

Chapter 2

Section 2.1 Practice

1. $x - 5 = 8$

$$x - 5 + 5 = 8 + 5$$

$$x = 13$$

Check: $x - 5 = 8$

$$13 - 5 \stackrel{?}{=} 8$$

$$8 = 8 \quad \text{True}$$

The solution is 13.

2. $y + 1.7 = 0.3$

$$y + 1.7 - 1.7 = 0.3 - 1.7$$

$$y = -1.4$$

Check: $y + 1.7 = 0.3$

$$-1.4 + 1.7 \stackrel{?}{=} 0.3$$

$$0.3 = 0.3 \quad \text{True}$$

The solution is -1.4 .

3. $\frac{7}{8} = y - \frac{1}{3}$

$$\frac{7}{8} + \frac{1}{3} = y - \frac{1}{3} + \frac{1}{3}$$

$$\frac{7}{8} \cdot \frac{3}{3} + \frac{1}{3} \cdot \frac{8}{8} = y$$

$$\frac{21}{24} + \frac{8}{24} = y$$

$$\frac{29}{24} = y$$

Check: $\frac{7}{8} = y - \frac{1}{3}$

$$\frac{7}{8} \stackrel{?}{=} \frac{29}{24} - \frac{1}{3}$$

$$\frac{7}{8} \stackrel{?}{=} \frac{29}{24} - \frac{8}{24}$$

$$\frac{7}{8} \stackrel{?}{=} \frac{21}{24}$$

$$\frac{7}{8} = \frac{7}{8} \quad \text{True}$$

The solution is $\frac{29}{24}$.

4. $3x + 10 = 4x$

$$3x + 10 - 3x = 4x - 3x$$

$$10 = x$$

Check: $3x + 10 = 4x$

$$3(10) + 10 \stackrel{?}{=} 4(10)$$

$$30 + 10 \stackrel{?}{=} 40$$

$$40 = 40 \quad \text{True}$$

The solution is 10.

5. $10w + 3 - 4w + 4 = -2w + 3 + 7w$

$$6w + 7 = 5w + 3$$

$$-5w + 6w + 7 = -5w + 5w + 3$$

$$w + 7 = 3$$

$$w + 7 - 7 = 3 - 7$$

$$w = -4$$

Check:

$$10w + 3 - 4w + 4 = -2w + 3 + 7w$$

$$10(-4) + 3 - 4(-4) + 4 \stackrel{?}{=} -2(-4) + 3 + 7(-4)$$

$$-40 + 3 + 16 + 4 \stackrel{?}{=} 8 + 3 - 28$$

$$-17 = -17 \quad \text{True}$$

The solution is -4 .

6. $3(2w - 5) - (5w + 1) = -3$

$$3(2w) - 3(5) - 1(5w) - 1(1) = -3$$

$$6w - 15 - 5w - 1 = -3$$

$$w - 16 = -3$$

$$w - 16 + 16 = -3 + 16$$

$$w = 13$$

Check: $3(2w - 5) - (5w + 1) = -3$

$$3(2 \cdot 13 - 5) - (5 \cdot 13 + 1) \stackrel{?}{=} -3$$

$$3(26 - 5) - (65 + 1) \stackrel{?}{=} -3$$

$$3(21) - 66 \stackrel{?}{=} -3$$

$$63 - 66 \stackrel{?}{=} -3$$

$$-3 = -3 \quad \text{True}$$

The solution is 13.

7. $12 - y = 9$

$$12 - y - 12 = 9 - 12$$

$$-y = -3$$

$$y = 3$$

Check: $12 - y = 9$

$$12 - 3 \stackrel{?}{=} 9$$

$$9 = 9 \quad \text{True}$$

The solution is 3.

8. a. If the sum of two numbers is 11 and one number is 4, find the other number by subtracting 4 from 11. The other number is $11 - 4$, or 7.

- b. If the sum of two numbers is 11 and one number is x , find the other number by subtracting x from 11. The other number is $11 - x$.
- c. If the sum of two numbers is 56 and one number is a , find the other number by subtracting a from 56. The other number is $56 - a$.
9. Mike received 100,445 more votes than Zane, who received n votes. So, Mike received $(n + 100,445)$ votes.

Vocabulary and Readiness Check

- A combination of operations on variables and numbers is called an expression.
 - A statement of the form "expression = expression" is called an equation.
 - An equation contains an equal sign (=).
 - An expression does not contain an equal sign (=).
 - An expression may be simplified and evaluated while an equation may be solved.
 - A solution of an equation is a number that when substituted for a variable makes the equation a true statement.
 - Equivalent equations have the same solution.
 - By the addition property of equality, the same number may be added to or subtracted from both sides of an equation without changing the solution of the equation.
9. $x + 4 = 6$
 $x = 2$
10. $x + 7 = 17$
 $x = 10$
11. $n + 18 = 30$
 $n = 12$
12. $z + 22 = 40$
 $z = 18$
13. $b - 11 = 6$
 $b = 17$
14. $d - 16 = 5$
 $d = 21$

Exercise Set 2.1

2. $x + 14 = 25$
 $x + 14 - 14 = 25 - 14$
 $x = 11$
 Check: $x + 14 = 25$
 $11 + 14 \stackrel{?}{=} 25$
 $25 = 25$ True
 The solution is 11.

4. $y - 9 = 1$
 $y - 9 + 9 = 1 + 9$
 $y = 10$
 Check: $y - 9 = 1$
 $10 - 9 \stackrel{?}{=} 1$
 $1 = 1$ True
 The solution is 10.

6. $-8 = 8 + z$
 $-8 - 8 = -8 + 8 + z$
 $-16 = z$
 Check: $-8 = 8 + z$
 $-8 \stackrel{?}{=} 8 + (-16)$
 $-8 = -8$ True
 The solution is -16 .

8. $t - 9.2 = -6.8$
 $9.2 + t - 9.2 = 9.2 - 6.8$
 $t = 2.4$
 Check: $t - 9.2 = -6.8$
 $2.4 - 9.2 \stackrel{?}{=} -6.8$
 $-6.8 = -6.8$ True
 The solution is 2.4.

10. $y - \frac{4}{7} = -\frac{3}{14}$
 $y - \frac{4}{7} + \frac{4}{7} = -\frac{3}{14} + \frac{4}{7}$
 $y = -\frac{3}{14} + \frac{8}{14}$
 $y = \frac{5}{14}$

$$\begin{aligned} \text{Check: } y - \frac{4}{7} &= -\frac{3}{14} \\ \frac{5}{14} - \frac{4}{7} &\stackrel{?}{=} -\frac{3}{14} \\ \frac{5}{14} - \frac{8}{14} &\stackrel{?}{=} -\frac{3}{14} \\ -\frac{3}{14} &= -\frac{3}{14} \quad \text{True} \end{aligned}$$

The solution is $\frac{5}{14}$.

$$\begin{aligned} 12. \quad c + \frac{1}{6} &= \frac{3}{8} \\ c + \frac{1}{6} - \frac{1}{6} &= \frac{3}{8} - \frac{1}{6} \\ c &= \frac{9}{24} - \frac{4}{24} \\ c &= \frac{5}{24} \end{aligned}$$

$$\begin{aligned} \text{Check: } c + \frac{1}{6} &= \frac{3}{8} \\ \frac{5}{24} + \frac{1}{6} &\stackrel{?}{=} \frac{3}{8} \\ \frac{5}{24} + \frac{4}{24} &\stackrel{?}{=} \frac{3}{8} \\ \frac{9}{24} &\stackrel{?}{=} \frac{3}{8} \\ \frac{3}{8} &= \frac{3}{8} \quad \text{True} \end{aligned}$$

The solution is $\frac{5}{24}$.

$$\begin{aligned} 14. \quad 3n + 2n &= 7 + 4n \\ 5n &= 7 + 4n \\ 5n - 4n &= 7 + 4n - 4n \\ n &= 7 \\ \text{Check: } 3n + 2n &= 7 + 4n \\ 3(7) + 2(7) &\stackrel{?}{=} 7 + 4(7) \\ 21 + 14 &\stackrel{?}{=} 7 + 28 \\ 35 &= 35 \quad \text{True} \end{aligned}$$

The solution is 7.

$$\begin{aligned} 16. \quad \frac{13}{11}y - \frac{2}{11}y &= -3 \\ \frac{11}{11}y &= -3 \\ y &= -3 \end{aligned}$$

$$\begin{aligned} \text{Check: } \frac{13}{11}y - \frac{2}{11}y &= -3 \\ \frac{13}{11}(-3) - \frac{2}{11}(-3) &\stackrel{?}{=} -3 \\ -\frac{39}{11} + \frac{6}{11} &\stackrel{?}{=} -3 \\ -\frac{33}{11} &\stackrel{?}{=} -3 \\ -3 &= -3 \quad \text{True} \end{aligned}$$

The solution is -3.

$$\begin{aligned} 18. \quad 4x - 4 &= 10x - 7x \\ 4x - 4 &= 3x \\ 4x - 4 - 4x &= 3x - 4x \\ -4 &= -x \\ 4 &= x \\ \text{Check: } 4x - 4 &= 10x - 7x \\ 4(4) - 4 &\stackrel{?}{=} 10(4) - 7(4) \\ 16 - 4 &\stackrel{?}{=} 40 - 28 \\ 12 &= 12 \quad \text{True} \end{aligned}$$

The solution is 4.

$$\begin{aligned} 20. \quad -4(z - 3) &= 2 - 3z \\ -4z + 12 &= 2 - 3z \\ -4z + 12 + 3z &= 2 - 3z + 3z \\ -z + 12 &= 2 \\ -z + 12 - 12 &= 2 - 12 \\ -z &= -10 \\ z &= 10 \\ \text{Check: } -4(z - 3) &= 2 - 3z \\ -4(10 - 3) &\stackrel{?}{=} 2 - 3(10) \\ -4(7) &\stackrel{?}{=} 2 - 30 \\ -28 &= -28 \quad \text{True} \end{aligned}$$

The solution is 10.

$$\begin{aligned} 22. \quad \frac{1}{5}x - 1 &= -\frac{4}{5}x - 13 \\ \frac{4}{5}x + \frac{1}{5}x - 1 &= \frac{4}{5}x - \frac{4}{5}x - 13 \\ \frac{5}{5}x - 1 &= -13 \\ x - 1 &= -13 \\ x - 1 + 1 &= -13 + 1 \\ x &= -12 \end{aligned}$$

$$\begin{aligned} \text{Check: } \frac{1}{5}x - 1 &= -\frac{4}{5}x - 13 \\ \frac{1}{5}(-12) - 1 &\stackrel{?}{=} -\frac{4}{5}(-12) - 13 \\ -\frac{12}{5} - \frac{5}{5} &\stackrel{?}{=} \frac{48}{5} - \frac{65}{5} \\ -\frac{17}{5} &= -\frac{17}{5} \quad \text{True} \end{aligned}$$

The solution is -12 .

$$\begin{aligned} \mathbf{24.} \quad 2x + 7 &= x - 10 \\ -x + 2x + 7 &= -x + x - 10 \\ x + 7 &= -10 \\ x + 7 - 7 &= -10 - 7 \\ x &= -17 \end{aligned}$$

$$\begin{aligned} \text{Check: } 2x + 7 &= x - 10 \\ 2(-17) + 7 &\stackrel{?}{=} -17 - 10 \\ -34 + 7 &\stackrel{?}{=} -27 \\ -27 &= -27 \quad \text{True} \end{aligned}$$

The solution is -17 .

$$\begin{aligned} \mathbf{26.} \quad 4p - 11 - p &= 2 + 2p - 20 \\ 3p - 11 &= 2p - 18 \\ -2p + 3p - 11 &= -2p + 2p - 18 \\ p - 11 &= -18 \\ p - 11 + 11 &= -18 + 11 \\ p &= -7 \end{aligned}$$

$$\begin{aligned} \text{Check: } 4p - 11 - p &= 2 + 2p - 20 \\ 4(-7) - 11 - (-7) &\stackrel{?}{=} 2 + 2(-7) - 20 \\ -28 - 11 + 7 &\stackrel{?}{=} 2 - 14 - 20 \\ -32 &= -32 \quad \text{True} \end{aligned}$$

The solution is -7 .

$$\begin{aligned} \mathbf{28.} \quad -2(x - 1) &= -3x \\ -2x + 2 &= -3x \\ 2x - 2x + 2 &= 2x - 3x \\ 2 &= -x \\ -2 &= x \end{aligned}$$

$$\begin{aligned} \text{Check: } -2(x - 1) &= -3x \\ -2(-2 - 1) &\stackrel{?}{=} -3(-2) \\ -2(-3) &\stackrel{?}{=} 6 \\ 6 &= 6 \quad \text{True} \end{aligned}$$

The solution is -2 .

$$\begin{aligned} \mathbf{30.} \quad \frac{2}{5}x - \frac{1}{12} &= -\frac{3}{5}x - \frac{3}{4} \\ \frac{2}{5}x - \frac{1}{12} + \frac{3}{5}x &= -\frac{3}{5}x - \frac{3}{4} + \frac{3}{5}x \\ \frac{5}{5}x - \frac{1}{12} &= -\frac{3}{4} \\ x - \frac{1}{12} &= -\frac{3}{4} \\ x - \frac{1}{12} + \frac{1}{12} &= -\frac{3}{4} + \frac{1}{12} \\ x &= -\frac{9}{12} + \frac{1}{12} \\ x &= -\frac{8}{12} \\ x &= -\frac{2}{3} \end{aligned}$$

$$\begin{aligned} \text{Check: } \frac{2}{5}x - \frac{1}{12} &= -\frac{3}{5}x - \frac{3}{4} \\ \frac{2}{5}\left(-\frac{2}{3}\right) - \frac{1}{12} &\stackrel{?}{=} -\frac{3}{5}\left(-\frac{2}{3}\right) - \frac{3}{4} \\ -\frac{4}{15} - \frac{1}{12} &\stackrel{?}{=} \frac{6}{15} - \frac{3}{4} \\ -\frac{16}{60} - \frac{5}{60} &\stackrel{?}{=} \frac{24}{60} - \frac{45}{60} \\ -\frac{21}{60} &= -\frac{21}{60} \quad \text{True} \end{aligned}$$

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

$$\begin{aligned} \mathbf{32.} \quad 3(y + 7) &= 2y - 5 \\ 3y + 21 &= 2y - 5 \\ -2y + 3y + 21 &= -2y + 2y - 5 \\ y + 21 &= -5 \\ y + 21 - 21 &= -5 - 21 \\ y &= -26 \end{aligned}$$

$$\begin{aligned} \text{Check: } 3(y + 7) &= 2y - 5 \\ 3(-26 + 7) &\stackrel{?}{=} 2(-26) - 5 \\ 3(-19) &\stackrel{?}{=} -52 - 5 \\ -57 &= -57 \quad \text{True} \end{aligned}$$

The solution is -26 .

$$\begin{aligned} \mathbf{34.} \quad 5(3 + z) - (8z + 9) &= -4z \\ 15 + 5z - 8z - 9 &= -4z \\ -3z + 6 &= -4z \\ 3z - 3z + 6 &= 3z - 4z \\ 6 &= -z \\ -6 &= z \end{aligned}$$

$$\begin{aligned} \text{Check: } & 5(3+z) - (8z+9) = -4z \\ & 5(3+(-6)) - (8(-6)+9) \stackrel{?}{=} -4(-6) \\ & 5(-3) - (-48+9) \stackrel{?}{=} 24 \\ & -15 - (-39) \stackrel{?}{=} 24 \\ & -15 + 39 \stackrel{?}{=} 24 \\ & 24 = 24 \quad \text{True} \end{aligned}$$

The solution is -6 .

$$\begin{aligned} 36. \quad & -5(x+1) + 4(2x-3) = 2(x+2) - 8 \\ & -5x - 5 + 8x - 12 = 2x + 4 - 8 \\ & 3x - 17 = 2x - 4 \\ & 3x - 17 - 2x = 2x - 4 - 2x \\ & x - 17 = -4 \\ & x - 17 + 17 = -4 + 17 \\ & x = 13 \end{aligned}$$

$$\begin{aligned} \text{Check: } & -5(x+1) + 4(2x-3) = 2(x+2) - 8 \\ & -5(13+1) + 4(2 \cdot 13 - 3) \stackrel{?}{=} 2(13+2) - 8 \\ & -5(14) + 4(26-3) \stackrel{?}{=} 2(15) - 8 \\ & -70 + 4(23) \stackrel{?}{=} 30 - 8 \\ & -70 + 92 \stackrel{?}{=} 22 \\ & 22 = 22 \quad \text{True} \end{aligned}$$

The solution is 13 .

$$\begin{aligned} 38. \quad & 18x - 9 = 19x \\ 18x - 9 - 18x &= 19x - 18x \\ -9 &= x \end{aligned}$$

$$\begin{aligned} 40. \quad & 9x + 5.5 = 10x \\ 9x + 5.5 - 9x &= 10x - 9x \\ 5.5 &= x \end{aligned}$$

$$\begin{aligned} 42. \quad & 7y + 2 = 6y + 2 \\ 7y + 2 - 6y &= 6y + 2 - 6y \\ y + 2 &= 2 \\ y + 2 - 2 &= 2 - 2 \\ y &= 0 \end{aligned}$$

$$\begin{aligned} 44. \quad & 15x + 20 - 10x - 9 = 25x + 8 - 21x - 7 \\ & 5x + 11 = 4x + 1 \\ -4x + 5x + 11 &= -4x + 4x + 1 \\ x + 11 &= 1 \\ x + 11 - 11 &= 1 - 11 \\ x &= -10 \end{aligned}$$

$$\begin{aligned} 46. \quad & 6(5+c) = 5(c-4) \\ 30 + 6c &= 5c - 20 \\ 30 + 6c - 5c &= 5c - 20 - 5c \\ 30 + c &= -20 \\ -30 + 30 + c &= -30 - 20 \\ c &= -50 \end{aligned}$$

$$\begin{aligned} 48. \quad & m + 2 = 7.1 \\ m + 2 - 2 &= 7.1 - 2 \\ m &= 5.1 \end{aligned}$$

$$\begin{aligned} 50. \quad & 15 - (6 - 7k) = 2 + 6k \\ 15 - 6 + 7k &= 2 + 6k \\ 9 + 7k &= 2 + 6k \\ 9 + 7k - 6k &= 2 + 6k - 6k \\ 9 + k &= 2 \\ -9 + 9 + k &= -9 + 2 \\ k &= -7 \end{aligned}$$

$$\begin{aligned} 52. \quad & \frac{1}{11} = y + \frac{10}{11} \\ \frac{1}{11} - \frac{10}{11} &= y + \frac{10}{11} - \frac{10}{11} \\ -\frac{9}{11} &= y \end{aligned}$$

$$\begin{aligned} 54. \quad & -1.4 - 7x - 3.6 - 2x = -8x + 4.4 \\ -9x - 5 &= -8x + 4.4 \\ 8x - 9x - 5 &= 8x - 8x + 4.4 \\ -x - 5 &= 4.4 \\ -x - 5 + 5 &= 4.4 + 5 \\ -x &= 9.4 \\ x &= -9.4 \end{aligned}$$

56. If the sum of the lengths of the two pieces is 5 feet and one piece is x feet, then the other piece has a length of $(5 - x)$ feet.

58. If the sum of the measures of two angles is 90° and one angle measures x° , then the other angle measures $(90 - x)^\circ$.

60. If the length of I-80 is m miles and the length of I-90 is 178.5 miles longer than I-80, the length of I-90 is $m + 178.5$.

62. If the weight of the Armanty meteorite is y kilograms and the weight of the Hoba West meteorite is 3 times the weight of the Armanty meteorite, then the weight of the Hoba West meteorite is $3y$ kilograms.

$$\begin{aligned} 64. \quad & \text{The multiplicative inverse of } \frac{7}{6} \text{ is } \frac{6}{7}, \text{ since} \\ & \frac{7}{6} \cdot \frac{6}{7} = 1. \end{aligned}$$

66. The multiplicative inverse of 5 is $\frac{1}{5}$, since

$$5 \cdot \frac{1}{5} = 1.$$

68. The multiplicative inverse of $-\frac{3}{5}$ is $-\frac{5}{3}$ since

$$-\frac{3}{5} \cdot \left(-\frac{5}{3}\right) = 1.$$

70. $\frac{-2y}{-2} = \frac{-2 \cdot y}{-2 \cdot 1} = \frac{y}{1} = y$

72. $7\left(\frac{1}{7}r\right) = \left(7 \cdot \frac{1}{7}\right)r = 1r = r$

74. $\frac{9}{2}\left(\frac{2}{9}x\right) = \left(\frac{9}{2} \cdot \frac{2}{9}\right)x = 1x = x$

76. answers may vary

78. $a + 9 = 15$
 $a + 9 + (-9) = 15 + (-9)$
 $a = 6$

80. answers may vary

82. $360 - x - 3x - 5x = 360 - 9x$
 The measure of the fourth angle is $(360 - 9x)^\circ$.

84. answers may vary

86. $-85.325 = x - 97.985$
 $-85.325 + 97.985 = x - 97.985 + 97.985$
 $12.66 = x$

Section 2.2 Practice

1. $\frac{3}{7}x = 9$
 $\frac{7}{3} \cdot \left(\frac{3}{7}x\right) = \frac{7}{3} \cdot 9$
 $\left(\frac{7}{3} \cdot \frac{3}{7}\right)x = \frac{7}{3} \cdot 9$
 $1x = 21$
 $x = 21$

Check: $\frac{3}{7}x = 9$
 $\frac{3}{7}(21) \stackrel{?}{=} 9$
 $9 = 9$ True
 The solution is 21.

2. $7x = 42$
 $\frac{7x}{7} = \frac{42}{7}$
 $1 \cdot x = 6$
 $x = 6$
 Check: $7x = 42$
 $7 \cdot 6 \stackrel{?}{=} 42$
 $42 = 42$ True
 The solution is 6.

3. $-4x = 52$
 $\frac{-4x}{-4} = \frac{52}{-4}$
 $1x = -13$
 $x = -13$
 Check: $-4x = 52$
 $-4(-13) \stackrel{?}{=} 52$
 $52 = 52$ True
 The solution is -13 .

4. $\frac{y}{5} = 13$
 $\frac{1}{5}y = 13$
 $5 \cdot \frac{1}{5}y = 5 \cdot 13$
 $1y = 65$
 $y = 65$
 Check: $\frac{y}{5} = 13$
 $\frac{65}{5} \stackrel{?}{=} 13$
 $13 = 13$ True
 The solution is 65.

5. $2.6x = 13.52$
 $\frac{2.6x}{2.6} = \frac{13.52}{2.6}$
 $x = 5.2$
 Check: $2.6x = 13.52$
 $2.6(5.2) \stackrel{?}{=} 13.52$
 $13.52 = 13.52$ True
 The solution is 5.2.

$$6. \quad -\frac{5}{6}y = -\frac{3}{5}$$

$$-\frac{6}{5} \cdot -\frac{5}{6}y = -\frac{6}{5} \cdot -\frac{3}{5}$$

$$y = \frac{18}{25}$$

$$\text{Check: } -\frac{5}{6}y = -\frac{3}{5}$$

$$-\frac{5}{6}\left(\frac{18}{25}\right) \stackrel{?}{=} -\frac{3}{5}$$

$$-\frac{3}{5} = -\frac{3}{5} \quad \text{True}$$

The solution is $\frac{18}{25}$.

$$7. \quad -x + 7 = -12$$

$$-x + 7 - 7 = -12 - 7$$

$$-x = -19$$

$$\frac{-x}{-1} = \frac{-19}{-1}$$

$$1x = 19$$

$$x = 19$$

$$\text{Check: } -x + 7 = -12$$

$$-19 + 7 \stackrel{?}{=} -12$$

$$-12 = -12 \quad \text{True}$$

The solution is 19.

$$8. \quad -7x + 2x + 3 - 20 = -2$$

$$-5x - 17 = -2$$

$$-5x - 17 + 17 = -2 + 17$$

$$-5x = 15$$

$$\frac{-5x}{-5} = \frac{15}{-5}$$

$$x = -3$$

$$\text{Check: } -7x + 2x + 3 - 20 = -2$$

$$-7(-3) + 2(-3) + 3 - 20 \stackrel{?}{=} -2$$

$$21 - 6 + 3 - 20 \stackrel{?}{=} -2$$

$$-2 = -2 \quad \text{True}$$

The solution is -3.

$$9. \quad 10x - 4 = 7x + 14$$

$$10x - 4 - 7x = 7x + 14 - 7x$$

$$3x - 4 = 14$$

$$3x - 4 + 4 = 14 + 4$$

$$3x = 18$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

$$\text{Check: } 10x - 4 = 7x + 14$$

$$10(6) - 4 \stackrel{?}{=} 7(6) + 14$$

$$60 - 4 \stackrel{?}{=} 42 + 14$$

$$56 = 56 \quad \text{True}$$

The solution is 6.

$$10. \quad 4(3x - 2) = -1 + 4$$

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

$$12x - 8 = 3$$

$$12x - 8 + 8 = 3 + 8$$

$$12x = 11$$

$$\frac{12x}{12} = \frac{11}{12}$$

$$x = \frac{11}{12}$$

$$\text{Check: } 4(3x - 2) = -1 + 4$$

$$4\left(3 \cdot \frac{11}{12} - 2\right) \stackrel{?}{=} -1 + 4$$

$$4\left(\frac{11}{4} - 2\right) \stackrel{?}{=} -1 + 4$$

$$11 - 8 \stackrel{?}{=} 3$$

$$3 = 3 \quad \text{True}$$

The solution is $\frac{11}{12}$.

11. a. If x is the first integer, then $x + 1$ is the second integer.
Their sum is $x + (x + 1) = x + x + 1 = 2x + 1$.
- b. If x is the first odd integer, then $x + 2$ is the second consecutive odd integer.
Their sum is $x + (x + 2) = x + x + 2 = 2x + 2$.

Vocabulary and Readiness Check

- By the multiplication property of equality, both sides of an equation may be multiplied or divided by the same nonzero number without changing the solution of the equation.
- By the addition property of equality, the same number may be added to or subtracted from both sides of an equation without changing the solution of the equation.
- An equation may be solved while an expression may be simplified and evaluated.
- An equation contains an equal sign (=) while an expression does not.
- Equivalent equations have the same solution.

6. A solution of an equation is a number that when substituted for a variable makes the equation a true statement.

7. $3a = 27$
 $a = 9$

8. $9c = 54$
 $c = 6$

9. $5b = 10$
 $b = 2$

10. $7t = 14$
 $t = 2$

11. $6x = -30$
 $x = -5$

12. $8r = -64$
 $r = -8$

Exercise Set 2.2

2. $-7x = -49$
 $\frac{-7x}{-7} = \frac{-49}{-7}$
 $x = 7$

Check: $-7x = -49$
 $-7(7) \stackrel{?}{=} -49$
 $-49 = -49$ True

The solution is 7.

4. $2x = 0$
 $\frac{2x}{2} = \frac{0}{2}$
 $x = 0$

Check: $2x = 0$
 $2(0) \stackrel{?}{=} 0$
 $0 = 0$ True

The solution is 0.

6. $-y = 8$
 $\frac{-y}{-1} = \frac{8}{-1}$
 $y = -8$

Check: $-y = 8$
 $-(-8) \stackrel{?}{=} 8$
 $8 = 8$ True

The solution is -8 .

8. $\frac{3}{4}n = -15$
 $\frac{4}{3} \cdot \frac{3}{4}n = \frac{4}{3} \cdot (-15)$
 $n = -20$

Check: $\frac{3}{4}n = -15$

$\frac{3}{4}(-20) \stackrel{?}{=} -15$

$-15 = -15$ True

The solution is -20 .

10. $\frac{1}{8}v = \frac{1}{4}$
 $8 \cdot \frac{1}{8}v = 8 \cdot \frac{1}{4}$
 $v = 2$

Check: $\frac{1}{8}v = \frac{1}{4}$

$\frac{1}{8} \cdot 2 \stackrel{?}{=} \frac{1}{4}$

$\frac{1}{4} = \frac{1}{4}$ True

The solution is 2.

12. $\frac{d}{15} = 2$
 $15 \cdot \frac{d}{15} = 15 \cdot 2$
 $d = 30$

Check: $\frac{d}{15} = 2$

$\frac{30}{15} \stackrel{?}{=} 2$

$2 = 2$ True

The solution is 30.

14. $\frac{f}{-5} = 0$
 $-5 \cdot \left(\frac{f}{-5}\right) = -5 \cdot 0$
 $f = 0$

Check: $\frac{f}{-5} = 0$

$\frac{0}{-5} \stackrel{?}{=} 0$

$0 = 0$ True

The solution is 0.

16. $8.5y = 19.55$

$$\frac{8.5y}{8.5} = \frac{19.55}{8.5}$$

$$y = 2.3$$

Check: $8.5y = 19.55$
 $8.5(2.3) \stackrel{?}{=} 19.55$
 $19.55 = 19.55$ True

The solution is 2.3.

18. $3x - 1 = 26$

$3x - 1 + 1 = 26 + 1$

$3x = 27$

$$\frac{3x}{3} = \frac{27}{3}$$

$x = 9$

Check: $3x - 1 = 26$
 $3 \cdot 9 - 1 \stackrel{?}{=} 26$
 $27 - 1 \stackrel{?}{=} 26$
 $26 = 26$ True

The solution is 9.

20. $-x + 4 = -24$

$-x + 4 - 4 = -24 - 4$

$-x = -28$

$$\frac{-x}{-1} = \frac{-28}{-1}$$

$x = 28$

Check: $-x + 4 = -24$
 $-28 + 4 \stackrel{?}{=} -24$
 $-24 = -24$ True

The solution is 28.

22. $8t + 5 = 5$

$8t + 5 - 5 = 5 - 5$

$8t = 0$

$$\frac{8t}{8} = \frac{0}{8}$$

$t = 0$

Check: $8t + 5 = 5$
 $8 \cdot 0 + 5 \stackrel{?}{=} 5$
 $0 + 5 \stackrel{?}{=} 5$
 $5 = 5$ True

The solution is 0.

24. $\frac{b}{4} - 1 = -7$

$\frac{b}{4} - 1 + 1 = -7 + 1$

$\frac{b}{4} = -6$

$4 \cdot \frac{b}{4} = 4 \cdot (-6)$

$b = -24$

Check: $\frac{b}{4} - 1 = -7$

$\frac{-24}{4} - 1 \stackrel{?}{=} -7$

$-6 - 1 \stackrel{?}{=} -7$

$-7 = -7$ True

The solution is -24.

26. $4a + 1 + a - 11 = 0$

$5a - 10 = 0$

$5a - 10 + 10 = 0 + 10$

$5a = 10$

$$\frac{5a}{5} = \frac{10}{5}$$

$a = 2$

Check: $4a + 1 + a - 11 = 0$

$4 \cdot 2 + 1 + 2 - 11 \stackrel{?}{=} 0$

$8 + 1 + 2 - 11 \stackrel{?}{=} 0$

$0 = 0$ True

The solution is 2.

28. $19 = 0.4x - 0.9x - 6$

$19 = -0.5x - 6$

$19 + 6 = -0.5x - 6 + 6$

$25 = -0.5x$

$$\frac{25}{-0.5} = \frac{-0.5x}{-0.5}$$

$-50 = x$

Check: $19 = 0.4x - 0.9x - 6$

$19 \stackrel{?}{=} 0.4(-50) - 0.9(-50) - 6$

$19 \stackrel{?}{=} -20 + 45 - 6$

$19 = 19$ True

The solution is -50.

$$30. \quad \frac{3}{5}x - 14 = -8$$

$$\frac{3}{5}x - 14 + 14 = -8 + 14$$

$$\frac{3}{5}x = 6$$

$$\frac{5}{3} \cdot \frac{3}{5}x = \frac{5}{3} \cdot 6$$

$$x = 10$$

$$\text{Check: } \frac{3}{5}x - 14 = -8$$

$$\frac{3}{5} \cdot 10 - 14 \stackrel{?}{=} -8$$

$$6 - 14 \stackrel{?}{=} -8$$

$$-8 = -8 \quad \text{True}$$

The solution is 10.

$$32. \quad \frac{2}{7}z - \frac{1}{5} = \frac{1}{2}$$

$$\frac{2}{7}z - \frac{1}{5} + \frac{1}{5} = \frac{1}{2} + \frac{1}{5}$$

$$\frac{2}{7}z = \frac{5}{10} + \frac{2}{10}$$

$$\frac{2}{7}z = \frac{7}{10}$$

$$\frac{7}{2} \cdot \frac{2}{7}z = \frac{7}{2} \cdot \frac{7}{10}$$

$$z = \frac{49}{20}$$

$$\text{Check: } \frac{2}{7}z - \frac{1}{5} = \frac{1}{2}$$

$$\frac{2}{7} \left(\frac{49}{20} \right) - \frac{1}{5} \stackrel{?}{=} \frac{1}{2}$$

$$\frac{7}{10} - \frac{1}{5} \stackrel{?}{=} \frac{1}{2}$$

$$\frac{7}{10} - \frac{2}{10} \stackrel{?}{=} \frac{1}{2}$$

$$\frac{5}{10} \stackrel{?}{=} \frac{1}{2}$$

$$\frac{1}{2} = \frac{1}{2} \quad \text{True}$$

The solution is $\frac{49}{20}$.

$$34. \quad 11x + 13 = 9x + 9$$

$$11x + 13 - 9x = 9x + 9 - 9x$$

$$2x + 13 = 9$$

$$2x + 13 - 13 = 9 - 13$$

$$2x = -4$$

$$\frac{2x}{2} = \frac{-4}{2}$$

$$x = -2$$

$$36. \quad 2(4x + 1) = -12 + 6$$

$$8x + 2 = -12 + 6$$

$$8x + 2 = -6$$

$$8x + 2 - 2 = -6 - 2$$

$$8x = -8$$

$$\frac{8x}{8} = \frac{-8}{8}$$

$$x = -1$$

$$38. \quad 6x - 4 = -2x - 10$$

$$6x - 4 + 2x = -2x - 10 + 2x$$

$$8x - 4 = -10$$

$$8x - 4 + 4 = -10 + 4$$

$$8x = -6$$

$$\frac{8x}{8} = \frac{-6}{8}$$

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

$$40. \quad 8 + 4 = -6(5x - 2)$$

$$8 + 4 = -30x + 12$$

$$12 = -30x + 12$$

$$12 - 12 = -30x + 12 - 12$$

$$0 = -30x$$

$$\frac{0}{-30} = \frac{-30x}{-30}$$

$$0 = x$$

$$42. \quad -17z - 4 = -16z - 20$$

$$17z - 17z - 4 = 17z - 16z - 20$$

$$-4 = z - 20$$

$$-4 + 20 = z - 20 + 20$$

$$16 = z$$