

Solution Manual for Intermediate Algebra 8th edition Tobey Slater Blair and Crawford 0134178963 9780134178967

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Solution Manual

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Chapter 2

2.1 Exercises

2. $2x + 12 = 2(21) + 12 = 54 \neq -30$

No; 21 is not a root since replacing x with 21 does not give a true statement.

4. $5y + 9 = 5\left(\frac{3}{5}\right) + 9 = 3 + 9 = 12$

Yes: when you replace y by $\frac{3}{5}$ in the equation, you get a true statement.

6. Multiply each term of the equation by 100 to clear the decimals.

8. No; it would be easier to add $\frac{1}{4}$ to both sides of the equation since the coefficient of x is 1.

10. $26 + x = -35$

12.

18. $16x + 5 = 10x - 1$
 $16x - 10x + 5 = 10x - 10x - 1$
 $6x + 5 = -1$
 $6x + 5 - 5 = -1 - 5$
 $6x = -6$
 $\frac{6x}{6} = \frac{-6}{6}$
 $x = -1$
Check: $16(-1) + 5 = 10(-1) - 1$
 $-16 + 5 = -10 - 1$
 $-11 = -11$

20. $-11x - 8 = 2x + 5$
 $-11x - 2x - 8 = 2x - 2x + 5$
 $-13x - 8 = 5$
 $-13x - 8 + 8 = 5 + 8$
 $-13x = 13$
 $\frac{-13x}{-13} = \frac{13}{-13}$

$26 + x - 26 = -35 - 26$
 $x = -61$
Check: $26 + (-61) = -35$
 $-35 = -35$

$$\begin{array}{r}
 -16x \\
 = \\
 -64 \\
 \hline
 -16x \\
 = \\
 -64
 \end{array}
 \qquad
 \begin{array}{r}
 x \\
 = \\
 - \\
 1 \\
 \text{Check: } -11(-1) - 8 \\
 2(-1) + 5 \\
 1 \\
 1 \\
 - \\
 8 \\
 - \\
 2 \\
 + \\
 5 \\
 3 \\
 = \\
 3
 \end{array}$$

22. $6a + 5 - a = 3a - 9$

$$\begin{array}{r}
 5 \\
 a \\
 + \\
 5 \\
 = \\
 3 \\
 a \\
 - \\
 9 \\
 5a - 3a + 5 = 3a - 3a \\
 -9 \quad -16
 \end{array}$$

$x = 4$
 Check: $-16(4) = -64$
 $-64 = -64$

14. $-15x = 75$
 $\frac{-15x}{-15} = \frac{75}{-15}$

$x = -5$
 Check: $-15(-5) = 75$
 $75 = 75$

16. $10x + 3 = 15$
 $10x + 3 - 3 = 15 - 3$

$$\begin{array}{r}
 10x = 12 \\
 \frac{10x}{10} = \frac{12}{10} \\
 x = \frac{6}{5} \text{ or } 1\frac{1}{5} \text{ or } 1.2
 \end{array}$$

Check: $10\left(\frac{6}{5}\right) + 3 = 15$

$15 = 15$

$$2a + 5 = -9$$

$$2a + 5 - 5 = -9 - 5$$

$$2a = -14$$

$$\frac{2a}{2} = \frac{-14}{2}$$

$$a = -7$$

Check: $6(-7) + 5 - (-7) = 3(-7) - 9$

$$\begin{array}{r}
 -42 + 5 + 7 = -21 - 9 \\
 -30 = -30
 \end{array}$$

24. $3(5 - y) = 3(y + 4)$

$$15 - 3y = 3y + 12$$

$$15 - 3y - 3y = 3y - 3y + 12$$

$$15 - 6y = 12$$

$$15 - 15 - 6y = 12 - 15$$

$$-6y = -3$$

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

$$-6 \quad -6$$

$$y = \frac{1}{2} \text{ or } 0.5$$

Check: $3 \begin{pmatrix} 5 - \frac{1}{2} \\ 2 \\ 2 \end{pmatrix} = 3 \begin{pmatrix} \frac{1}{2} + 4 \\ 2 \\ 2 \end{pmatrix}$

$$3 \begin{pmatrix} \frac{9}{2} \\ 2 \\ 2 \end{pmatrix} = 3 \begin{pmatrix} \frac{9}{2} \\ 2 \\ 2 \end{pmatrix}$$

$$\frac{27}{2} = \frac{27}{2}$$

26. $4y + 5 = 6(y + 3) - y$

$$4y + 5 = 6y + 18 - y$$

$$4y + 5 = 5y + 18$$

$$4y - 5y + 5 = 5y - 5y + 18$$

$$-y + 5 = 18$$

$$-y + 5 - 5 = 18 - 5$$

$$-y = 13$$

$$y = -13$$

Check: $4(-13) + 5 = 6(-13 + 3) - (-13)$

$$-52 + 5 = 6(-10) + 13$$

$$-47 = -60 + 13$$

$$-47 = -47$$

28. $-\frac{5}{6}x = 5$

$$-\frac{5}{6}x \begin{pmatrix} 6 \\ -6 \\ 5 \end{pmatrix} = 5 \begin{pmatrix} -6 \\ -6 \\ 5 \end{pmatrix}$$

$$x = -6$$

Check: $-\frac{5}{6}(-6) = 5$

$$5 = 5$$

30. $\frac{y}{5} + 2 = \frac{4}{5}$

$$15 \begin{pmatrix} 3 \\ \frac{y}{5} + 2 \\ 3 \end{pmatrix} = 15 \begin{pmatrix} 5 \\ \frac{4}{5} \\ 5 \end{pmatrix}$$

$$5y + 30 = 12$$

$$5y + 30 - 30 = 12 - 30$$

$$5y = -18$$

$$\frac{5y}{5} = \frac{-18}{5}$$

$$y = -\frac{18}{5} \text{ or } -3\frac{3}{5} \text{ or } -3.6$$

Check: $\frac{-3.6}{5} + 2 = \frac{4}{5}$

32. $\frac{4x}{5} + \frac{3}{2} = 2x$

$$10 \left(\frac{4x}{5} + \frac{3}{2} \right) = 2x(10)$$

$$8x + 15 = 20x$$

$$8x - 8x + 15 = 20x - 8x$$

$$15 = 12x$$

$$\frac{15}{12} = \frac{12x}{12}$$

$$12 = 12x$$

$$x = \frac{5}{4} \text{ or } 1\frac{1}{4} \text{ or } 1.25$$

Check: $\frac{4(\frac{5}{4})}{5} + \frac{3}{2} = 2 \left(\frac{5}{4} \right)$

$$1 + \frac{3}{2} = \frac{5}{2}$$

$$\frac{5}{2} = \frac{5}{2}$$

34. $5 - \frac{2}{3}(x + 2) = 3$

$$3 \left(5 - \frac{2}{3}(x + 2) \right) = 3(3)$$

$$15 - 2(x + 2) = 9$$

$$15 - 2x - 4 = 9$$

$$-2x + 11 = 9$$

$$-2x + 11 - 11 = 9 - 11$$

$$-2x = -2$$

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

$$x = 1$$

Check: $5 - \frac{2}{3}(1 + 2) = 3$

$$5 - \frac{2}{3}(3) = 3$$

$$5 - 2 = 3$$

$$3 = 3$$

5

-

1

2

+

2

0

.

8

0.8 = 0.8

$$36. \quad 6 + 2(x - 1) = \frac{3x}{5} + 4$$

$$6 + 2x - 2 = \frac{3x}{5} + 4$$

$$2x + 4 = \frac{3x}{5} + 4$$

$$5(2x + 4) = 5\left(\frac{3x}{5} + 4\right)$$

$$10x + 20 = 3x + 20$$

$$10x - 3x + 20 = 3x - 3x + 20$$

$$7x + 20 = 20$$

$$7x + 20 - 20 = 20 - 20$$

$$7x = 0$$

$$\frac{7x}{7} = \frac{0}{7}$$

$$x = 0$$

$$\text{Check: } 6 + 2(0 - 1) = \frac{3(0)}{5} + 4$$

$$6 + (-2) = 0 + 4$$

$$4 = 4$$

$$38. \quad 0.8x - 0.1 = 0.4x + 0.7$$

$$10(0.8x - 0.1) = 10(0.4x + 0.7)$$

$$8x - 1 = 4x + 7$$

$$8x - 4x - 1 = 4x - 4x + 7$$

$$4x - 1 = 7$$

$$4x - 1 + 1 = 7 + 1$$

$$4x = 8$$

$$\frac{4x}{4} = \frac{8}{4}$$

$$x = 2$$

$$\text{Check: } 0.8(2) - 0.1 = 0.4(2) + 0.7$$

$$1.6 - 0.1 = 0.8 + 0.7$$

$$1.5 = 1.5$$

$$40. \quad 0.1x - 0.12 = 0.04x + 0.03$$

$$100(0.1x - 0.12) = 100(0.04x + 0.03)$$

$$10x - 12 = 4x + 3$$

$$10x - 4x - 12 = 4x - 4x + 3$$

$$6x - 12 = 3$$

$$6x - 12 + 12 = 3 + 12$$

$$6x = 15$$

$$\frac{6x}{6} = \frac{15}{6}$$

$$x = 2.5 \text{ or } 2\frac{1}{2} \text{ or } \frac{5}{2}$$

$$\text{Check: } 0.1(2.5) - 0.12 = 0.04(2.5) + 0.03$$

$$0.25 - 0.12 = 0.1 + 0.03$$

$$0.13 = 0.13$$

$$42. \quad 0.5(3x + 5) = 1$$

$$1.5x + 2.5 = 1$$

$$10(1.5x + 2.5) = 10(1)$$

$$15x + 25 = 10$$

$$15x + 25 - 25 = 10 - 25$$

$$15x = -15$$

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

$$x = -1$$

$$\text{Check: } 0.5[3(-1) + 5] = 1$$

$$0.5[-3 + 5] = 1$$

$$0.5[2] = 1$$

$$1 = 1$$

$$44. \quad 0.3(x + 2) - 2 = 0.05x$$

$$0.3x + 0.6 - 2 = 0.05x$$

$$100(0.3x + 0.6 - 2) = 100(0.05x)$$

$$30x + 60 - 200 = 5x$$

$$30x - 140 = 5x$$

$$30x - 140 + 140 = 5x + 140$$

$$30x - 5x = 5x - 5x + 140$$

$$25x = 140$$

$$\frac{25x}{25} = \frac{140}{25}$$

$$x = 5.6 \text{ or } \frac{28}{5} \text{ or } 5\frac{3}{5}$$

$$\text{Check: } 0.3(5.6 + 2) - 2 = 0.05(5.6)$$

$$2.28 - 2 = 0.28$$

$$0.28 = 0.28$$

$$46. \quad 8y + 15 - 4y = 20 - 13$$

$$4y + 15 = 7$$

$$4y + 15 - 15 = 7 - 15$$

$$4y = -8$$

$$\frac{4y}{4} = \frac{-8}{4}$$

$$y = -2$$

$$48. \quad \left(\frac{1}{2} - \frac{x}{8}\right) = \frac{x-3}{4}$$

$$8\left(\frac{1}{2} - \frac{x}{8}\right) = 8\left(\frac{x-3}{4}\right)$$

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

$$4 - x = 2x - 6$$

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

$$4 = 3x - 6$$

$$4 + 6 = 3x - 6 + 6$$

$$10 = 3x$$

$$\frac{10}{3} = x \text{ or } x = 3\frac{1}{3}$$

$$\begin{aligned}
 50. \quad & \frac{y+5}{12} = \frac{3}{4} \left(\frac{y+1}{8} \right) \\
 & 24 \left(\frac{y+5}{12} \right) = 24 \left(\frac{3}{4} \cdot \frac{y+1}{8} \right) \\
 & 2(y+5) = 6(3) - 3(y+1) \\
 & 2y+10 = 18-3y-3 \\
 & 2y+10 = 15-3y \\
 & 2y+3y+10 = 15-3y+3y \\
 & 5y+10 = 15 \\
 & 5y+10-10 = 15-10 \\
 & 5y = 5 \\
 & \underline{5y = 5} \\
 & y = 1
 \end{aligned}$$

$$\begin{aligned}
 52. \quad & 1.7 + 3(0.2x - 0.3) = 0.2(4 - x) \\
 & 1.7 + 0.6x - 0.9 = 0.8 - 0.2x \\
 & 10(1.7 + 0.6x - 0.9) = 10(0.8 - 0.2x)
 \end{aligned}$$

$$\begin{aligned}
 & 17 + 6x - 9 = 8 - 2x \\
 & 8 + 6x = 8 - 2x \\
 & 8 + 6x + 2x = 8 - 2x + 2x \\
 & 8 + 8x = 8 \\
 & 8 - 8 + 8x = 8 - 8 \\
 & 8x = 0 \\
 & \frac{8x}{8} = \frac{0}{8} \\
 & x = 0
 \end{aligned}$$

$$\begin{aligned}
 54. \quad & 7x - 5 = -2x - 15 + 10x + 6 \\
 & 7x - 5 = 8x - 9 \\
 & 7x - 8x - 5 = 8x - 8x - 9 \\
 & -x - 5 = -9 \\
 & -x - 5 + 5 = -9 + 5 \\
 & -x = -4 \\
 & x = 4
 \end{aligned}$$

$$\begin{aligned}
 56. \quad & 3x - 17 = 8x - 5(x - 2) \\
 & 3x - 17 = 8x - 5x + 10 \\
 & 3x - 17 = 3x + 10 \\
 & 3x - 3x - 17 = 3x - 3x + 10 \\
 & -17 = 10 \Rightarrow \text{since } -17 \neq 10, \\
 & \text{no solution}
 \end{aligned}$$

$$\begin{aligned}
 60. \quad & 2x + 4(x - 5) = -x + 7(x - 1) + 3 \\
 & 2x + 4x - 20 = -x + 7x - 7 + 3 \\
 & 6x - 20 = 6x - 4 \\
 & 6x - 6x - 20 = 6x - 6x - 4 \\
 & -20 = -4 \Rightarrow \text{since } -20 \neq -4, \\
 & \text{no solution.}
 \end{aligned}$$

$$\begin{aligned}
 62. \quad & \left(x + \frac{2x+8}{3} \right) = \left(\frac{5x+5}{3} + 1 \right) \\
 & 3 \left(x + \frac{2x+8}{3} \right) = 3 \left(\frac{5x+5}{3} + 1 \right) \\
 & \left(\begin{array}{c} 3x \\ 2x+8 \end{array} \right) = \left(\begin{array}{c} 5x+5 \\ 3 \end{array} \right) + 1
 \end{aligned}$$

$$\begin{aligned}
 & + 5x + 8 \equiv 5x + 8 + \\
 & 5x - 5x + 8 = 5x - 5x + 8 \\
 & 8 = 8 \\
 & \text{Any real number is a solution.}
 \end{aligned}$$

Cumulative Review

$$\begin{aligned}
 63. \quad & 5 - (4 - 2)^2 + 3(-2) = 5 - (2)^2 + (-6) \\
 & = 5 - 4 + (-6) \\
 & = 1 + (-6) \\
 & = -5
 \end{aligned}$$

$$\begin{aligned}
 64. \quad & (-2)^4 - 12 - 6(-2) = 16 - 12 + (-6)(-2) \\
 & = 16 - 12 + 12 \\
 & = 4 + 12 \\
 & = 16
 \end{aligned}$$

$$\begin{aligned}
 65. \quad & \left(\frac{3xy^2}{2x^3y} \right)^3 = \frac{3^3 x^3 y^{2 \cdot 3}}{2^3 x^{2 \cdot 3} y^3} \\
 & = \frac{27x^3 y^6}{8x^6 y^3} \\
 & \quad \underline{27y^{6-3}} \\
 & = \frac{8x^{6-3}}{8x^3} \\
 & = \frac{27y^3}{8x^3}
 \end{aligned}$$

58. $8(x + 2) - 7 = 3(x + 3) + 5x$

$$8x + 16 - 7 = 3x + 9 + 5x$$

$$8x + 9 = 8x + 9$$

$$8x - 8x + 9 = 8x - 8x + 9$$

$$9 = 9$$

Any real number is a solution.

$$\begin{aligned}
 66. & (2x^{-2}y^{-3})^2(4xy^{-2})^{-2} \\
 & = 2^2x^{-2 \cdot 2}y^{-3 \cdot 2} \cdot 4^{-2}x^{-2}y^{-2(-2)} \\
 & = 4x^{-4}y^{-6} \cdot \frac{1}{16} \cdot x^{-2}y^4 \\
 & = \frac{4}{16}x^{-4-2}y^{-6+4} \\
 & = \frac{1}{4}x^{-6}y^{-2} \\
 & = \frac{1}{4x^6y^2}
 \end{aligned}$$

Classroom Quiz 2.1

$$\begin{aligned}
 1. & \quad 3(8 - 2x) = 10 - 4(x - 3) \\
 & \quad 24 - 6x = 10 - 4x + 12 \\
 & \quad 24 - 6x = 22 - 4x \\
 & \quad 24 - 6x + 4x = 22 - 4x + 4x \\
 & \quad 24 - 2x = 22 \\
 & \quad 24 - 24 - 2x = 22 - 24 \\
 & \quad -2x = -2 \\
 & \quad \frac{-2x}{-2} = \frac{-2}{-2} \\
 & \quad -2 \quad -2 \\
 & \quad x = 1
 \end{aligned}$$

$$\begin{aligned}
 2. & \quad \frac{3}{4}(x - 1) + 2 = 2(x - 4) \\
 & \quad 4 \left[\frac{3}{4}(x - 1) + 2 \right] = 4[2(x - 4)] \\
 & \quad \left[\begin{array}{l} 3(x - 1) + 4 \cdot 2 = 8(x - 4) \\ 3x - 3 + 8 = 8x - 32 \\ 3x + 5 = 8x - 32 \\ 3x - 8x + 5 = 8x - 8x - 32 \\ -5x + 5 = -32 \\ -5x + 5 - 5 = -32 - 5 \\ -5x = -37 \\ \frac{-5x}{-5} = \frac{-37}{-5} \end{array} \right. \\
 & \quad x = \frac{37}{5} \text{ or } 7\frac{2}{5} \text{ or } 7.4
 \end{aligned}$$

$$\begin{aligned}
 3. & \quad 0.6x + 1.2 = 4x - 3.56 \\
 & \quad 100(0.6x + 1.2) = 100(4x - 3.56) \\
 & \quad 60x + 120 = 400x - 356 \\
 & \quad 60x - 400x + 120 = 400x - 400x - 356 \\
 & \quad -340x + 120 = -356 \\
 & \quad -340x + 120 - 120 = -356 - 120 \\
 & \quad -340x = -476 \\
 & \quad \frac{-340x}{-340} = \frac{-476}{-340} \\
 & \quad x = 1.4 \text{ or } \frac{7}{5} \text{ or } 1\frac{2}{5}
 \end{aligned}$$

2.2 Exercises

$$\begin{aligned}
 2. & \quad 9x + y = 4 \\
 & \quad 9x = 4 - y \\
 & \quad 4 - y \\
 & \quad x = \frac{\quad}{9}
 \end{aligned}$$

$$\begin{aligned}
 4. & \quad 7x - 9 = 6y - x \\
 & \quad 7x + x = 6y + 9 \\
 & \quad 8x = 6y + 9 \\
 & \quad x = \frac{6y + 9}{8}
 \end{aligned}$$

$$\begin{aligned}
 6. & \quad y = -\frac{1}{4}x + 3 \\
 & \quad 4(y) = 4 \left(-\frac{1}{4}x + 3 \right) \\
 & \quad 4y = -x + 12 \\
 & \quad x = 12 - 4y
 \end{aligned}$$

$$\begin{aligned}
 8. & \quad x = \frac{5}{8}y - \frac{1}{4} \\
 & \quad 8x = 8 \left(\frac{5}{8}y - \frac{1}{4} \right) \\
 & \quad 8x = 5y - 2 \\
 & \quad 8x + 2 = 5y \\
 & \quad \frac{8x + 2}{5} = y
 \end{aligned}$$

$$10. \quad V = lwh$$

$$\frac{V}{lh} = \frac{lwh}{lh}$$
$$\frac{V}{lh} = w \text{ or } w = \frac{V}{lh}$$

12. $C = \frac{5}{9}(F - 32)$
 $9C = 5(F - 32)$
 $9C = 5F - 160$
 $9C + 160 = 5F$
 $\frac{9C + 160}{5} = F$
 5

14. $V = \pi r^2 h$
 $\frac{V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$
 $\frac{V}{\pi r^2} = h$

16. $H = \frac{3}{4}(5a + b)$
 $4H = 3(5a + b)$
 $4H = 15a + 3b$
 $4H - 3b = 15a$

$\frac{4H - 3b}{15} = a$

18. $4(-ax + 2y) = 5ax + y$
 $-4ax + 8y = 5ax + y$
 $-4ax - 5ax = y - 8y$
 $-9ax = -7y$
 $x = \frac{-7y}{-9a} = \frac{7y}{9a}$

20. a. $F = \frac{9}{5}C + 32$
 $5F = 5\left(\frac{9}{5}C + 32\right)$
 $5F = 9C + 160$
 $5F - 160 = 9C$
 $C = \frac{5F - 160}{9}$

b. $C = \frac{5F - 160}{9} = \frac{5(23) - 160}{9} = -5^\circ$

22. a. $V = \frac{1}{3}\pi r^2 h$
 $3V = \pi r^2 h$
 $\frac{3V}{\pi r^2} = h$

b. $h = \frac{3V}{\pi r^2} \approx \frac{3(6.28)}{3.14(3)^2} = \frac{2}{3}$

24. $y = 0.27x + 72$
 $y - 72 = 0.27x$
 $\frac{y - 72}{0.27} = x$ or $x = \frac{100y - 7200}{27}$

$y = 87: x = \frac{100(87) - 7200}{27} = \frac{1500}{27} \approx 55.6$
 $1970 + 55.6 = 2025.6$
 Life expectancy in Japan is expected to be 87 years in 2025.

26. a. $ND = 0.95T$
 $N = \frac{0.95T}{D}$

b. $D = 30, T = 6 \cdot 60 = 360$
 $N = \frac{0.95(360)}{30} = 11.4 \approx 11$
 She should schedule 11 patient appointments.

28. a. $C = 0.7649D + 6.1275$
 $C - 6.1275 = 0.7649D$
 $D = \frac{C - 6.1275}{0.7649}$

b. $D = \frac{12.48 - 6.1275}{0.7649} \approx 8.3$
 The disposable income is \$8.3 billion.

Cumulative Review

29. $(2x^{-3}y)^{-2} = 2^{-2}x^{-3(-2)}y^{-2}$
 $= 2^{-2}x^6y^{-2}$
 $= \frac{x^6}{2^2y^2}$
 $= \frac{x^6}{4y^2}$

$$\begin{aligned}
 30. \left(\frac{5x^2y^{-3}}{x^{-4}y^2} \right)^{-3} &= \frac{5^{-3}x^{2(-3)}y^{-3(-3)}}{x^{-4(-3)}y^{2(-3)}} \\
 &= \frac{5^{-3}x^{-6}y^9}{x^{12}y^{-6}} \\
 &= \frac{y^{9+6}}{5^3x^{12+6}} \\
 &= \frac{y^{15}}{125x^{18}}
 \end{aligned}$$

$$\begin{aligned}
 31. 1 + 16 \div (2 - 4)^3 - 3 &= 1 + 16 \div (-2)^3 - 3 \\
 &= 1 + 16 \div (-8) - 3 \\
 &= 1 + (-2) - 3 \\
 &= -1 - 3 \\
 &= -4
 \end{aligned}$$

$$\begin{aligned}
 32. 2[a - (3 - 2b)] + 5a &= 2(a - 3 + 2b) + 5a \\
 &= 2a - 6 + 4b + 5a \\
 &= 7a + 4b - 6
 \end{aligned}$$

$$\begin{aligned}
 33. \$5000 \text{ investment: } I &= prt = 5000(0.05)(1) = 250 \\
 \$4000 \text{ investment: } I &= prt = 4000(0.09)(1) = 360 \\
 \text{Total} &= \$5000 + \$250 + \$4000 + \$360 = \$9610 \\
 \text{They would have } &\$9610 \text{ after 1 year.}
 \end{aligned}$$

$$\begin{aligned}
 34. \frac{46,622.1 - 45,711.3}{9.9 + 11.7 + 10.6 + 5.8 + 8} &= \frac{910.8}{46} = 19.8 \\
 \text{The car got } &19.8 \text{ miles per gallon.}
 \end{aligned}$$

Classroom Quiz 2.2

$$\begin{aligned}
 1. \quad A &= 3b + 6(x - 2) \\
 A &= 3b + 6x - 12 \\
 A - 3b + 12 &= 6x \\
 \frac{A - 3b + 12}{6} &= \frac{6x}{6} \\
 x &= \frac{A - 3b + 12}{6}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad M &= \frac{2}{3}gh \\
 \frac{3}{3}M &= gh
 \end{aligned}$$

$$\begin{aligned}
 3. \quad B &= 3a + \frac{3}{4}w - \frac{1}{8} \\
 8B &= 8 \left(3a + \frac{3}{4}w - \frac{1}{8} \right) \\
 8B &= 24a + 6w - 1 \\
 8B - 24a + 1 &= 6w \\
 \frac{8B - 24a + 1}{6} &= \frac{6w}{6} \\
 w &= \frac{8B - 24a + 1}{6}
 \end{aligned}$$

2.3 Exercises

2. It could happen if $b = 0$. Then $-b$ and b would be the same number.

4. You must first isolate the absolute value expression. To do this you add -5 to each side of the equation. The result will be $|3x - 1| = 9$, then you solve the two equations $3x - 1 = 9$ and $3x - 1 = -9$. The final answer is $x = \frac{10}{3}$, $x = -\frac{8}{3}$.

$$\begin{aligned}
 6. \quad |x| &= 14 \\
 x &= 14 \text{ or } x = -14 \\
 \text{Check: } |14| &= 14 \quad |-14| = 14 \\
 14 &= 14 \quad 14 = 14
 \end{aligned}$$

$$\begin{aligned}
 8. \quad |x + 6| &= 13 \\
 x + 6 &= 13 \text{ or } x + 6 = -13 \\
 x &= 7 \quad x = -19 \\
 \text{Check: } |7 + 6| &= 13 \quad |-19 + 6| = 13 \\
 13 &= 13 \quad 13 = 13
 \end{aligned}$$

$$\begin{aligned}
 10. \quad |4x - 7| &= 9 \\
 4x - 7 &= 9 \text{ or } 4x - 7 = -9 \\
 4x &= 16 \quad 4x = -2 \\
 x &= 4 \quad x = \frac{-2}{4} = -\frac{1}{2}
 \end{aligned}$$

Chapter 2: Intermediate Algebra and Inequalities

2

$$\frac{3M}{2g} = h \text{ or } h = \frac{3M}{2g}$$

Chapter 2: Linear Equations and Inequalities

$$\begin{array}{r} \text{Check: } |4(4) - 7| \quad 9 \\ |16 - 7| \quad 9 \\ |9| \quad 9 \\ 9 = 9 \end{array} \qquad \begin{array}{r} 4\left(-\frac{1}{2}\right) - 7 \quad 9 \\ |-2 - 7| \quad 9 \\ |-9| \quad 9 \\ 9 = 9 \end{array}$$

12. $|3 - x| = 7$
 $3 - x = 7$ or $3 - x = -7$
 $-x = 4$ $-x = -10$
 $x = -4$ $x = 10$

Check: $|3 - (-4)| = 7$ $|3 - 10| = 7$
 $|3 + 4| = 7$ $|-7| = 7$
 $|7| = 7$ $7 = 7$

14. $|\frac{1}{4}x + 5| = 3$

$\frac{1}{4}x + 5 = 3$ or $\frac{1}{4}x + 5 = -3$
 $x + 20 = 12$ $x + 20 = -12$
 $x = -8$ $x = -32$

Check: $|\frac{1}{4}(-8) + 5| = 3$ $|\frac{1}{4}(-32) + 5| = 3$
 $|-2 + 5| = 3$ $|-8 + 5| = 3$
 $|3| = 3$ $|-3| = 3$
 $3 = 3$ $3 = 3$

16. $|2.4 - 0.8x| = 2$

$2.4 - 0.8x = 2$ or $2.4 - 0.8x = -2$
 $24 - 8x = 20$ $24 - 8x = -20$

$-8x = -4$ $-8x = -44$
 $x = \frac{-4}{-8} = \frac{1}{2}$ $x = \frac{-44}{-8} = \frac{11}{2}$

Check: $|2.4 - 0.8(\frac{1}{2})| = 2$ $|2.4 - 0.8(\frac{11}{2})| = 2$
 $|2.4 - 0.4| = 2$ $|2.4 - 4.4| = 2$
 $|2| = 2$ $|-2| = 2$
 $2 = 2$ $2 = 2$

18. $|x + 3| - 4 = 8$
 $|x + 3| = 12$

$x + 3 = 12$ or $x + 3 = -12$
 $x = 9$ $x = -15$

Check: $|9 + 3| - 4 = 8$ $|-15 + 3| - 4 = 8$
 $|12| - 4 = 8$ $|-12| - 4 = 8$
 $12 - 4 = 8$ $12 - 4 = 8$
 $8 = 8$ $8 = 8$

20. $|\frac{2}{3} - \frac{1}{2}x| - 2 = -1$
 $|\frac{2}{3} - \frac{1}{2}x| = 1$

$\frac{2}{3} - \frac{1}{2}x = 1$ or $\frac{2}{3} - \frac{1}{2}x = -1$

$4 - 3x = 6$ $4 - 3x = -6$
 $-3x = 2$ $-3x = -10$
 $x = -\frac{2}{3}$ $x = \frac{10}{3}$

Check:

$|\frac{2}{3} - \frac{1}{2}(-\frac{2}{3})| - 2 = -1$ $|\frac{2}{3} - \frac{1}{2}(\frac{10}{3})| - 2 = -1$
 $|\frac{2}{3} + \frac{1}{3}| - 2 = -1$ $|\frac{2}{3} - \frac{5}{3}| - 2 = -1$
 $|1 - 2| = -1$ $|-1 - 2| = -1$
 $1 - 2 = -1$ $1 - 2 = -1$
 $-1 = -1$ $-1 = -1$

22. $|5 - \frac{7}{2}x| + 1 = 11$
 $|5 - \frac{7}{2}x| = 10$

$5 - \frac{7}{2}x = 10$ or $5 - \frac{7}{2}x = -10$
 $-\frac{7}{2}x = 5$ $-\frac{7}{2}x = -15$

$x = -\frac{10}{7}$ $x = \frac{30}{7}$

Check: $|5 - \frac{7}{2}(-\frac{10}{7})| + 1 = 11$ $|5 - \frac{7}{2}(\frac{30}{7})| + 1 = 11$
 $|5 + 5| + 1 = 11$ $|5 - 15| + 1 = 11$
 $|10| + 1 = 11$ $|-10| + 1 = 11$
 $10 + 1 = 11$ $10 + 1 = 11$
 $11 = 11$ $11 = 11$

24. $\left| \frac{2x-1}{4} \right| = \frac{1}{3}$

$$\frac{2x-1}{4} = \frac{1}{3} \quad \text{or} \quad \frac{2x-1}{4} = -\frac{1}{3}$$

$$6x-3 = 4 \qquad 6x-3 = -4$$

$$6x = 7 \qquad 6x = -1$$

$$x = \frac{7}{6} \qquad x = -\frac{1}{6}$$

Check: $\left| \frac{2\left(\frac{7}{6}\right)-1}{4} \right| = \frac{1}{3}$ $\left| \frac{2\left(-\frac{1}{6}\right)-1}{4} \right| = \frac{1}{3}$

$$\frac{6}{4} \left| \frac{7-3}{3} \right| = \frac{1}{3} \qquad \frac{6}{4} \left| \frac{-1-3}{3} \right| = \frac{1}{3}$$

$$\frac{3}{2} \left| \frac{4}{3} \right| = \frac{1}{3} \qquad \frac{3}{2} \left| -\frac{4}{3} \right| = \frac{1}{3}$$

$$\frac{3}{2} \cdot \frac{4}{3} = \frac{1}{3} \qquad \frac{3}{2} \cdot \frac{4}{3} = \frac{1}{3}$$

$$2 = \frac{1}{3} \qquad 2 = \frac{1}{3}$$

26. $|x - 7| = |3x - 1|$

$$x - 7 = 3x - 1 \quad \text{or} \quad x - 7 = -(3x - 1)$$

$$-2x - 7 = -1 \qquad x - 7 = -3x + 1$$

$$-2x = 6 \qquad 4x - 7 = 1$$

$$x = -3 \qquad 4x = 8$$

$$\qquad \qquad x = 2$$

28. $\left| \frac{2x+3}{3} \right| = |x+4|$

$$\frac{2x+3}{3} = x+4 \quad \text{or} \quad \frac{2x+3}{3} = -(x+4) = -x-4$$

$$2x+3 = 3x+12 \qquad 2x+3 = -3x-12$$

$$-x+3 = 12 \qquad 5x+3 = -12$$

$$-x = 9 \qquad 5x = -15$$

$$x = -9 \qquad x = -3$$

30. $|2.2x + 2| = |1 - 2.8x|$

$$2.2x + 2 = 1 - 2.8x \quad \text{or} \quad 2.2x + 2 = -1 + 2.8x$$

$$22x + 20 = 10 - 28x \qquad 22x + 20 = -10 + 28x$$

$$50x = -10 \qquad -6x = -30$$

$$x = -\frac{1}{5} \qquad x = 5$$

32. $\left| \frac{2x}{5} + 1 \right| = |1 - x|$

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

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

$$5^{-x}$$

34. $|-0.74x - 8.26| = 5.36$

$$-0.74x - 8.26 = 5.36$$

$$-0.74x = 13.62$$

$$x \approx -18.41$$

or

$$-0.74x - 8.26 = -5.36$$

$$-0.74x = 2.9$$

$$x \approx -3.92$$

36. $|4(x-1)| + 5 = 15$

$$4x - 4 = 10$$

$$4x - 4 = 10 \quad \text{or} \quad 4x - 4 = -10$$

$$4x = 14 \qquad 4x = -6$$

$$x = \frac{14}{4} = \frac{7}{2} \qquad x = \frac{-6}{4} = -\frac{3}{2}$$

Check: $\left| 4\left(\frac{7}{2} - 1\right) \right| + 5 = 15$

$$\left| 4\left(\frac{5}{2}\right) \right| + 5 = 15$$

$$|10| + 5 = 15$$

$$10 + 5 = 15$$

$$15 = 15$$

$$\left| 4\left(-\frac{3}{2} - 1\right) \right| + 5 = 15$$

$$\left| 4\left(-\frac{5}{2}\right) \right| + 5 = 15$$

$$|-10| + 5 = 15$$

$$10 + 5 = 15$$

$$15 = 15$$

38. $\left| \frac{3}{4}x + 9 \right| = 0$

$$\frac{3}{4}x + 9 = 0$$

$$3x + 36 = 0$$

$$3x = -36$$

$$x = -12$$

or $\frac{2x}{5} + 1 = -(1 - x)$

Chapter 2: Intermediate Algebra and Inequalities

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

Check: $\frac{3}{4}(-12) + 9$

$$= 0 - 9 + 9$$

$$= 0$$

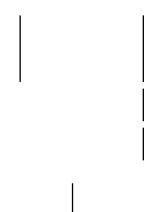
$$\frac{7}{5}x = 0$$

$$-\frac{3x}{5} = -2$$

$$x = 0$$

$$x = \frac{10}{3}$$

Chapter 2: Linear Equations and Inequalities



40. $\left| \frac{3}{4}x - \frac{2}{3} \right| = -8$ has no solution because absolute value is ≥ 0 .

42. $\left| \frac{5x+1}{2} \right| = \frac{3}{4}$

$\frac{5x+1}{2} = \frac{3}{4}$ or $\frac{5x+1}{2} = -\frac{3}{4}$

$2(5x+1) = 3$ $2(5x+1) = -3$

$10x+2 = 3$ $10x+2 = -3$

$10x = 1$ $10x = -5$

$x = \frac{1}{10}$ $x = \frac{-5}{10} = -\frac{1}{2}$

Check:

$\left \frac{5\left(\frac{1}{10}\right)+1}{2} \right = \frac{3}{4}$	$\left \frac{5\left(-\frac{1}{2}\right)+1}{2} \right = \frac{3}{4}$
$\left \frac{\frac{1}{2}+1}{2} \right = \frac{3}{4}$	$\left \frac{-\frac{5}{2}+1}{2} \right = \frac{3}{4}$
$\left \frac{\frac{3}{2}}{2} \right = \frac{3}{4}$	$\left \frac{-\frac{3}{2}}{2} \right = \frac{3}{4}$
$\frac{3}{4} = \frac{3}{4}$	$\frac{3}{4} = \frac{3}{4}$

2. $\left| \frac{3}{4}x - 2 \right| + 3 = 10$

$\left| \frac{3}{4}x - 2 \right| = 7$

$\frac{3}{4}x - 2 = 7$ or $\frac{3}{4}x - 2 = -7$

$\frac{3}{4}x = 9$ $\frac{3}{4}x = -5$

$x = 12$ $x = -\frac{20}{3}$

3. $|3x - 4| = |x + 3|$

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

$2x - 4 = 3$ $3x - 4 = -x - 3$

$2x = 7$ $4x - 4 = -3$

$x = \frac{7}{2}$ $4x = 1$

$x = \frac{7}{2}$ $x = \frac{1}{4}$

Cumulative Review

43. $(3x^{-3}yz^0) \left(\frac{5}{3}x^4y^2 \right) = 5x^{-3+4}y^{1+2} \cdot 1 = 5xy^3$

44. $\frac{\sqrt{3-2 \cdot 1^2} + 5}{4^2 - 2 \cdot 3} = \frac{\sqrt{3-2} + 5}{16-6}$

$= \frac{\sqrt{1} + 5}{10}$

$= \frac{1+5}{10}$

$= \frac{6}{10}$

$= \frac{3}{5}$

Classroom Quiz 2.3

1. $|2x + 5| = 55$

2.4 Exercises

2. Let x = the number.

$\frac{5}{8}x = -75$

$5x = -600$

$x = -120$

The number is -120 .

4. Let x = the monthly fee last year.

$98 = \frac{3}{2}x - 10$

$196 = 3x - 20$

$216 = 3x$

$72 = x$

Last year's monthly parking fee was \$72.

6. Let x = the number of days the car has been parked.

$78 + 24(x - 2) = 174$

$78 + 24x - 48 = 174$

$30 + 24x = 174$

Chapter 2: Intermediate Algebra and Inequalities

$$\begin{array}{l} 2x + 5 = 55 \quad \text{or} \quad 2x + 5 = -55 \\ 2x = 50 \quad \quad \quad 2x = -60 \\ x = 25 \quad \quad \quad x = -30 \end{array}$$

Chapter 2: Linear Equations and Inequalities

$$\begin{array}{l} 24x = 144 \\ x = 6 \end{array}$$

The car has been parked for 6 days.

8. Let x = the number of bills paid.

$$5.00(6) + 0.50x = 48.50$$

$$30 + 0.50x = 48.50$$

$$0.50x = 18.50$$

$$x = 37$$

He paid 37 bills.

10. Profit = Revenue - Cost.
For one year the profit must be
 $120,000 \cdot 3 = 360,000$.
The revenue for one week is
 $(5000 \cdot 4 \cdot 18) = 360,000$.
The cost for one week is
 $55,000 \cdot 4 + 110,000 = 330,000$.
The profit for one week is
 $360,000 - 330,000 = 30,000$.
Let x = the number of weeks on tour, then
 $30,000x = 360,000$
 $x = 12$
They need to be on tour 12 weeks each year.
12. Let x = the width of the driveway.
Then $2x + 15$ = the length of the driveway.
 $2W + 2L = P$
 $2x + 2(2x + 15) = 120$
 $2x + 4x + 30 = 120$
 $6x = 90$
 $x = 15$
 $2x + 15 = 2(15) + 15 = 45$
The width of the driveway is 15 feet and the length is 45 feet.
14. Let x = the length of equal sides.
 $x + x + 1.5x - 3 = 28.5$
 $3.5x = 31.5$
 $x = 9$
 $1.5x - 3 = 1.5(9) - 3 = 10.5$
The equal sides are each 9 centimeters and the third side is 10.5 centimeters.

Cumulative Review

15. $57 + 0 = 57$
Identity property of addition
16. $(2 \cdot 3) \cdot 9 = 2 \cdot (3 \cdot 9)$
Associative property of multiplication
17. $7(-2) \div 7(-3) - 3 = -14 \div 7(-3) - 3$
 $= (-2)(-3) - 3$
 $= 6 - 3$
 $= 3$
18. $(7 - 12)^3 - (-4) + 3^3 = (-5)^3 + (4) + 27$
 $= -125 + 4 + 27$
 $= -94$

Classroom Quiz 2.4

1. Let
- x
- = the number.

$$\frac{3}{5}x = -81$$

$$\frac{5}{3} \cdot \frac{3}{5}x = \frac{5}{3} \cdot (-81)$$

$$x = -135$$

The number is -135.

2. Let
- x
- = length of second side.

 $3x$ = length of first side. $x + 16$ = length of third side.

$$3x + x + x + 16 = 66$$

$$5x + 16 = 66$$

$$5x = 50$$

$$x = 10$$

$$3x = 3(10) = 30$$

$$x + 16 = 10 + 16 = 26$$

The first side is 30 meters, the second side is 10 meters, and the third side is 26 meters.

3. Let
- x
- = number of hours she parked in the garage.

$$7 + 2.50(x - 1) = 44.50$$

$$7 + 2.5x - 2.5 = 44.5$$

$$2.5x + 4.5 = 44.5$$

$$2.5x = 40$$

$$x = 16$$

She parked in the garage for 16 hours.

Use Math to Save Money

1. Apartment 1:

$$\$800 + \$110 + \$90 + \$90 + \$25 = \$1115$$

$$\text{Apartment 2: } \$850 + \$90 + \$90 + \$25 = \$1055$$

$$\text{Apartment 3: } \$900 + \$110 + \$25 = \$1035$$

2. Annual cost without free rent:

$$\$1115 \times 12 = \$13,380$$

Subtract one month's rent to find annual cost

$$\text{with free rent: } \$13,380 - \$800 = \$12,580$$

Divide by 12 to find monthly cost:

$$\$12,580$$

$$\frac{\quad}{12} \approx \$1048.33$$

3. They should rent Apartment 3 since it has the lowest monthly expenses.

4. Divide the monthly expenses for Apartment 3 by 2.

\$

1

0

3

5

=

\$

5

1

7.

5

0

2

Each person's share is \$17.50.

$$\begin{aligned}
 5. \quad & -5x + 9y = 18 \\
 & -5x + 5x + 9y = 5x + 18 \\
 & 9y = 5x + 18 \\
 & \frac{9y}{9} = \frac{5x + 18}{9} \\
 & y = \frac{5x + 18}{9} \quad \text{or} \quad y = \frac{5}{9}x + 2
 \end{aligned}$$

$$\begin{aligned}
 & = -5.5 \\
 5x - 8 = 3x + 2 \quad & \text{or} \quad 5x - 8 = -3x - 2 \\
 2x = 10 \quad & 8x = 6 \\
 x = 5 \quad & x = \frac{6}{8} = 0.75
 \end{aligned}$$

13. Let W = width, then $W + 20$ = length.

$$P = 2L + 2W$$

$$280 = 2(W + 20) + 2W$$

$$280 = 2W + 40 + 2W$$

$$280 = 4W + 40$$

$$240 = 4W$$

$$60 = W$$

$$80 = W + 20$$

The dimensions are 60 in. \times 80 in.

14. Let n = the number of checks.

$$6 + 0.12n = 9.12$$

$$0.12n = 3.12$$

$$n = 26$$

He used 26 checks.

15. Let x = number of lb Cindi picked up.

$$x + \frac{x}{2} + 80 = 455$$

$$2x + x + 160 = 910$$

$$3x = 750$$

$$x = 250$$

$$\frac{x}{2} + 80 = 205 \text{ pounds for Alan}$$

Cindi picked up 250 pounds and Alan picked up 205 pounds.

16. Let x = length of shortest side.

Then $2x - 5$ = length of longest side and

$x + 9$ = length of third side.

$$2x - 5 + x + 9 + x = 62$$

$$4x + 4 = 62$$

$$4x = 58$$

$$x = 14.5$$

$$x + 9 = 14.5 + 9 = 23.5$$

$$2x - 5 = 2(14.5) - 5 = 24$$

The shortest side is 14.5 feet, the longest side is 24 feet, and the third side is 23.5 feet.

2.5 Exercises

2. Let x = debt in 2011.

$$x + 0.28x = 18.1$$

$$1.28x = 18.1$$

$$x \approx 14.1$$

The U.S. national debt on February 5, 2011, was approximately \$14.1 trillion.

4. Let x = members in 2000.

$$x + 0.61x = 52.9$$

$$1.61x = 52.9$$

$$x \approx 32.9$$

Approximately 32.9 million Americans were health club members in 2000.

6. Let x = the number of deer carrying infected ticks.
 $0.6x = 15$
 $x = 25$
 The total number of deer carrying infected ticks is approximately 25.

8. Let x = Judy's cost.
 Then $2x - 250$ = Lynn's cost.
 $x + 2x - 250 = 950$
 $3x = 1200$
 $x = 400$
 $2x - 250 = 550$
 Judy pays \$400 and Lynn pays \$550.

10. Let x = Grace's starting salary.
 $1300 - x$ = Tony's starting salary.
 $2x + 3(1300 - x) = 3200$
 $2x + 3900 - 3x = 3200$
 $-x = -700$
 $x = 700$
 $1300 - x = 600$
 Grace earned \$700 per week ten years ago.
 Tony earned \$600 per week ten years ago.

12. Let x = number of boxes Rockland sold.
 $460 - x$ = number of boxes Harrisville sold.
 $\frac{1}{2}x + \frac{2}{5}(460 - x) = 205$
 $5x + 4(460 - x) = 2050$
 $5x + 1840 - 4x = 2050$
 $x = 210$
 $460 - x = 250$
 Rockland sold 210 boxes of cookies and Harrisville sold 250 boxes.

14. $I = prt = 4800(0.11)(2)$
 $I = 1056$
 The interest was \$1056.

16. $I = prt$
 $I = 4000(0.061)(0.25)$
 $I = 61.00$
 The interest was \$61.

18. Let x = amount invested at 13%.
 Then $45,000 - x$ = amount invested at 16%.
 $0.13x + 0.16(45,000 - x) = 6570$
 $0.13x + 7200 - 0.16x = 66,570$
 $-0.3x = -630$
 $x = 21,000$
 $45,000 - x = 24,000$
 She invested \$21,000 at 13% and \$24,000 at 16%.

20. Let x = amount invested at 5%.
 Then $8000 - x$ = amount invested at 7%.
 $0.05x + 0.07(8000 - x) = 496$
 $0.05x + 560 - 0.07x = 496$
 $-0.02x = -64$

$$x = 3200$$

$$8000 - x = 4800$$

The amount invested at 5% was \$3200. The amount invested at 7% was \$4800.

22. Let x = milliliters of 16% solution.
 Then $350 - x$ = milliliters of 9% solution.
 $0.16x + 0.09(350 - x) = 0.12(350)$
 $0.16x + 31.5 - 0.09x = 42$

$$0.07x = 10.5$$

$$x = 150$$

$$350 - x = 200$$

She should use 150 milliliters of the 16% solution and 200 milliliters of the 9% solution.

24. Let x = the number of pounds of \$7 per pound tea. Then $32 - x$ = the number of pounds of \$9 per pound tea.
 $7x + 9(32 - x) = 8.50(32)$
 $7x + 288 - 9x = 272$
 $x = 8$

$$32 - x = 24$$

He should use 8 pounds of the \$7/lb tea and 24 pounds of the \$9/lb tea.

26. Let x = number of oz of 90% DEET.
 $10 - x$ = number of oz of 10% DEET.
 $0.90x + 0.10(10 - x) = 0.3(10)$

$$0.9x + 1 - 0.1x = 3$$

$$0.8x = 2$$

$$x = 2.5$$

$$10 - x = 10 - 2.5 = 7.5$$

They need to mix 2.5 ounces of 90% DEET with 7.5 ounces of 10% DEET.

28. Let x = maximum flying speed.
 Then $x - 60$ = cruising speed.
 $3x + 2(x - 60) = 930$
 $3x + 2x - 120 = 930$
 $5x = 1050$
 $x = 210$

Maximum flying speed is 210 mph.

30. Let x = time of each trip.
 $14x = 6x + 20$
 $8x = 20$
 $x = 2.5$

$$\frac{1}{2}$$

Each family spent 2.5 hours or $2\frac{1}{2}$ hours.

Cumulative Review

31. $5a - 2b + c = 5(1) - 2(-3) + (-4)$
 $= 5 + 6 - 4$
 $= 11 - 4$
 $= 7$

32. $2x^2 - 3x + 1 = 2(-2)^2 - 3(-2) + 1$
 $= 2 \cdot 4 + 6 + 1$
 $= 8 + 6 + 1$
 $= 14 + 1$
 $= 15$

$$33. \frac{5 + 8(-2) + 2^4}{|2 - 7|} = \frac{5 + (-16) + 16}{|-5|} = \frac{5}{5} = 1$$

$$34. \frac{\sqrt{49 - 24}}{2^3(-1) + 7(4)} = \frac{\sqrt{25}}{8(-1) + 7(4)}$$

$$= \frac{\sqrt{25}}{-8 + 28}$$

$$= \frac{5}{20}$$

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

Classroom Quiz 2.5

1. Let x = price one month ago.
 $x - 0.07x = 1302$
 $0.93x = 1302$
 $x = 1400$
 The price was \$1400 a month ago.
2. Let x = amount of 45% fertilizer.
 Then $120 - x$ = amount of 18% fertilizer.
 $0.45x + 0.18(120 - x) = 0.36(120)$
 $0.45x + 21.6 - 0.18x = 43.2$
 $0.27x + 21.6 = 43.2$
 $0.27x = 21.6$
 $x = 80$

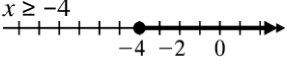
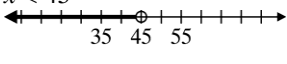
$$120 - x = 40$$

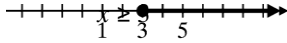
They should mix 80 gallons of the 45% fertilizer and 40 gallons of the 18% fertilizer.

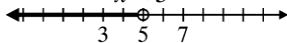
3. Let x = amount invested at 6%.
 Then $6000 - x$ = amount invested at 8%.
 $0.06x + 0.08(6000 - x) = 450$
 $0.06x + 480 - 0.08x = 450$
 $480 - 0.02x = 450$
 $-0.02x = -30$
 $x = 1500$

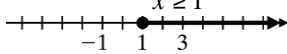
$6000 - x = 4500$
 He invested \$1500 at 6% and \$4500 at 8%.

2.6 Exercises

- 2. False, adding $-5x$ to both sides of an inequality does not reverse the direction of the inequality.
- 4. True, the graph of $x > -2$ is the set of all points to the right of -2 on a number line.
- 6. False, the term -4 must also be multiplied by the LCD.
- 8. $-15 < 4$ because -15 is to the left of 4 on a number line.
- 10. $-5 > -9$ because -5 is to the right of -9 on a number line.
- 12. $\frac{5}{6} > \frac{5}{7}$ because $\frac{5}{6}$ is to the right of $\frac{5}{7}$ on a number line.
- 14. $-\frac{5}{12} = -0.41\bar{6} > -0.\overline{428571} = -\frac{3}{7}$
- 16. $-2.69 > -2.7$ because -2.69 is to the right of -2.7 on a number line.
- 18. $|8 - 13| = |-5| = 5$
 $|-3 - 4| = |-7| = 7$
 $|8 - 13| < |-3 - 4|$ since $5 < 7$.
- 20. $x \geq -4$

- 22. $x < 45$


24. $3 + 5x \geq 18$
 $3 - 3 + 5x \geq 15 - 3$
 $5x \geq 15$
 $\frac{5x}{5} \geq \frac{15}{5}$
 $x \geq 3$


26. $2x + 5 > 4x - 5$
 $2x - 4x + 5 > 4x - 5 - 4x$
 $-2x + 5 > -5$
 $-2x + 5 - 5 > -5 - 5$
 $-2x > -10$
 $\frac{-2x}{-2} < \frac{-10}{-2}$
 $x < 5$


28. $1.7 - 0.6x \leq x + 0.1$
 $1.7 - 0.6x - x \leq x - x + 0.1$
 $1.7 - 1.6x \leq 0.1$
 $1.7 - 1.7 - 1.6x \leq 0.1 - 1.7$
 $-1.6x \leq -1.6$
 $x \geq 1$


30. $5x - 1 > 29$
 $5x - 1 + 1 > 29 + 1$
 $5x > 30$
 $\frac{5x}{5} > \frac{30}{5}$
 $x > 6$

32. $8x - 7 \leq 4x - 19$
 $8x - 4x - 7 \leq 4x - 4x - 19$
 $4x - 7 \leq -19$
 $4x - 7 + 7 \leq -19 + 7$
 $4x \leq -12$
 $\frac{4x}{4} \leq \frac{-12}{4}$
 $x \leq -3$

34. $2x + \frac{5}{2} > \frac{3}{2}x - 2$
 $2\left(2x + \frac{5}{2}\right) > 2\left(\frac{3}{2}x - 2\right)$

$$\begin{aligned}4x + 5 &> 3x - 4 \\4x - 3x &> -4 - 5 \\x &> -9\end{aligned}$$

36. $4x + 7 + 5(x - 5) < 0$

$$4x + 7 + 5x - 25 < 0$$

$$9x - 18 < 0$$

$$9x < 18$$

$$\frac{9x}{9} < \frac{18}{9}$$

$$x < 2$$

38. $-3(x + 1) - \frac{x}{2} + \frac{3}{2} < 0$

$$-3x - 3 - \frac{x}{2} + \frac{3}{2} < 0$$

$$2 \left(-3x - 3 - \frac{x}{2} + \frac{3}{2} \right) < 2(0)$$

$$-6x - 6 - x + 3 < 0$$

$$-7x - 3 < 0$$

$$-7x < 3$$

$$\frac{-7x}{-7} > \frac{3}{-7}$$

$$-7 > -7$$

$$x > -\frac{3}{7}$$

40. $0.3x + 1.2 \geq 3.8 - x$

$$10(0.3x + 1.2) \geq 10(3.8 - x)$$

$$3x + 12 \geq 38 - 10x$$

$$3x + 10x \geq 38 - 12$$

$$13x \geq 26$$

$$\frac{13x}{13} \geq \frac{26}{13}$$

$$x \geq 2$$

42. $1.2 - 0.8x \leq 0.3(4 - x)$

$$1.2 - 0.8x \leq 1.2 - 0.3x$$

$$-0.8x + 0.3x \leq 1.2 - 1.2$$

$$-0.5x \leq 0$$

$$\frac{-0.5x}{-0.5} \geq \frac{0}{-0.5}$$

$$-0.5 \geq -0.5$$

$$x \geq 0$$

44. $\frac{3}{4} + \frac{1}{3}(x - 7) \leq 1 - \frac{x}{4}$

46. $1 - \frac{2x+1}{2} > \frac{x}{4} + \frac{4}{3}$

$$12 \left(1 - \frac{2x+1}{2} \right) > 12 \left(\frac{x}{4} + \frac{4}{3} \right)$$

$$12 - 12x - 6 > 3x + 16$$

$$-12x + 6 > 3x + 16$$

$$-15x > 10$$

$$\frac{-15x}{-15} < \frac{10}{-15}$$

$$-15 < -15$$

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

48. Let x = number of new customers.

$$(7.50)(20) + 25x > 600$$

$$150 + 25x > 600$$

$$25x > 450$$

$$\frac{25x}{25} > \frac{450}{25}$$

$$x > 18$$

She must sign up more than 18 customers.

50. Let x = the number of packages.

$$180 + 160 + 68.5x \leq 2395$$

$$68.5x \leq 2055$$

$$x \leq 30$$

A maximum of thirty packages can be carried.

52. Let x = the number of additional ounces per package after the first ounce.

$$0.50 + 0.25x \leq 8.00$$

$$0.25x \leq 7.50$$

$$\frac{0.25x}{0.25} \leq \frac{7.50}{0.25}$$

$$0.25 \leq 0.25$$

$$x \leq 30$$

A box could not weigh more than 30 + 1 = 31 ounces.

Cumulative Review

$$\frac{4}{2} \left[\frac{3}{4} + \frac{1}{3}(x - 7) \right] \leq 4 \left(1 - \frac{x}{4} \right)$$

53.

$$\begin{aligned} & \left[\begin{array}{c} 4 \\ 2 \end{array} \right] \left(\begin{array}{c} 4 \\ 4 \end{array} \right) \\ & 3 + 2(x - 7) \leq 4 - x \\ & 3 + 2x - 14 \leq 4 - x \\ & 2x - 11 \leq 4 - x \\ & 2x + x \leq 4 + 11 \\ & 3x \leq 15 \\ & \frac{3x}{3} \leq \frac{15}{3} \\ & x \leq 5 \end{aligned}$$

$$\begin{aligned} & 3x \\ & y(\\ & x + \\ & 2) \\ & - \\ & 4x \\ & 2 \\ & (y \\ & -1 \\ &) \\ & = \\ & 3x \\ & 2y \\ & + \\ & 6x \\ & y - \\ & 4x \\ & 2y \\ & + \\ & 4x \\ & 2 \\ & = \\ & 6x \\ & y - \\ & x^2 \\ & y + \\ & 4x \\ & 2 \end{aligned}$$

$$\begin{aligned} 54. & \frac{2}{3}ab(6a - 2b + 9) \\ & = \frac{2}{3}ab(6a) - \frac{2}{3}ab(2b) + \frac{2}{3}ab(9) \\ & = 4a^2b - \frac{4}{3}ab^2 + 6ab \end{aligned}$$

$$55. \left(\frac{4x^2}{3yw^{-1}} \right)^3 = \frac{4^3 x^{2 \cdot 3}}{3^3 y^3 w^{-1(3)}} = \frac{64x^6}{27y^3 w^{-3}} = \frac{64x^6 w^3}{27y^3}$$

$$56. \begin{aligned} (-3a^0 b^{-3} c^5)^{-2} &= (-3b^{-3} c^5)^{-2} \\ &= (-3)^{-2} b^{-3(-2)} c^{5(-2)} \\ &= \frac{1}{9} b^6 c^{-10} \\ &= \frac{b^6}{9c^{10}} \end{aligned}$$

Classroom Quiz 2.6

$$1. \begin{aligned} 9x - 2 &> 4x + 8 \\ 9x - 4x - 2 &> 4x - 4x + 8 \\ 5x - 2 &> 8 \\ 5x - 2 + 2 &> 8 + 2 \\ 5x &> 10 \\ \frac{5x}{5} &> \frac{10}{5} \\ x &> 2 \end{aligned}$$

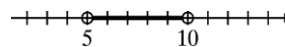
$$2. \begin{aligned} -6(x + 3) &> -3x - 8 \\ -6x - 18 &> -3x - 8 \\ -6x + 3x - 18 &> -3x + 3x - 8 \\ -3x - 18 &> -8 \\ -3x - 18 + 18 &> -8 + 18 \\ -3x &> 10 \\ \frac{-3x}{-3} &< \frac{10}{-3} \\ x &< -\frac{10}{3} \end{aligned}$$

$$3. \frac{1}{3}(x - 2) \leq \frac{1}{7}(7x - 14) - 2$$

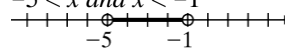
$$\begin{aligned} 21 \left[\frac{1}{3}(x - 2) \right] &\leq 21 \left[\frac{1}{7}(7x - 14) - 2 \right] \\ 7(x - 2) &\leq 3(7x - 14) - 42 \\ 7x - 14 &\leq 21x - 42 - 42 \\ 7x - 14 &\leq 21x - 84 \\ 7x - 21x &\leq -84 + 14 \\ -14x &\leq -70 \end{aligned}$$

2.7 Exercises

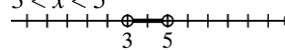
2. $5 < x$ and $x < 10$



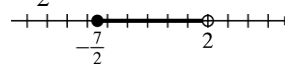
4. $-5 < x$ and $x < -1$



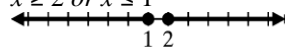
6. $3 < x < 5$



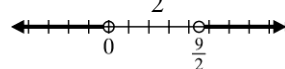
8. $-\frac{7}{2} \leq x < 2$



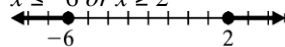
10. $x \geq 2$ or $x \leq 1$



12. $x < 0$ or $x > \frac{9}{2}$

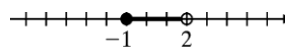


14. $x \leq -6$ or $x \geq 2$

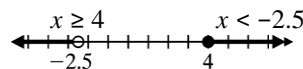


16. $4x - 1 < 7$ and $x \geq -1$

$$\begin{aligned} -1 \leq x \quad \text{and} \quad 4x - 1 < 7 \\ 4x < 8 \\ x < 2 \end{aligned}$$



18. $x + 1 \geq 5$ or $x + 5 < 2.5$

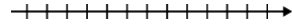


$$\frac{-14x}{-14} \geq \frac{-70}{-14}$$

20. $x < 6$ and $x > 9$
 These two graphs do not overlap. No solution

$$-14 \quad -14$$

$$x \geq 5$$



22. $s < 10$ or $s > 12$
24. $490 \leq c \leq 2000$
26. $16 \leq C \leq 24$

$$16 \leq \frac{5}{9}(F - 32) \leq 24$$

$$\frac{9}{5}(16) \leq \frac{9}{5} \cdot \frac{5}{9}(F - 32) \leq \frac{9}{5}(24)$$

$$28.8 \leq F - 32 \leq 43.2$$

$$60.8^\circ \leq F \leq 75.2^\circ$$

28. Carrie will need between 69,000 yen and 84,000 yen for 3 weeks.

$$69,000 \leq Y \leq 84,000$$

$$69,000 \leq 119(d - 5) \leq 84,000$$

$$579.83 \leq d - 5 \leq 705.88$$

$$\$584.83 \leq d \leq 710.88$$

30. $x - 2 < 9$ and $x + 3 < 6$
 $x < 11$ $x < 3$

$x < 3$ is the solution.

32. $5x + 6 \geq -9$ and $10 - x \geq 3$

$$5x \geq -15 \qquad -x \geq -7$$

$$x \geq -3 \qquad x \leq 7$$

$-3 \leq x \leq 7$ is the solution.

34. $5x + 1 < 1$ or $3x - 9 > 9$
 $5x < 0$ $3x > 18$
 $x < 0$ $x > 6$

$x < 0$ or $x > 6$ is the solution.

36. $-0.3x - 0.4 \geq 0.1x$ or $0.2x + 0.3 \leq -0.4x$
 Multiply by 10 on both sides of both inequalities to clear decimals.

$$-3x - 4 \geq x \quad \text{or} \quad 2x + 3 \leq -4x$$

$$-4x \geq 4 \qquad 6x \leq -3$$

$$x \leq -1 \qquad x \leq -0.5$$

$x \leq -0.5$ contains $x \leq -1$.

$x \leq -0.5$ is the solution.

38. $\frac{5x}{3} - 2 < \frac{14}{3}$ and $3x + \frac{5}{2} < -\frac{1}{2}$
 $5x - 6 < 14$ $6x + 5 < -1$

$$5x < 20 \qquad 6x < -6$$

$$x < 4 \qquad x < -1$$

$x < -1$ is the solution.

40. $6x - 10 < 8$ and $2x + 1 > 9$
 $6x < 18$ $2x > 8$
 $x < 3$ $x > 4$

44. $\frac{x-4}{6} - \frac{x-2}{9} \leq \frac{5}{18}$ or $-\frac{2}{5}(x+3) < -\frac{6}{5}$

$$3x - 12 - 2x + 4 \leq 5 \qquad -2x - 6 < -6$$

$$x - 8 \leq 5 \qquad -2x < 0$$

$$x \leq 13 \qquad x > 0$$

The solution is all real numbers.

Cumulative Review

45. $-3(x + 5) + 2(2x - 4) = -3x - 15 + 4x - 2 = x - 17$

46. Radius = $r = \frac{d}{2} = \frac{6}{2} = 3$ in.
 Area = $\pi r^2 = \pi(3)^2 = 9\pi \approx 9(3.14) = 28.26$ in.²

47. $3y - 5x = 8$
 $-5x = 8 - 3y$
 $(-1)(-5x) = (-1)(8 - 3y) = -8 + 3y$

$$5x = 3y - 8$$

$$x = \frac{3y - 8}{5}$$

48. $7x + 6y = -12$
 $6y = -12 - 7x$
 $y = \frac{-12 - 7x}{6}$

Classroom Quiz 2.7

1. $2x - 5 < 25$ and $2x > -6$
 $2x < 30$ $x > -3$
 $x < 15$

$-3 < x < 15$ is the solution.

2. $x > 7$ and $3x - 1 < 29$
 $3x < 30$
 $x < 10$

$7 < x < 10$ is the solution.

Chapter 2: Intermediate Algebra and Inequalities

$x < 3$ and $x > 4$ do not overlap.
No solution

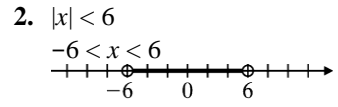
42. $7x + 2 \geq 11x + 14$ and $x + 9 \geq 6$
 $-4x \geq 12$ $x \geq -3$
 $x \leq -3$

$x \leq -3$ and $x \geq -3$ overlap at $x = -3$. $x = -3$ is the solution.

Chapter 2: Linear Equations and Inequalities

3. $x - 2 \leq -20$ or $4x + 3 \geq 19$
 $x \leq -18$ $4x \geq 16$
 $x \geq 4$
 $x \leq -18$ or $x \geq 4$ is the solution.

2.8 Exercises



4. $|x + 6| < 3.5$
 $-3.5 < x + 6 < 3.5$
 $-9.5 < x < -2.5$

6. $|x - 8| \leq 12$
 $-12 \leq x - 8 \leq 12$
 $-4 \leq x \leq 20$

8. $|2x + 3| \leq 11$
 $-11 \leq 2x + 3 \leq 11$
 $-14 \leq 2x \leq 8$
 $-7 \leq x \leq 4$

10. $|2x - 3| \leq 1 \Leftrightarrow -1 \leq 2x - 3 \leq 1$
 $2 \leq 2x \leq 4$
 $1 \leq x \leq 2$

12. $|0.6 - 0.3x| < 9 \Leftrightarrow -9 < 0.6 - 0.3x < 9$
 $-9.6 < -0.3x < 8.4$
 $32 > x > -28$
 $-28 < x < 32$

14. $\left| \frac{1}{3}x + 4 \right| < 7$
 $-7 < \frac{1}{3}x + 4 < 7$
 $-21 < x + 12 < 21$
 $-33 < x < 9$

16. $\left| \frac{3}{4}(x + 1) \right| < 2$
 $-2 < \frac{3}{4}(x + 1) < 2$
 $-\frac{8}{3} < x + 1 < \frac{8}{3}$
 $-\frac{11}{3} < x < \frac{5}{3}$

18. $\left| \frac{5x - 3}{2} \right| < 4$

20. $|x| \geq 7$
 $x \geq 7$ or $x \leq -7$

22. $|x + 4| > 7$
 $x + 4 < -7$ or $x + 4 > 7$
 $x < -11$ or $x > 3$
 $x < -11$ or $x > 3$

24. $|x - 6| \geq 4$
 $x - 6 \leq -4$ or $x - 6 \geq 4$
 $x \leq 2$ or $x \geq 10$
 $x \leq 2$ or $x \geq 10$

26. $|6x - 5| \geq 7$
 $6x - 5 \leq -7$ or $6x - 5 \geq 7$
 $6x \leq -2$ or $6x \geq 12$
 $x \leq -\frac{1}{3}$ or $x \geq 2$

$x \leq -\frac{1}{3}$ or $x \geq 2$

28. $|0.5 - 0.1x| > 6$
 $0.5 - 0.1x < -6$ or $0.5 - 0.1x > 6$
 $-0.1x < -6.5$ or $-0.1x > 5.5$
 $x > 65$ or $x < -55$
 $x < -55$ or $x > 65$

30. $\left| \frac{1}{4}x - \frac{3}{8} \right| > 1$
 $\frac{1}{4}x - \frac{3}{8} < -1$ or $\frac{1}{4}x - \frac{3}{8} > 1$
 $2x - 3 < -8$ or $2x - 3 > 8$
 $2x < -5$ or $2x > 11$
 $x < -\frac{5}{2}$ or $x > \frac{11}{2}$
 $x < -2\frac{1}{2}$ or $x > 5\frac{1}{2}$
 $x < -2\frac{1}{2}$ or $x > 5\frac{1}{2}$

$-4 < \frac{5x - 3}{2} < 4$

$$32. \frac{2}{5}(x-2) \leq 4$$

$$-8 < 5x - 3 < 8$$

$$-5 < 5x < 11$$

$$-1 < x < \frac{11}{5}$$

$$-1 < x < 2\frac{1}{5}$$

$$5$$

$$-4 \leq \frac{2}{5}(x-2) \leq 4$$

$$-20 \leq 2x - 4 \leq 20$$

$$-16 \leq 2x \leq 24$$

$$-8 \leq x \leq 12$$

34. $|2x + 3| < 5$
 $-5 < 2x + 3 < 5$
 $-8 < 2x < 2$
 $-4 < x < 1$

36. $|4 - 3x| > 4$
 $4 - 3x < -4$ or $4 - 3x > 4$
 $-3x < -8$ $-3x > 0$
 $x > \frac{8}{3}$ $x < 0$

$x < 0$ or $x > \frac{8}{3}$

38. $|m - s| \leq 0.12$
 $|m - 17.48| \leq 0.12$
 $-0.12 \leq m - 17.48 \leq 0.12$
 $17.36 \leq m \leq 17.60$

40. $|n - p| \leq 0.03$
 $|n - 19.8| \leq 0.03$
 $-0.03 \leq n - 19.8 \leq 0.03$
 $19.77 \leq n \leq 19.83$

Cumulative Review

41. $0.000045 = 4.5 \times 10^{-5}$

42. $|2x - 1| = 8$
 $2x - 1 = 8$ or $2x - 1 = -8$
 $2x = 9$ $2x = -7$
 $x = \frac{9}{2}$ $x = -\frac{7}{2}$

43. distance = $2 \left[\frac{1}{8} \cdot \text{circumference} \right]$
 $= 2 \left[\frac{1}{8} (2\pi \cdot \text{radius}) \right]$
 $\approx 2 \left[\frac{1}{3} (2 \cdot 3.14 \cdot 19) \right]$

Classroom Quiz 2.8

1. $\left| \frac{1}{3}x - \frac{1}{6} \right| < 2$
 $-2 < \frac{1}{3}x - \frac{1}{6} < 2$
 $6(-2) < 6 \left(\frac{1}{3}x - \frac{1}{6} \right) < 6(2)$
 $-12 < 2x - 1 < 12$
 $-11 < 2x < 13$

$-\frac{11}{2} < x < \frac{13}{2}$
 $-5\frac{1}{2} < x < 6\frac{1}{2}$

2. $|3x + 12| \leq 10$
 $-10 \leq 3x + 12 \leq 10$
 $-22 \leq 3x \leq -2$
 $-\frac{22}{3} \leq x \leq -\frac{2}{3}$
 $-\frac{7}{3} \leq x \leq -\frac{1}{3}$

3. $|4x - 3| > 21$
 $4x - 3 < -21$ or $4x - 3 > 21$
 $4x < -18$ $4x > 24$
 $x < -\frac{18}{4}$ $x > 6$
 $x < -4\frac{1}{2}$
 $x < -4\frac{1}{2}$ or $x > 6$

Career Exploration Problems

1. Let x = liters of 60% solution used.
 Then $14 - x$ = liters of 25% solution.
 $0.60x + 0.25(14 - x) = 0.40(14)$
 $0.6x + 3.5 - 0.25x = 5.6$
 $0.35x = 2.1$

$$\approx 29.83$$

44. The end of the rope travels 29.83 meters.

$$\text{distance} = 2 \cdot \frac{1}{6} (2\pi \cdot 30)$$

$$\approx 2 \cdot \frac{1}{6} (2 \cdot 3.14 \cdot 30)$$

$$\approx 62.8$$

The end of the wire travels 62.8 feet.

$$x = 6$$

$$14 - x = 14 - 6 = 8$$

6 liters of 60% solution should be mixed with
8 liters of 25% solution.

2. Let $x =$ liters of 10% solution used.
 Then $15 - x =$ liters of 30% solution.
 $0.10x + 0.30(15 - x) = 0.15(15)$
 $0.1x + 4.5 - 0.3x = 2.25$
 $-0.2x = -2.25$
 $x = 11.25$
- $15 - x = 15 - 11.25 = 3.75$
 11.25 liters of 10% solution should be mixed
 with 3.75 liters of 30% solution.
3. Let x be the actual alcohol content of the solution.
 $|x - 40| \leq 1.3$
 $-1.3 \leq x - 40 < 1.3$
 $38.7 \leq x \leq 41.3$
 The minimum alcohol content is 38.7% and the maximum alcohol content is 41.3%.
4. Let x be the actual alcohol content of the solution.
 $|x - 15| \leq 0.7$
 $-0.7 \leq x - 15 \leq 0.7$
 $14.3 \leq x \leq 15.7$
- The minimum alcohol content is 14.3% and the maximum alcohol content is 15.7%.

You Try It

1. $\frac{1}{4}(x+5) = 6 - \frac{1}{3}(2x-5)$

$$12 \left(\frac{1}{4}x + \frac{5}{4} \right) = 12 \left(6 - \frac{2}{3}x + \frac{5}{3} \right)$$

$$3x + 15 = 72 - 8x + 20$$

$$3x + 15 = 92 - 8x$$

$$11x = 77$$

$$x = 7$$

2. $A = \frac{h}{2}(B+b)$

$$2A = 2 \left[\frac{h}{2}(B+b) \right]$$

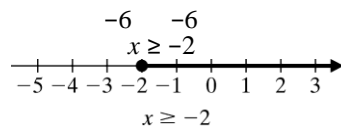
$$2A = h(B+b)$$

$$2A = hB + hb$$

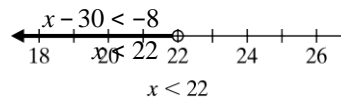
$$2A - hB = hb$$

3. $|3x + 5| = 11$
 $3x + 5 = 11$ or $3x + 5 = -11$
 $3x = 6$ $3x = -16$
 $x = 2$ $x = -\frac{16}{3}$
4. Let $x =$ amount invested at 6%.
 Then $12,000 - x =$ amount invested at 9%.
 $0.06x + 0.09(12,000 - x) = 960$
 $0.06x + 1080 - 0.09x = 960$
 $1080 - 0.03x = 960$
 $-0.03x = -120$
 $x = 4000$
- $12,000 - x = 8000$
 Therefore, \$4000 was invested at 6% and \$8000 at 9%.

5. a. $8 - 2(3x + 1) \leq 18$
 $8 - 6x - 2 \leq 18$
 $-6x + 6 \leq 18$
 $-6x \leq 12$
 $\frac{-6x}{-6} \geq \frac{12}{-6}$



b. $\frac{1}{2}(x-6) < \frac{2}{5}(x-2)$
 $\frac{1}{2}x - 3 < \frac{2}{5}x - \frac{4}{5}$
 $5x - 30 < 4x - 8$



6. $x + 7 > -1$ and $3x + 4 < 10$
 $x > -8$ $3x < 6$
 $x < 2$

$x > -8$ and $x < 2$

$$\frac{2}{\frac{A}{\frac{h}{B}}} = b^h$$

7. $5x + 2 \leq -8$
 $5x \leq -10$
 $x \leq -2$

or $4x - 3 \geq 9$

4

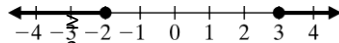
x

\geq

1

2

x



$x \leq -2$ or $x \geq 3$

$$\begin{aligned}
 8. \quad & |2x + 7| < 17 \\
 & -17 < 2x + 7 < 17 \\
 & -17 - 7 < 2x + 7 - 7 < 17 - 7 \\
 & -24 < 2x < 10 \\
 & \frac{-24}{2} < \frac{2x}{2} < \frac{10}{2} \\
 & -12 < x < 5 \\
 & \begin{array}{c} -12 \qquad \qquad \qquad 5 \\ \circ \qquad \qquad \qquad \circ \\ \hline -16 \quad -8 \quad 0 \quad 8 \quad 16 \\ -12 < x < 5 \end{array}
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & \left| \frac{1}{4}(x+8) \right| > 1 \\
 & \frac{1}{4}(x+8) < -1 \quad \text{or} \quad \frac{1}{4}(x+8) > 1 \\
 & \frac{1}{4}x + 2 < -1 \qquad \qquad \frac{1}{4}x + 2 > 1 \\
 & \frac{4}{4}x + 8 < -4 \qquad \qquad \frac{4}{4}x + 8 > 4 \\
 & \begin{array}{c} x < -12 \qquad \qquad \qquad x > -4 \\ \leftarrow \qquad \circ \qquad \qquad \qquad \circ \qquad \rightarrow \\ \hline -16 \quad -12 \quad -8 \quad -4 \quad 0 \\ x < -12 \text{ or } x > -4 \end{array}
 \end{aligned}$$

Chapter 2 Review Problems

$$\begin{aligned}
 1. \quad & 7x - 3 = -5x - 18 \\
 & 7x + 5x - 3 = -5x + 5x - 18 \\
 & 12x - 3 = -18 \\
 & 12x - 3 + 3 = -18 + 3 \\
 & 12x = -15 \\
 & \frac{12x}{12} = \frac{-15}{12} \\
 & x = -\frac{5}{4} \text{ or } -1.25 \text{ or } -1\frac{1}{4}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & 8 - 2(x+3) = 24 - (x-6) \\
 & 8 - 2x - 6 = 24 - x + 6 \\
 & 2 - 2x = 30 - x \\
 & -2x + x = 30 - 2 \\
 & -x = 28 \\
 & x = -28
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & 5(x-2) + 4 = x + 9 - 2x \\
 & 5x - 10 + 4 = -x + 9 \\
 & 5x - 6 = -x + 9 \\
 & 5x + x - 6 = -x + x + 9 \\
 & 6x - 6 = 9 \\
 & 6x - 6 + 6 = 9 + 6 \\
 & 6x = 15 \\
 & \frac{6x}{6} = \frac{15}{6} \\
 & x = \frac{5}{2} \text{ or } 2\frac{1}{2} \text{ or } 2.5
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & \begin{array}{l} x - \frac{4}{3} = \frac{11}{12} + \frac{3}{4}x \\ 12 \left(x - \frac{4}{3} \right) = 12 \left(\frac{11}{12} + \frac{3}{4}x \right) \end{array} \\
 & 12x - 16 = 11 + 9x \\
 & 12x - 9x = 11 + 16 \\
 & 3x = 27 \\
 & x = 9
 \end{aligned}$$

$$\begin{aligned}
 5. \quad & \frac{1}{2}x - 1 = \frac{1}{3} \left(x + \frac{1}{3} \right) \\
 & 18 \left(\frac{1}{2}x - 1 \right) = 18 \left[\frac{1}{3} \left(x + \frac{1}{3} \right) \right] \\
 & \begin{array}{l} 2x - 18 = 9x + 3 \\ 2x - 9x = 3 + 18 \\ -7x = 21 \\ x = -3 \end{array}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad & 5x = 3(1.6x - 4.2) \\
 & 5x = 4.8x - 12.6 \\
 & 0.2x = -12.6 \\
 & x = -63
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & P = \frac{1}{2}ab \\
 & 2P = ab \\
 & \frac{2P}{b} = \frac{ab}{b} \\
 & \frac{2P}{b} = a \text{ or } a = \frac{2P}{b}
 \end{aligned}$$

$$\begin{aligned}
 8. \quad & 2(3ax - 2y) - 6ax = -3(ax + 2y) \\
 & 6ax - 4y - 6ax = -3ax - 6y
 \end{aligned}$$

$$-4y = -3ax - 6y$$

$$2y = -3ax$$

$$3ax = -2y$$

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

9. a. $C = \frac{5F - 160}{9}$
 $9C = 5F - 160$
 $5F - 160 = 9C$
 $5F = 9C + 160$
 $F = \frac{9C + 160}{5}$

b. $F = \frac{9(10) + 160}{5} = \frac{250}{5} = 50$

$F = 50^\circ$ when $C = 10^\circ$.

10. a. $P = 2W + 2L$
 $P - 2L = 2W$
 $2W = P - 2L$

$W = \frac{P - 2L}{2}$

b. $W = \frac{100 - 2(20.5)}{2}$
 $= \frac{100 - 41}{2}$

$= \frac{59}{2}$
 $= 29.5$

$W = 29.5$ meters

11. $|2x - 7| = 9$

$2x - 7 = 9$ or $2x - 7 = -9$
 $2x = 16$ $2x = -2$
 $x = 8$ $x = -1$

12. $|5x + 2| = 7$
 $5x + 2 = 7$ or $5x + 2 = -7$
 $5x = 5$ $5x = -9$

$x = 1$ $x + 8 = 2x$
 -4
 $-x =$

13. $|3 - x| = |5 - 2x|$ -12
 $3 - x = 5 - 2x$ $x =$
 $x = 2$ 12

14. $|x + 8| = |2x - 4|$

15. $|\frac{1}{4}x - 3| = 8$

$\frac{1}{4}x - 3 = 8$ or $\frac{1}{4}x - 3 = -8$
 $x - 12 = 32$ $x - 12 = -32$
 $x = 44$ $x = -20$

16. $|2x - 8 + 7| = 12$
 $|2x - 8| = 5$

$2x - 8 = 5$ or $2x - 8 = -5$
 $2x = 13$ $2x = 3$
 $x = \frac{13}{2}$ $x = \frac{3}{2}$

17. $P = 2L + 2W$
 $42 = 2(2W + 3) + 2W$
 $21 = 2W + 3 + W$
 $3W = 18$
 $W = 6$

$2W + 3 = 15$
 The width is 6 feet and the length is 15 feet.

18. Let $x =$ the number of women.
 Then $2x - 200 =$ the number of men.
 $2x - 200 + x = 280$
 $3x - 200 = 280$
 $3x = 480$

$x = 160$
 $2x - 200 = 120$
 There are 160 women and 120 men attending Western Tech.

19. Let $x =$ miles she drove.
 $3(38) + 0.15x = 150$
 $114 + 0.15x = 150$

$x = -$ $\frac{9}{5}$

or $3 - x = -(5 - 2x)$
 $3 - x = -5 + 2x$
 $-3x = -8$
 $x = \frac{8}{3}$

Chapter 2: Intermediate Algebra

$$\begin{aligned} \text{or } x + 8 &= -2x + 4 && 0 \\ 3x &= -4 && . \\ x &= -\frac{4}{3} && 1 \\ &&& 5 \\ &&& x \end{aligned}$$

=

3
6

$$x = 240$$

S
h
e

d
r
o
v
e

2
4
0

m
i
l
e
s
.

20. Let x = the amount withheld for retirement.

Then $x + 13$ = the amount withheld for state tax, and $3(x + 13)$ = the amount withheld for federal tax.

x
+
 x
+
13
+
3
(
 x
+
13
)

Chapter 2: Linear Equations and Inequalities

$$\begin{aligned} &= 102 \\ 2x + 13 + 3x + 39 &= 102 \\ 5x + 52 &= 102 \\ 5x &= 50 \\ x &= 10 \end{aligned}$$

$$x + 13 = 23$$

$$3(x + 13) = 69$$

\$10 is withheld for retirement, \$23 for state tax, and \$69 for federal tax.

21. Let x = the number of tickets Nicholas sold.
 Then $2x - 5$ = the number of tickets Emma sold,
 and $2x + 10$ = the number of tickets Jackson
 sold.
 $x + 2x - 5 + 2x + 10 = 180$
 $5x = 175$
 $x = 35$
 $2x - 5 = 65$
 $2x + 10 = 80$
 Nicholas sold 35 tickets, Emma sold 65 tickets,
 and Jackson sold 80 tickets.

22. Let x = the number of students enrolled five
 years ago.
 $x + 0.15x = 2415$
 $1.15x = 2415$
 $x = 2100$

2100 students were enrolled five years ago.

23. Let x = amount invested at 11%.

Then $9000 - x$ = the amount invested at 6%.
 $0.11x + 0.06(9000 - x) = 815$
 $0.11x + 540 - 0.06x = 815$
 $540 + 0.05x = 815$
 $0.05x = 275$

$$x = 5500$$

$$9000 - x = 3500$$

He invested \$5500 at 11% and \$3500 at 6%.

24. Let x = the number of liters of 2% acid.
 Then $24 - x$ = the number of liters of 5% acid.
 $0.02x + 0.05(24 - x) = 0.04(24)$
 $0.02x + 1.2 - 0.05x = 0.96$

$$-0.03x = -0.24$$

$$x = 8$$

$$24 - x = 16$$

He should use 8 liters of the 2% acid and 16
 liters of the 5% acid.

25. Let x = the number of pounds of the \$4.25 a

pound coffee.

Then $30 - x$ = the number of pounds of the \$4.50

a pound coffee.

26. Let x = current full-time students.

$$\frac{1}{2}x + \frac{1}{3}(890 - x) = 380$$

$$3x + 1780 - 2x = 2280$$

$$x = 500$$

$$890 - 500 = 390$$

The present number of students is 500 full-time
 and 390 part-time.

27. $7x + 8 < 5x$

$$2x < -8$$

$$\frac{2x}{2} < \frac{-8}{2}$$

$$x < -4$$

28. $9x + 3 < 12x$

$$-3x < -3$$

$$\frac{-3x}{-3} > \frac{-3}{-3}$$

$$x > 1$$

29. $3(3x - 2) \leq 4x - 16$

$$9x - 6 \leq 4x - 16$$

$$9x - 4x \leq -16 + 6$$

$$5x \leq -10$$

$$\frac{5x}{5} \leq \frac{-10}{5}$$

$$x \leq -2$$

30.
$$\frac{\frac{5}{3} - x}{3} \geq \frac{-\frac{1}{6}x + \frac{5}{6}}{6}$$

$$\frac{\frac{5}{3} - x}{3} \geq \frac{-\frac{1}{6}x + \frac{5}{6}}{6}$$

$$10 - 6x \geq -x + 5$$

$$-6x + x \geq 5 - 10$$

$$\frac{-5x}{-5} \geq \frac{-5}{-5}$$

$$-5x \leq -5$$

$$-5 \leq -5$$

$$x \leq 1$$

31.
$$\frac{1}{x-2} < \frac{1}{x+5} - \frac{5}{x}$$

Chapter 2: Intermediate Algebra and Inequalities

$$4.25x + 4.50(30 - x) = 4.40(30)$$

$$4.25x + 135 - 4.5x = 132$$

$$-0.25x = -3$$

$$x = 12$$

$$30 - x = 18$$

12 pounds of \$4.25 and 18 pounds of \$4.50 should be used.

Chapter 2: Linear Equations and Inequalities

$$12 \left[\frac{1}{3}(x-2) \right] < 12 \left[\frac{1}{4}(x+5) - \frac{5}{3} \right]$$

$$4(x-2) < 3(x+5) - 20$$

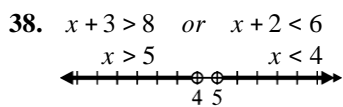
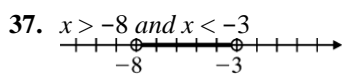
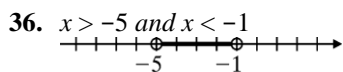
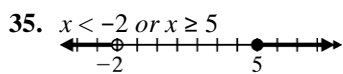
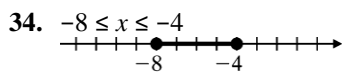
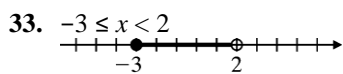
$$4x - 8 < 3x + 15 - 20$$

$$4x - 8 < 3x - 5$$

$$4x - 3x < -5 + 8$$

$$x < 3$$

$$\begin{aligned}
 32. \quad & \frac{1}{3}(x+2) > 3x - 5(x-2) \\
 & 3\left[\frac{1}{3}(x+2)\right] > 3[3x - 5(x-2)] \\
 & \left[3\right] \\
 & x+2 > 9x - 15(x-2) \\
 & x+2 > 9x - 15x + 30 \\
 & x+2 > -6x + 30 \\
 & x+6x > 30 - 2 \\
 & 7x > 28 \\
 & x > 4
 \end{aligned}$$



39. $x-2 > 7$ or $x+3 < 2$

$$x > 9 \quad x < -1$$

40. $x+3 > 8$ and $x-4 < -2$

$$x > 5 \quad x < 2$$

Since x cannot be both > 5 and < 2 , there is no solution.

41. $-1 < x+5 < 8$

$$-6 < x < 3$$

42. $0 \leq 5-3x \leq 17$

$$-5 \leq -3x \leq 12$$

$$\frac{5}{3} \geq x \geq -4$$

43. $2x-7 < 3$ and $5x-1 \geq 8$

$$\begin{aligned}
 2x < 10 & \quad 5x \geq 9 \\
 x < 5 & \quad x \geq \frac{9}{5}
 \end{aligned}$$

$$\begin{aligned}
 \frac{9}{5} & \leq x < 5 \\
 1\frac{4}{5} & \leq x < 5
 \end{aligned}$$

44. $4x-2 < 8$ or $3x+1 > 4$

$$\begin{aligned}
 4x < 10 & \quad 3x > 3 \\
 x < \frac{5}{2} & \quad x > 1
 \end{aligned}$$

The solution is all real numbers.

45. $|x+7| < 15$

$$\begin{aligned}
 -15 < x+7 < 15 \\
 -22 < x < 8
 \end{aligned}$$

46. $|x+9| < 18$

$$\begin{aligned}
 -18 < x+9 < 18 \\
 -27 < x < 9
 \end{aligned}$$

47. $\left|\frac{1}{2}x+2\right| < \frac{7}{4}$

$$\begin{aligned}
 -\frac{7}{4} < \frac{1}{2}x+2 < \frac{7}{4} \\
 -7 < 2x+8 < 7 \\
 -15 < 2x < -1 \\
 -\frac{15}{2} < x < -\frac{1}{2} \\
 -7\frac{1}{2} < x < -\frac{1}{2}
 \end{aligned}$$

48. $|2x-1| \geq 9$

$$\begin{aligned}
 2x-1 \leq -9 & \quad \text{or} \quad 2x-1 \geq 9 \\
 2x \leq -8 & \quad 2x \geq 10 \\
 x \leq -4 & \quad x \geq 5
 \end{aligned}$$

49. $|3x-1| \geq 2$

$$\begin{aligned}
 3x-1 \leq -2 & \quad \text{or} \quad 3x-1 \geq 2 \\
 3x \leq -1 & \quad 3x \geq 3 \\
 \frac{1}{3} & \quad x \geq 1 \\
 x \leq -\frac{1}{3} &
 \end{aligned}$$

$$-4 \leq x \leq \frac{5}{3}$$
$$-4 \leq x \leq 1\frac{2}{3}$$

50. $|2(x - 5)| \geq 2$
 $2(x - 5) \leq -2$ or $2(x - 5) \geq 2$
 $2x - 10 \leq -2$ $2x - 10 \geq 2$
 $2x \leq 8$ $2x \geq 12$
 $x \leq 4$ $x \geq 6$

51. Let x = the number of minutes he talks.
 $3.95 + 0.65(x - 1) \leq 13.05$
 $3.95 + 0.65x - 0.65 \leq 13.05$
 $0.65x \leq 9.75$
 $x \leq 15$
 He can talk for a maximum of 15 minutes.

52. Let x = the number of packages.
 $170 + 200 + 77.5x \leq 1765$
 $77.5x \leq 1395$
 $x \leq 18$
 A maximum of eighteen packages can be carried.

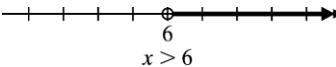
53. Let x = number of cubic yards.
 $40 + 28x \leq 250$
 $28x \leq 210$
 $x \leq 7.5$
 He can order a maximum of 7 cubic yards.

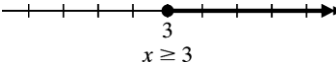
54. $1.04(2,312,000) \leq x \leq 1.06(2,854,000)$
 $2,404,480 \leq x \leq 3,025,240$

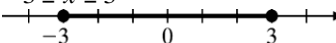
55. $4 - 7x = 3(x + 3)$
 $4 - 7x = 3x + 9$
 $-7x - 3x = 9 - 4$
 $-10x = 5$
 $\frac{-10x}{-10} = \frac{5}{-10}$
 $x = -\frac{1}{2}$ or -0.5

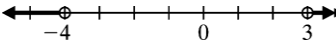
56. $H = \frac{3}{4}B - 16$
 $\frac{3}{4}B = H + 16$
 $B = \frac{4}{3}(H + 16)$
 $B = \frac{4H + 64}{3}$

57. Let x = number of grams of 77% copper.
 Then $100 - x$ = number of grams of 92% copper.
 $0.77x + 0.92(100 - x) = 0.80(100)$
 $0.77x + 92 - 0.92x = 80$
 $-0.15x = -12$

58. $7x + 12 < 9x$
 $-2x < -12$
 $x > 6$
- 

59. $\frac{2}{3}x - \frac{5}{6}x - 3 \leq \frac{1}{2}x - 5$
 $4x - 5x - 18 \leq 3x - 30$
 $-x - 18 \leq 3x - 30$
 $-4x \leq -12$
 $x \geq 3$
- 

60. $-2 \leq x + 1 \leq 4$
 $-3 \leq x \leq 3$
- 

61. $2x + 3 < -5$ or $x - 2 > 1$
 $2x < -8$ $x > 3$
 $x < -4$
- 

62. $|2x - 7| + 4 = 5$
 $|2x - 7| = 1$
 $2x - 7 = -1$ or $2x - 7 = 1$
 $2x = 6$ $2x = 8$
 $x = 3$ $x = 4$

63. $\left| \frac{2}{3}x - \frac{1}{2} \right| \leq 3$
 $-3 \leq \frac{2}{3}x - \frac{1}{2} \leq 3$
 $-18 \leq 4x - 3 \leq 18$
 $-15 \leq 4x \leq 21$
 $-\frac{15}{4} \leq x \leq \frac{21}{4}$

64. $\left| \frac{x}{2} - 5x - 4 \right| > 13$
 $\frac{x}{2} - 5x - 4 > 13$
 $0 - 5x > 15$
 $x < -3$

Chapter 2: Intermediate Algebra and Inequalities

or $2 - 5x - 4 < -13$

$$100 - x = 20$$

She should use 80 grams of 77% copper and 20 grams of 92% copper.

Chapter 2: Linear Equations and Inequalities

$$\begin{array}{r} - \\ 5 \\ x \end{array} < -11$$
$$x > \frac{11}{5}$$

How Am I Doing? Chapter 2 Test

1. $5x - 8 = -6x - 10$

$$5x + 6x - 8 = -6x + 6x - 10$$

$$11x - 8 = -10$$

$$11x - 8 + 8 = -10 + 8$$

$$11x = -2$$

$$\frac{11x}{11} = \frac{-2}{11}$$

$$x = -\frac{2}{11}$$

2. $3(7 - 2x) = 14 - 8(x - 1)$

$$21 - 6x = 14 - 8x + 8$$

$$21 - 6x = 22 - 8x$$

$$21 - 6x + 8x = 22 - 8x + 8x$$

$$21 + 2x = 22$$

$$21 - 21 + 2x = 22 - 21$$

$$2x = 1$$

$$x = \frac{1}{2} \text{ or } 0.5$$

$$2$$

3. $\frac{1}{3}(-x + 1) + 4 = 4(3x - 2)$

$$3\left[\frac{1}{3}(-x + 1) + 4\right] = 3[4(3x - 2)]$$

$$1(-x + 1) + 12 = 12(3x - 2)$$

$$-x + 1 + 12 = 36x - 24$$

$$-x + 13 = 36x - 24$$

$$-x - 36x = -24 - 13$$

$$-37x = -37$$

$$x = 1$$

4. $0.5x + 1.2 = 4x - 3.05$

$$100(0.5x + 1.2) = 100(4x - 3.05)$$

$$50x + 120 = 400x - 305$$

$$120 + 305 = 400x - 50x$$

$$425 = 350x \Rightarrow 350x = 425$$

$$x = \frac{425}{350} = \frac{17(25)}{14(25)} = \frac{17}{14}$$

$$x = \frac{17}{14} \text{ or } 1\frac{3}{14}$$

5. $L = a + d(n - 1)$

$$L = a + dn - d$$

6. $A = \frac{1}{2}bh$

$$2A = bh$$

$$bh = 2A$$

$$2A$$

$$b = \frac{2A}{h}$$

7. $b = \frac{2A}{h}$

$$b = \frac{2(15) \text{ cm}^2}{10 \text{ cm}}$$

$$b = 3 \text{ cm}$$

8. $H = \frac{1}{2}r + 3b - \frac{1}{4}$

$$4H = 2r + 12b - 1$$

$$2r = 4H - 12b + 1$$

$$r = \frac{4H - 12b + 1}{2}$$

9. $|5x - 2| = 37$

$$5x - 2 = 37 \quad \text{or} \quad 5x - 2 = -37$$

$$\begin{array}{l} 5x = 39 \\ 39 \end{array} \quad \begin{array}{l} 5x = -35 \\ x = -7 \end{array}$$

$$x = \frac{39}{5}$$

10. $\left|\frac{1}{2}x + 3\right| - 2 = 4$

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

$$\frac{1}{2}x + 3 = 6 \quad \text{or} \quad \frac{1}{2}x + 3 = -6$$

$$x + 6 = 12 \quad x + 6 = -12$$

$$x = 6 \quad x = -18$$

$$L - a + d = dn$$

$$n = \frac{L - a + d}{d}$$

11. Let x = the length of first side.
 Then $2x$ = the length of the second side, and $x + 5$ = the length of the third side.

$$x + 2x + x + 5 = 69$$

$$4$$

$$x$$

$$=$$

$$6$$

$$4$$

$$x$$

$$=$$

$$1$$

$$6$$

$$2x = 32$$

$$x + 5 = 21$$

The first side is 16 meters, the second side is

32 meters, and the third side is 21 meters.

12. Let x = electric bill for August.

$$x - 0.05x = 2489$$

$$0.95$$

$$x =$$

$$248$$

$$9$$

$$x$$

$$=$$

$$2$$

$$6$$

$$2$$

$$0$$

The electric bill for August was \$2620.

13. Let x = gallons of 50% antifreeze.
 Then $10 - x$ = gallons of 90% antifreeze.
 $0.50x + 0.90(10 - x) = 0.60(10)$
 $0.5x + 9 - 0.9x = 6$

$$\begin{aligned} -0.4x &= -3 \\ x &= 7.5 \end{aligned}$$

$$10 - 7.5 = 2.5$$

She should use 2.5 gallons of 90% and 7.5 gallons of 50%.

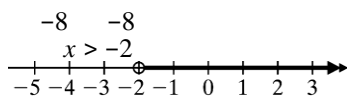
14. Let x = amount invested at 6%.
 Then $5000 - x$ = amount invested at 10%.
 $0.06x + 0.10(5000 - x) = 428$
 $0.06x + 500 - 0.1x = 428$
 $-0.04x = -72$

$$x = 1800$$

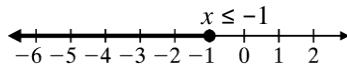
$$5000 - x = 3200$$

\$1800 was invested at 6% and \$3200 was invested at 10%.

15. $5 - 6x < 2x + 21$
 $-8x < 16$
 $\frac{-8x}{-8} > \frac{16}{-8}$



16. $-\frac{1}{2} + \frac{1}{3}(2 - 3x) \geq \frac{1}{2}x + \frac{5}{3}$
 $6\left[-\frac{1}{2} + \frac{1}{3}(2 - 3x)\right] \geq 6\left(\frac{1}{2}x + \frac{5}{3}\right)$
 $-3 + 4 - 6x \geq 3x + 10$
 $1 - 6x \geq 3x + 10$
 $-6x - 3x \geq 10 - 1$
 $-9x \geq 9$
 $\frac{-9x}{-9} \leq \frac{9}{-9}$
 $x \leq -1$



17. $-11 < 2x - 1 \leq -3$
 $-10 < 2x \leq -2$
 $-5 < x \leq -1$

18. $x - 4 \leq -6$ or $2x + 1 \geq 3$
 $x \leq -2$ $2x \geq 2$
 $x \geq 1$

19. $|7x - 3| \leq 18$
 $-18 \leq 7x - 3 \leq 18$
 $-15 \leq 7x \leq 21$
 $-\frac{15}{7} \leq x \leq 3$

20. $|3x + 1| > 7$
 $3x + 1 < -7$ or $3x + 1 > 7$
 $3x < -8$ $3x > 6$
 $x < \frac{8}{3}$ $x > 2$