43. **GEOMETRY** The perimeter of a regular pentagon is 100 inches. Find the length of each side.

ANSWER:
s = length of a side; $5s = 100$; 20 in.

Solve each equation or formula for the specified variable.

45. $E = mc^2$, for m

ANSWER:
$m = \frac{E}{c^2}$

47. $z = \pi q^3 h$, for h

ANSWER:
$h = \frac{z}{\pi q^3}$

49. $y = ax^2 + bx + c$, for a

ANSWER:
$a = \frac{y - bx - c}{x^2}$

51. **GEOMETRY** The formula for the volume of a cylinder with radius *r* and height *h* is π times the radius times the height.
    a. Write this as an algebraic expression.
    b. Solve the expression in part **a** for *h*.

    ANSWER:

    a. $V = \pi \times r \times r \times h$
    b. $h = \frac{V}{\pi r^2}$

    Solve each equation. Check your solution.

53. $5x - 9 = 11x + 3$

    ANSWER:

    –2

55. $5.4(3k - 12) + 3.2(2k + 6) = -136$

    ANSWER:

    –4

57. $\frac{4}{9}y + 5 = -\frac{7}{9}y - 8$

    ANSWER:

    $-\frac{117}{11}$

59. **FINANCIAL LITERACY** Benjamin spent $10,734 on his living expenses last year. Most of these expenses are listed at the right. Benjamin's only other expense last year was rent. If he paid rent 12 times last year, how much is Benjamin's rent each month?

Expense	Annual Cost
Electric	$622
Gas	$428
Water	$240
Renter's Insurance	$144

    ANSWER:

    x = the cost of rent each month; 622 + 428 + 240 + 144 + 12*x* = 10,734; $775 per month

61. **MULTIPLE REPRESENTATIONS** The absolute value of a number describes the distance of the number from zero.
a. GEOMETRIC Draw a number line. Label the integers from –5 to 5.
b. TABULAR Create a table of the integers on the number line and their distance from zero.
c. GRAPHICAL Make a graph of each integer x and its distance from zero y using the data points in the table.
d. VERBAL Make a conjecture about the integer and its distance from zero. Explain the reason for any changes in sign.

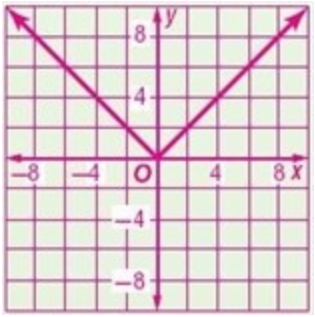
ANSWER:

a.

b.

Integer	Distance from Zero
–5	5
–4	4
–3	3
–2	2
–1	1
0	0
1	1
2	2
3	3
4	4
5	5

c.



d. For positive integers, the distance from zero is the same as the integer. For negative integers, the distance is the integer with the opposite sign because distance is always positive.

63. **CHALLENGE** Solve $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ for y_1

ANSWER:

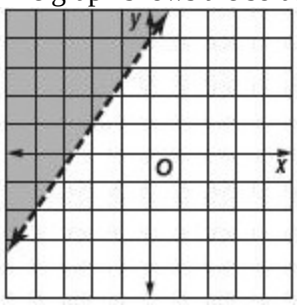
$y_1 = y_2 - \sqrt{d^2 - (x_2 - x_1)^2}$

65. **OPEN ENDED** Provide one example of an equation involving the Distributive Property that has no solution and another example that has infinitely many solutions.

ANSWER:

Sample answer: $3(x - 4) = 3x + 5$; $2(3x - 1) = 6x - 2$

67. The graph shows the solution of which inequality?



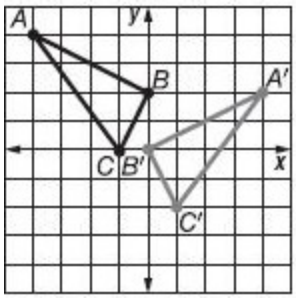
A. $y < \frac{2}{3}x + 4$ **C.** $y < \frac{3}{2}x + 4$

B. $y > \frac{2}{3}x + 4$ **D.** $y > \frac{3}{2}x + 4$

ANSWER:

D

69. **GEOMETRY** Which of the following describes the transformation of ΔABC to $\Delta A'B'C'$?



A. a reflection across the *y*-axis and a translation down 2 units

B. a reflection across the *x*-axis and a translation down 2 units

C. a rotation $90°$ to the right and a translation down 2 units

D. a rotation $90°$ to the right and a translation right 2 units

ANSWER:

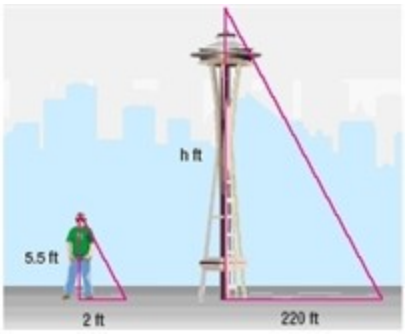
A

71. Simplify $3x + 8y + 5z - 2y - 6x + z$.

ANSWER:

$-3x + 6y + 6z$

73. **LANDMARKS** Suppose the Space Needle in Seattle, Washington, casts a 220-foot shadow at the same time a nearby tourist casts a 2-foot shadow. If the tourist is $5\frac{1}{2}$ feet tall, how tall is the Space Needle?



ANSWER:
605 ft

Identify the additive inverse for each number or expression.

75. $-4\frac{1}{5}$

ANSWER:

$4\frac{1}{5}$

77. $-2x$

ANSWER:
$2x$

79. $3\frac{2}{3}$

ANSWER:

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

81. $5x$

ANSWER:
$-5x$