

SOLUTIONS MANUAL

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Intermediate Algebra

SIXTH EDITION



Inside:

How Are I Doing?
Guide to Math
Success

WOW
Use Math to
Earn Money

Test Prep
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Chapter 2

2.1 Exercises

2. $2x + 12 \stackrel{?}{=} -30$
 $2(21) + 12 \stackrel{?}{=} -30$
 $54 \neq -30$

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.

10. $26 + x - 26 = -35 - 26$
 $26 + x = -35$
 $x = -61$

Check: $26 + (-61) \stackrel{?}{=} -35$
 $-35 = -35$

12. $-16x = -64$
 $\frac{-16x}{-16} = \frac{-64}{-16}$
 $x = 4$

Check: $-16(4) \stackrel{?}{=} -64$
 $-64 = -64$

14. $-12x = 72$
 $\frac{-12x}{-12} = \frac{72}{-12}$
 $x = -6$

Check: $-12(-6) \stackrel{?}{=} 72$
 $72 = 72$

16. $10x + 3 = 15$
 $10x + 3 - 3 = 15 - 3$
 $10x = 12$

$$\frac{10x}{10} = \frac{12}{10}$$

$$x = \frac{6}{5} = 1\frac{1}{5} = 1.2$$

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

18. $14x + 3 = 11x - 3$
 $14x - 11x + 3 = 11x - 11x - 3$
 $3x + 3 = -3$
 $3x + 3 - 3 = -3 - 3$

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

$$x = -2$$

Check: $14(-2) + 3 \stackrel{?}{=} 11(-2) - 3$
 $-28 + 3 \stackrel{?}{=} -22 - 3$
 $-25 = -25$

20. $-12x - 8 = 10 - 3x$
 $-12x + 3x - 8 = 10 - 3x + 3x$
 $-9x - 8 = 10$
 $-9x - 8 + 8 = 10 + 8$

$$\frac{-9x}{-9} = \frac{18}{-9}$$

$$x = -2$$

Check: $-12(-2) - 8 \stackrel{?}{=} 10 - 3(-2)$
 $24 - 8 \stackrel{?}{=} 10 + 6$
 $16 = 16$

22. $5a - 2 + 4a = 2a + 12$
 $9a - 2 = 2a + 12$
 $9a - 2a - 2 = 2a - 2a + 12$
 $7a - 2 = 12$
 $7a - 2 + 2 = 12 + 2$

$$\frac{7a}{7} = \frac{14}{7}$$

$$a = 2$$

Check: $5(2) - 2 + 4(2) \stackrel{?}{=} 2(2) + 12$
 $10 - 2 + 8 \stackrel{?}{=} 4 + 12$
 $16 = 16$

$$\begin{aligned}
 24. \quad & 3(4-y) = 5(y+2) \\
 & 12-3y = 5y+10 \\
 12-3y-5y &= 5y-5y+10 \\
 12-8y &= 10 \\
 12-12-8y &= 10-12 \\
 -8y &= -2 \\
 \frac{-8y}{-8} &= \frac{-2}{-8} \\
 y &= \frac{1}{4} \text{ or } 0.25
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } 3\left(4-\frac{1}{4}\right) &\stackrel{?}{=} 5\left(\frac{1}{4}+2\right) \\
 3\left(\frac{15}{4}\right) &\stackrel{?}{=} 5\left(\frac{9}{4}\right) \\
 \frac{45}{4} &= \frac{45}{4}
 \end{aligned}$$

$$\begin{aligned}
 26. \quad & 3y+3 = 7(y+2)-3y \\
 & 3y+3 = 7y+14-3y \\
 & 3y+3 = 4y+14 \\
 3y-4y+3 &= 4y-4y+14 \\
 -y+3 &= 14 \\
 -y+3-3 &= 14-3 \\
 -y &= 11 \\
 y &= -11
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } 3(-11)+3 &\stackrel{?}{=} 7(-11+2)-3(-11) \\
 -33+3 &\stackrel{?}{=} 7(-9)+33 \\
 -30 &= -30
 \end{aligned}$$

$$\begin{aligned}
 28. \quad & -\frac{5}{6}x = 5 \\
 -\frac{5}{6}x\left(-\frac{6}{5}\right) &= 5\left(-\frac{6}{5}\right) \\
 x &= -6
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } -\frac{5}{6}(-6) &\stackrel{?}{=} 5 \\
 5 &= 5
 \end{aligned}$$

$$\begin{aligned}
 30. \quad & \frac{y}{3}+2 = \frac{4}{5} \\
 15\left(\frac{y}{3}+2\right) &= 15\left(\frac{4}{5}\right) \\
 5y+30 &= 12 \\
 5y+30-30 &= 12-30 \\
 5y &= -18 \\
 \frac{5y}{5} &= \frac{-18}{5} \\
 y &= -\frac{18}{5} \text{ or } -3\frac{3}{5} \text{ or } -3.6
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } \frac{-3.6}{3}+2 &\stackrel{?}{=} \frac{4}{5} \\
 -1.2+2 &\stackrel{?}{=} 0.8 \\
 0.8 &= 0.8
 \end{aligned}$$

$$\begin{aligned}
 32. \quad & \frac{4x}{5}+\frac{3}{2} = 2x \\
 10\left(\frac{4x}{5}+\frac{3}{2}\right) &= 2x(10) \\
 8x+15 &= 20x \\
 8x-8x+15 &= 20x-8x \\
 15 &= 12x \\
 \frac{15}{12} &= \frac{12x}{12} \\
 x &= \frac{5}{4} \text{ or } 1\frac{1}{4} \text{ or } 1.25
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } \frac{4\left(\frac{5}{4}\right)}{5}+\frac{3}{2} &\stackrel{?}{=} 2\left(\frac{5}{4}\right) \\
 1+\frac{3}{2} &\stackrel{?}{=} \frac{5}{2} \\
 \frac{5}{2} &= \frac{5}{2}
 \end{aligned}$$

$$\begin{aligned}
 34. \quad & 5-\frac{2}{3}(x+2) = 3 \\
 3\left(5-\frac{2}{3}(x+2)\right) &= 3(3) \\
 15-2(x+2) &= 9 \\
 15-2x-4 &= 9 \\
 -2x+11 &= 9 \\
 -2x+11-11 &= 9-11 \\
 -2x &= -2 \\
 \frac{-2x}{-2} &= \frac{-2}{-2} \\
 x &= 1
 \end{aligned}$$

$$\begin{aligned}
 \text{Check: } 5-\frac{2}{3}(1+2) &\stackrel{?}{=} 3 \\
 5-\frac{2}{3}(3) &\stackrel{?}{=} 3 \\
 5-2 &\stackrel{?}{=} 3 \\
 3 &= 3
 \end{aligned}$$

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

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

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

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

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

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

$$7x + 20 = 20$$

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

$$7x = 0$$

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

$$x = 0$$

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

$$6 + (-2) \stackrel{?}{=} 0 + 4$$

$$4 = 4$$

$$38. \quad 0.7x - 0.2 = 0.5x + 0.8$$

$$10(0.7x - 0.2) = 10(0.5x + 0.8)$$

$$7x - 2 = 5x + 8$$

$$7x - 5x - 2 = 5x - 5x + 8$$

$$2x - 2 = 8$$

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

$$2x = 10$$

$$\frac{2x}{2} = \frac{10}{2}$$

$$x = 5$$

$$\text{Check: } 0.7(5) - 0.2 \stackrel{?}{=} 0.5(5) + 0.8$$

$$3.5 - 0.2 \stackrel{?}{=} 2.5 + 0.8$$

$$3.3 = 3.3$$

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

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

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

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

$$6x - 12 = 3$$

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

$$6x = 15$$

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

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

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

$$0.25 - 0.12 \stackrel{?}{=} 0.1 + 0.03$$

$$0.13 = 0.13$$

$$42. \quad 0.6(2x + 1) = 1$$

$$10[0.6(2x + 1)] = 10(1)$$

$$6(2x + 1) = 10$$

$$12x + 6 = 10$$

$$12x + 6 - 6 = 10 - 6$$

$$12x = 4$$

$$\frac{12x}{12} = \frac{4}{12}$$

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

$$\text{Check: } 0.6\left(2 \cdot \frac{1}{3} + 1\right) \stackrel{?}{=} 1$$

$$0.6\left(\frac{2}{3} + 1\right) \stackrel{?}{=} 1$$

$$1 = 1$$

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

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

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

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

$$30x - 140 = 5x$$

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

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

$$25x = 140$$

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

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

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

$$2.28 - 2 \stackrel{?}{=} 0.28$$

$$0.28 = 0.28$$

$$46. \quad 6y - 15 - 8y = 24 - 5$$

$$-2y - 15 = 19$$

$$-2y - 15 + 15 = 19 + 15$$

$$-2y = 34$$

$$\frac{-2y}{-2} = \frac{34}{-2}$$

$$y = -17$$

$$\begin{aligned}
 48. \quad \frac{1}{6} - \frac{x}{2} &= \frac{x-5}{3} \\
 6\left(\frac{1}{6} - \frac{x}{2}\right) &= 6\left(\frac{x-5}{3}\right) \\
 1-3x &= 2(x-5) \\
 1-3x &= 2x-10 \\
 1-3x+3x &= 2x+3x-10 \\
 1 &= 5x-10 \\
 1+10 &= 5x-10+10 \\
 11 &= 5x \\
 \frac{11}{5} &= \frac{5x}{5} \\
 \frac{11}{5} &= x \text{ or } x = 2\frac{1}{5} \text{ or } 2.2
 \end{aligned}$$

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

$$\begin{aligned}
 52. \quad 3(0.4-x)+2 &= x+0.4(x+8) \\
 1.2-3x+2 &= x+0.4x+3.2 \\
 10(1.2-3x+2) &= 10(x+0.4x+3.2) \\
 12-30x+20 &= 10x+4x+32 \\
 -30x+32 &= 14x+32 \\
 -30x-14x+32 &= 14x-14x+32 \\
 -44x+32 &= 32 \\
 -44x+32-32 &= 32-32 \\
 -44x &= 0 \\
 \frac{-44x}{-44} &= \frac{0}{-44} \\
 x &= 0
 \end{aligned}$$

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

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

$$\begin{aligned}
 58. \quad 8(x+2)-7 &= 3(x+3)+5x \\
 8x+16-7 &= 3x+9+5x \\
 8x+9 &= 8x+9 \\
 8x-8x+9 &= 8x-8x+9 \\
 9 &= 9 \\
 \text{Any real number is a solution.}
 \end{aligned}$$

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

$$\begin{aligned}
 62. \quad x + \frac{2x+8}{3} &= \frac{5x+5}{3} + 1 \\
 3\left(x + \frac{2x+8}{3}\right) &= 3\left(\frac{5x+5}{3} + 1\right) \\
 3x+2x+8 &= 5x+5+3 \\
 5x+8 &= 5x+8 \\
 5x-5x+8 &= 5x-5x+8 \\
 8 &= 8 \\
 \text{Any real number is a solution.}
 \end{aligned}$$

Cumulative Review

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

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

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

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

Classroom Quiz 2.1

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

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

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

2.2 Exercises

$$\begin{aligned}
 2. \quad 7x+2y &= 5 \\
 7x &= 5-2y \\
 x &= \frac{5-2y}{7}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad 11x-8 &= 5y+7x \\
 11x-7x &= 5y+8 \\
 4x &= 5y+8 \\
 x &= \frac{5y+8}{4}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad y &= -\frac{1}{3}x+2 \\
 3(y) &= 3\left(-\frac{1}{3}x+2\right) \\
 3y &= -x+6 \\
 x &= 6-3y
 \end{aligned}$$

$$\begin{aligned}
 8. \quad x &= \frac{5}{2}y - \frac{1}{5} \\
 10x &= 10\left(\frac{5}{2}y - \frac{1}{5}\right) \\
 10x &= 25y - 2 \\
 25y &= 10x + 2 \\
 y &= \frac{10x + 2}{25}
 \end{aligned}$$

$$\begin{aligned}
 10. \quad V &= lwh \\
 \frac{V}{lh} &= \frac{lwh}{lh} \\
 \frac{V}{lh} &= w \text{ or} \\
 w &= \frac{V}{lh}
 \end{aligned}$$

$$\begin{aligned}
 12. \quad C &= \frac{5}{9}(F - 32) \\
 9C &= 5(F - 32) \\
 9C &= 5F - 160 \\
 5F &= 9C + 160 \\
 F &= \frac{9C + 160}{5}
 \end{aligned}$$

$$\begin{aligned}
 14. \quad V &= \pi r^2 h \\
 \frac{V}{\pi r^2} &= \frac{\pi r^2 h}{\pi r^2} \\
 h &= \frac{V}{\pi r^2}
 \end{aligned}$$

$$\begin{aligned}
 16. \quad H &= \frac{3}{4}(5a + b) \\
 4H &= 3(5a + b) \\
 4H &= 15a + 3b \\
 15a &= 4H - 3b \\
 a &= \frac{4H - 3b}{15}
 \end{aligned}$$

$$\begin{aligned}
 18. \quad 3(4ax + y) &= 2ax - 3y \\
 12ax + 3y &= 2ax - 3y \\
 12ax - 2ax &= -3y - 3y \\
 10ax &= -6y \\
 x &= -\frac{6y}{10a} = -\frac{3y}{5a}
 \end{aligned}$$

$$\begin{aligned}
 20. \text{ a.} \quad F &= \frac{9}{5}C + 32 \\
 5F &= 5\left(\frac{9}{5}C + 32\right) \\
 5F &= 9C + 160 \\
 9C &= 5F - 160 \\
 C &= \frac{5F - 160}{9}
 \end{aligned}$$

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

$$\begin{aligned}
 22. \text{ a.} \quad V &= \frac{1}{3}\pi r^2 h \\
 3V &= \pi r^2 h \\
 h &= \frac{3V}{\pi r^2}
 \end{aligned}$$

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

$$\begin{aligned}
 24. \quad y &= -2.2x + 216 \\
 2.2x &= 216 - y \\
 x &= \frac{216 - y}{2.2} \text{ or } \frac{2160 - 10y}{22} \\
 x &= \frac{216 - 150}{2.2} = 30
 \end{aligned}$$

$1990 + 30 = 2020$
In the year 2020 the approximate cancer death rate will be 150.

$$\begin{aligned}
 26. \text{ a.} \quad ND &= 1.08T \\
 N &= \frac{1.08T}{D}
 \end{aligned}$$

$$\text{b.} \quad N = \frac{1.08(6 \cdot 60)}{15} = 25.92 \approx 26$$

The doctor should make 26 patient appointments.

$$\begin{aligned}
 28. \text{ a.} \quad C &= 0.7649D + 6.1275 \\
 C - 6.1275 &= 0.7649D \\
 D &= \frac{C - 6.1275}{0.7649}
 \end{aligned}$$

$$\text{b.} \quad D = \frac{12.48 - 6.1275}{0.7649} \approx 8.3$$

The disposable income is \$8.3 billion.

Cumulative Review

$$\begin{aligned}
 29. \quad (2x^{-3}y)^{-2} &= 2^{-2}x^{-3(-2)}y^{-2} \\
 &= 2^{-2}x^6y^{-2} \\
 &= \frac{x^6}{2^2y^2} \\
 &= \frac{x^6}{4y^2}
 \end{aligned}$$

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

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

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

$$\begin{aligned}
 33. \quad \$5000(1.05) + \$4000(1.09) &= \$9610 \\
 \text{They will have } \$9610.
 \end{aligned}$$

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

Classroom Quiz 2.2

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

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

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

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 $x = -\frac{8}{3}$ and $x = \frac{10}{3}$.

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

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

$$\begin{aligned}
 10. \quad |7x-3| &= 11 \\
 7x-3 &= 11 \text{ or } 7x-3 = -11 \\
 7x &= 14 & 7x &= -8 \\
 x &= 2 & x &= -\frac{8}{7}
 \end{aligned}$$

$$\begin{array}{l} \text{Check: } |7(2)-3| \stackrel{?}{=} 11 \\ |14-3| \stackrel{?}{=} 11 \\ |11| \stackrel{?}{=} 11 \\ 11=11 \end{array} \quad \begin{array}{l} \left|7\left(-\frac{8}{7}\right)-3\right| \stackrel{?}{=} 11 \\ |-8-3| \stackrel{?}{=} 11 \\ |-11| \stackrel{?}{=} 11 \\ 11=11 \end{array}$$

$$\begin{array}{l} 12. |2-3x|=13 \\ 2-3x=13 \quad \text{or} \quad 2-3x=-13 \\ -3x=11 \quad \quad \quad -3x=-15 \\ x=-\frac{11}{3} \quad \quad \quad x=5 \end{array}$$

$$\begin{array}{l} \text{Check: } \left|2-3\left(-\frac{11}{3}\right)\right| \stackrel{?}{=} 13 \\ |2+11| \stackrel{?}{=} 13 \\ |13| \stackrel{?}{=} 13 \\ 13=13 \end{array} \quad \begin{array}{l} |2-3(5)| \stackrel{?}{=} 13 \\ |2-15| \stackrel{?}{=} 13 \\ |-13| \stackrel{?}{=} 13 \\ 13=13 \end{array}$$

$$\begin{array}{l} 14. \left|\frac{1}{4}x+5\right|=3 \\ \frac{1}{4}x+5=3 \quad \text{or} \quad \frac{1}{4}x+5=-3 \\ x+20=12 \quad \quad \quad x+20=-12 \\ x=-8 \quad \quad \quad x=-32 \end{array}$$

$$\begin{array}{l} \text{Check: } \left|\frac{1}{4}(-8)+5\right| \stackrel{?}{=} 3 \\ |-2+5| \stackrel{?}{=} 3 \\ |3| \stackrel{?}{=} 3 \\ 3=3 \end{array} \quad \begin{array}{l} \left|\frac{1}{4}(-32)+5\right| \stackrel{?}{=} 3 \\ |-8+5| \stackrel{?}{=} 3 \\ |-3| \stackrel{?}{=} 3 \\ 3=3 \end{array}$$

$$\begin{array}{l} 16. |0.9-0.7x|=4 \\ 0.9-0.7x=4 \quad \text{or} \quad 0.9-0.7x=-4 \\ 9-7x=40 \quad \quad \quad 9-7x=-40 \\ -7x=31 \quad \quad \quad -7x=-49 \\ x=-\frac{31}{7} \quad \quad \quad x=7 \end{array}$$

$$\begin{array}{l} \text{Check: } \left|0.9-0.7\left(-\frac{31}{7}\right)\right| \stackrel{?}{=} 4 \\ |0.9+3.1| \stackrel{?}{=} 4 \\ |4| \stackrel{?}{=} 4 \\ 4=4 \end{array} \quad \begin{array}{l} |0.9-0.7(7)| \stackrel{?}{=} 4 \\ |0.9-4.9| \stackrel{?}{=} 4 \\ |-4| \stackrel{?}{=} 4 \\ 4=4 \end{array}$$

$$\begin{array}{l} 18. |x+3|-4=8 \\ |x+3|=12 \\ x+3=12 \quad \text{or} \quad x+3=-12 \\ x=9 \quad \quad \quad x=-15 \end{array}$$

$$\begin{array}{l} \text{Check: } |9+3|-4 \stackrel{?}{=} 8 \\ |12|-4 \stackrel{?}{=} 8 \\ 12-4 \stackrel{?}{=} 8 \\ 8=8 \end{array} \quad \begin{array}{l} |-15+3|-4 \stackrel{?}{=} 8 \\ |-12|-4 \stackrel{?}{=} 8 \\ 12-4 \stackrel{?}{=} 8 \\ 8=8 \end{array}$$

$$\begin{array}{l} 20. \left|\frac{2}{3}-\frac{1}{2}x\right|-2=-1 \\ \left|\frac{2}{3}-\frac{1}{2}x\right|=1 \end{array}$$

$$\begin{array}{l} \frac{2}{3}-\frac{1}{2}x=1 \quad \text{or} \quad \frac{2}{3}-\frac{1}{2}x=-1 \\ 4-3x=6 \quad \quad \quad 4-3x=-6 \\ -3x=2 \quad \quad \quad -3x=-10 \\ x=-\frac{2}{3} \quad \quad \quad x=\frac{10}{3} \end{array}$$

Check:

$$\begin{array}{l} \left|\frac{2}{3}-\frac{1}{2}\cdot\frac{-2}{3}\right|-2 \stackrel{?}{=} -1 \\ \left|\frac{2}{3}+\frac{1}{3}\right|-2 \stackrel{?}{=} -1 \\ |1|-2 \stackrel{?}{=} -1 \\ 1-2 \stackrel{?}{=} -1 \\ -1=-1 \end{array} \quad \begin{array}{l} \left|\frac{2}{3}-\frac{1}{2}\cdot\frac{10}{3}\right|-2 \stackrel{?}{=} -1 \\ \left|\frac{2}{3}-\frac{5}{3}\right|-2 \stackrel{?}{=} -1 \\ |-1|-2 \stackrel{?}{=} -1 \\ -1-2 \stackrel{?}{=} -1 \\ -1=-1 \end{array}$$

$$\begin{array}{l} 22. \left|5-\frac{7}{2}x\right|+1=11 \\ \left|5-\frac{7}{2}x\right|=10 \end{array}$$

$$\begin{array}{l} 5-\frac{7}{2}x=10 \quad \text{or} \quad 5-\frac{7}{2}x=-10 \\ -\frac{7}{2}x=5 \quad \quad \quad -\frac{7}{2}x=-15 \\ x=-\frac{10}{7} \quad \quad \quad x=\frac{30}{7} \end{array}$$

$$\begin{array}{l} \text{Check: } \left|5-\frac{7}{2}\left(-\frac{10}{7}\right)\right|+1 \stackrel{?}{=} 11 \\ |5+5|+1 \stackrel{?}{=} 11 \\ |10|+1 \stackrel{?}{=} 11 \\ 10+1 \stackrel{?}{=} 11 \\ 11=11 \end{array}$$

$$\begin{array}{l} \left|5-\frac{7}{2}\left(\frac{30}{7}\right)\right|+1 \stackrel{?}{=} 11 \\ |5-15|+1 \stackrel{?}{=} 11 \\ |-10|+1 \stackrel{?}{=} 11 \\ 10+1 \stackrel{?}{=} 11 \\ 11=11 \end{array}$$

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

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

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

$$3x = \frac{7}{2} \quad 3x = \frac{1}{2}$$

$$x = \frac{7}{6} \quad x = \frac{1}{6}$$

$$\text{Check: } \left| \frac{3 \cdot \frac{7}{6} - 2}{3} \right| \stackrel{?}{=} \frac{1}{2} \quad \left| \frac{3 \cdot \frac{1}{6} - 2}{3} \right| \stackrel{?}{=} \frac{1}{2}$$

$$\left| \frac{\frac{3}{2}}{3} \right| \stackrel{?}{=} \frac{1}{2} \quad \left| \frac{-\frac{3}{2}}{3} \right| \stackrel{?}{=} \frac{1}{2}$$

$$\left| \frac{1}{2} \right| \stackrel{?}{=} \frac{1}{2} \quad \left| \frac{-1}{2} \right| \stackrel{?}{=} \frac{1}{2}$$

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

$$26. |x-8| = |2x-7|$$

$$x-8 = 2x-7 \quad \text{or} \quad x-8 = -(2x-7)$$

$$-8 = x-7 \quad x-8 = -2x+7$$

$$-1 = x \quad 3x-8 = 7$$

$$x = -1 \quad 3x = 15$$

$$x = 5$$

$$28. \left| \frac{2x+7}{3} \right| = |x+2|$$

$$\frac{2x+7}{3} = x+2 \quad \text{or} \quad \frac{2x+7}{3} = -x-2$$

$$2x+7 = 3x+6 \quad 2x+7 = -3x-6$$

$$-x = -1 \quad 5x = -13$$

$$x = 1 \quad x = -\frac{13}{5}$$

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

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

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

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

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

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

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

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

$$\frac{7}{5}x = 0 \quad -\frac{3x}{5} = -2$$

$$x = 0 \quad x = \frac{10}{3}$$

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

$$-0.74x - 8.26 = 5.36$$

$$-0.74x = 13.62$$

$$x \approx -18.41$$

or

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

$$-0.74x = 2.9$$

$$x \approx -3.92$$

$$36. |4(x-2)| + 1 = 19$$

$$|4x-8| = 18$$

$$4x-8 = 18 \quad \text{or} \quad 4x-8 = -18$$

$$4x = 26 \quad 4x = -10$$

$$x = 6.5 \quad x = -2.5$$

Check:

$$|4(6.5-2)| + 1 \stackrel{?}{=} 19 \quad |4(-2.5-2)| + 1 \stackrel{?}{=} 19$$

$$|18| + 1 \stackrel{?}{=} 19 \quad |-18| + 1 \stackrel{?}{=} 19$$

$$18+1 \stackrel{?}{=} 19 \quad 18+1 \stackrel{?}{=} 19$$

$$19 = 19 \quad 19 = 19$$

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

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

$$3x + 36 = 0$$

$$3x = -36$$

$$x = -12$$

$$\text{Check: } \left| \frac{3}{4}(-12) + 9 \right| \stackrel{?}{=} 0$$

$$|-9+9| \stackrel{?}{=} 0$$

$$|0| \stackrel{?}{=} 0$$

$$0 = 0$$

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

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

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

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

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

$$8x = -9 \qquad 8x = -15$$

$$x = -\frac{9}{8} \qquad x = -\frac{15}{8}$$

Check:

$$\left| \frac{2\left(-\frac{9}{8}\right)+3}{3} \right| \stackrel{?}{=} \frac{1}{4} \qquad \left| \frac{2\left(-\frac{15}{8}\right)+3}{3} \right| \stackrel{?}{=} \frac{1}{4}$$

$$\left| \frac{-\frac{9}{4} + \frac{12}{4}}{3} \right| \stackrel{?}{=} \frac{1}{4} \qquad \left| \frac{-\frac{15}{4} + \frac{12}{4}}{3} \right| \stackrel{?}{=} \frac{1}{4}$$

$$\left| \frac{3 \cdot \frac{1}{4}}{3} \right| \stackrel{?}{=} \frac{1}{4} \qquad \left| -\frac{3 \cdot \frac{1}{4}}{3} \right| \stackrel{?}{=} \frac{1}{4}$$

$$\left| \frac{1}{4} \right| \stackrel{?}{=} \frac{1}{4} \qquad \left| -\frac{1}{4} \right| \stackrel{?}{=} \frac{1}{4}$$

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

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

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

$$2x + 5 = 55 \quad \text{or} \quad 2x + 5 = -55$$

$$2x = 50 \qquad 2x = -60$$

$$x = 25 \qquad x = -30$$

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

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

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

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

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

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

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

$$2x - 4 = 3 \qquad 3x - 4 = -x - 3$$

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

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

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

2.4 Exercises

2. Let x = the number.

$$\frac{5}{6}x = -60$$

$$5x = -360$$

$$x = -72$$

The number is -72 .4. Let x = the monthly fee last year.

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

$$196 = 3x - 20$$

$$3x = 216$$

$$x = 72$$

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

6. Let x = the number of hours the car has been parked after the first hour.

$$5.00 + 2.75x = 29.75$$

$$2.75x = 24.75$$

$$x = 9$$

Including the initial hour, the car had been parked for 10 hours.

8. Let x = the number of checks.

$$6.00(8) + 0.15x = 53.10$$

$$48 + 0.15x = 53.10$$

$$0.15x = 5.1$$

$$x = 34$$

He wrote 34 checks.

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.
 $2x + 2(3x + 12) = 168$
 $2x + 6x + 24 = 168$
 $8x = 144$
 $x = 18$
 $3x + 12 = 3(18) + 12 = 66$
The width of the driveway is 18 feet and the length of the driveway is 66 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.

How Am I Doing? Sections 2.1–2.4

1. $2x - 1 = 12x + 36$
 $2x - 12x - 1 = 12x - 12x + 36$
 $-10x - 1 = 36$
 $-10x - 1 + 1 = 36 + 1$
 $-10x = 37$
 $\frac{-10x}{-10} = \frac{37}{-10}$
 $x = -3.7$ or $-\frac{37}{10}$ or $-3\frac{7}{10}$

$$2. \quad \frac{x-2}{4} = \frac{1}{2}x + 4$$

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

$$x-2 = 2x+16$$

$$x-2x-2 = 2x-2x+16$$

$$-x-2 = 16$$

$$-x-2+2 = 16+2$$

$$-x = 18$$

$$x = -18$$

$$3. \quad 4(x-3) = x+2(5x-1)$$

$$4x-12 = x+10x-2$$

$$4x-12 = 11x-2$$

$$4x-11x-12 = 11x-11x-2$$

$$-7x-12 = -2$$

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

$$-7x = 10$$

$$x = -\frac{10}{7} = -1\frac{3}{7}$$

$$4. \quad 0.6x+3 = 0.5x-7$$

$$10(0.6x+3) = 10(0.5x-7)$$

$$6x+30 = 5x-70$$

$$6x-5x+30 = 5x-5x-70$$

$$x+30 = -70$$

$$x+30-30 = -70-30$$

$$x = -100$$

$$5. \quad 3x-7y = 14$$

$$3x-3x-7y = 14-3x$$

$$-7y = 14-3x$$

$$\frac{-7y}{-7} = \frac{14-3x}{-7}$$

$$y = \frac{3x-14}{7} \text{ or } y = \frac{3x}{7} - 2$$

$$6. \quad 5ab-2b = 16ab-3(8+b)$$

$$5ab-2b = 16ab-24-3b$$

$$-11ab = -b-24$$

$$11ab = b+24$$

$$a = \frac{b+24}{11b}$$

$$7. \quad A = P + Prt$$

$$Prt = A - P$$

$$\frac{Prt}{Pt} = \frac{A-P}{Pt}$$

$$r = \frac{A-P}{Pt}$$

$$8. \quad r = \frac{A-P}{Pt}$$

$$r = \frac{118-100}{(100)3}$$

$$r = \frac{18}{300}$$

$$r = \frac{3}{50}$$

$$r = 0.06$$

$$9. \quad |3x-2| = 7$$

$$3x-2 = 7 \quad \text{or} \quad 3x-2 = -7$$

$$3x = 9$$

$$3x = -5$$

$$x = 3$$

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

$$10. \quad |9-x| + 2 = 5$$

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

$$|9-x| = 3$$

$$9-x = 3 \quad \text{or} \quad 9-x = -3$$

$$-x = -6$$

$$-x = -12$$

$$x = 6$$

$$x = 12$$

$$11. \quad \left|\frac{2x+3}{4}\right| = 2$$

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

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

$$2x+3 = 8$$

$$2x+3 = -8$$

$$2x = 5$$

$$x = -11$$

$$x = \frac{5}{2} = 2.5$$

$$x = -\frac{11}{2} = -5.5$$

$$12. \quad |5x-8| = |3x+2|$$

$$5x-8 = 3x+2 \quad \text{or} \quad 5x-8 = -3x-2$$

$$2x = 10$$

$$8x = 6$$

$$x = 5$$

$$x = \frac{6}{8} = 0.75$$

$$13. \quad \text{Let } W = \text{width, then } W + 20 = \text{length.}$$

$$P = 2L + 2W$$

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

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

$$280 = 4W + 40$$

$$240 = 4W$$

$$60 = W$$

$$80 = W + 20$$

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 short side.

Then $2x - 5$ = length of long side and
 $x + 9$ = length of third side.

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

$$4x + 4 = 62$$

$$4x = 58$$

$$x = 14.5 \text{ ft, short side}$$

$$x + 9 = 14.5 + 9 = 23.5 \text{ ft, third side}$$

$$2x - 5 = 2(14.5) - 5 = 24 \text{ ft, long side}$$

2.5 Exercises

2. Let
- x
- = debt in 2000.

$$x + 0.61x = 9.19$$

$$1.61x = 9.19$$

$$x \approx 5.7$$

The debt on January 24, 2000 was approximately \$5.7 trillion.

- 4.
- x
- = number of members in 1990.

$$x + 1.06x = 42.7$$

$$2.06x = 42.7$$

$$x \approx 20.7$$

Approximately 20.7 million Americans were health club members in 1990.

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 is \$1056.

- 16.
- $I = prt$

$$I = 4000(0.061)(0.25)$$

$$I = 61.00$$

The interest is \$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.
 $7x + 9(32 - x) = 8.50(32)$
 $7x + 288 - 9x = 272$
 $-2x = -16$
 $x = 8$
 $32 - x = 24$
 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 100% deet.
 $10 - x$ = number of oz of 25% deet.
 $x + 0.25(10 - x) = 0.4(10)$
 $x + 2.5 - 0.25x = 4$
 $0.75x = 1.5$
 $x = 2$
 $10 - x = 8$
 They need to mix 2 ounces of 100% deet with 8 ounces of 25% 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.
 $14x = 6x + 20$
 $8x = 20$
 $x = 2.5$
 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. $\frac{\sqrt{7^2 - 24}}{2^3(-1) + 7(4)} = \frac{\sqrt{49 - 24}}{8(-1) + 7(4)}$
 $= \frac{\sqrt{25}}{-8 + 28}$
 $= \frac{5}{20}$
 $= \frac{1}{4}$

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 the 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. $-\frac{7}{16} = -0.4375 > -\frac{6}{13} \approx -0.4615$
16. $-2.69 > -2.7$ because -2.69 is to the right of -2.7 on a number line.
18. $|-8 + 2| = |-6| = 6$
 $|6 - 13| = |-7| = 7$
 $|-8 + 2| < |6 - 13|$ since $6 < 7$.

20. $x \geq -4$

22. $x < 80$

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. $1.7 - 0.6x \leq x + 0.1$
 $1.7 - 0.6x - x \leq x - x + 0.1$
 $1.7 - 1.6x \leq 0.1$
 $1.7 - 1.7 - 1.6x \leq 0.1 - 1.7$
 $-1.6x \leq -1.6$

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

32. $9x - 1 \leq 4x - 11$
 $9x - 4x - 1 \leq 4x - 4x - 11$
 $5x - 1 \leq -11$
 $5x - 1 + 1 \leq -11 + 1$
 $5x \leq -10$
 $\frac{5x}{5} \leq \frac{-10}{5}$
 $x \leq -2$

34. $2x + \frac{5}{2} > \frac{3}{2}x - 2$
 $2\left(2x + \frac{5}{2}\right) > 2\left(\frac{3}{2}x - 2\right)$
 $4x + 5 > 3x - 4$
 $4x - 3x > -4 - 5$
 $x > -9$

$$\begin{aligned}
 36. \quad & 2x - 11 + 3(x + 2) < 0 \\
 & 2x - 11 + 3x + 6 < 0 \\
 & 5x - 5 < 0 \\
 & 5x < 5 \\
 & \frac{5x}{5} < \frac{5}{5} \\
 & x < 1
 \end{aligned}$$

$$\begin{aligned}
 38. \quad & -3(x + 1) - \frac{x}{2} + \frac{3}{2} < 0 \\
 & -3x - 3 - \frac{x}{2} + \frac{3}{2} < 0 \\
 & 2\left(-3x - 3 - \frac{x}{2} + \frac{3}{2}\right) < 2(0) \\
 & -6x - 6 - x + 3 < 0 \\
 & -7x - 3 < 0 \\
 & -7x < 3 \\
 & \frac{-7x}{-7} > \frac{3}{-7} \\
 & x > -\frac{3}{7}
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & -0.4x + 1.5 \geq 2.1 - x \\
 & 10(-0.4x + 1.5) \geq 10(2.1 - x) \\
 & -4x + 15 \geq 21 - 10x \\
 & -4x + 10x \geq 21 - 15 \\
 & 6x \geq 6 \\
 & \frac{6x}{6} \geq \frac{6}{6} \\
 & x \geq 1
 \end{aligned}$$

$$\begin{aligned}
 42. \quad & 1.2 - 0.8x \leq 0.3(4 - x) \\
 & 1.2 - 0.8x \leq 1.2 - 0.3x \\
 & -0.8x + 0.3x \leq 1.2 - 1.2 \\
 & -0.5x \leq 0 \\
 & \frac{-0.5x}{-0.5} \geq \frac{0}{-0.5} \\
 & x \geq 0
 \end{aligned}$$

$$\begin{aligned}
 44. \quad & \frac{3}{4} + \frac{1}{2}(x - 7) \leq 1 - \frac{x}{4} \\
 & 4\left[\frac{3}{4} + \frac{1}{2}(x - 7)\right] \leq 4\left(1 - \frac{x}{4}\right) \\
 & 3 + 2(x - 7) \leq 4 - x \\
 & 3 + 2x - 14 \leq 4 - x \\
 & 2x - 11 \leq 4 - x \\
 & 2x + x \leq 4 + 11 \\
 & 3x \leq 15 \\
 & \frac{3x}{3} \leq \frac{15}{3} \\
 & x \leq 5
 \end{aligned}$$

$$\begin{aligned}
 46. \quad & 4 - \frac{3x - 1}{3} > \frac{x}{6} + \frac{7}{2} \\
 & 6\left(4 - \frac{3x - 1}{3}\right) > 6\left(\frac{x}{6} + \frac{7}{2}\right) \\
 & 24 - 6x + 2 > x + 21 \\
 & -6x + 26 > x + 21 \\
 & -7x > -5 \\
 & \frac{-7x}{-7} < \frac{-5}{-7} \\
 & x < \frac{5}{7}
 \end{aligned}$$

$$\begin{aligned}
 48. \quad & \text{Let } x = \text{number of new customers.} \\
 & (7.75)(26) + 25x > 401.50 \\
 & 201.5 + 25x > 401.5 \\
 & 25x > 200 \\
 & \frac{25x}{25} > \frac{200}{25} \\
 & x > 8
 \end{aligned}$$

She must sign up more than 8 customers.

$$\begin{aligned}
 50. \quad & \text{Let } x = \text{the number of packages.} \\
 & 180 + 160 + 68.5x \leq 2395 \\
 & 68.5x \leq 2055 \\
 & x \leq 30
 \end{aligned}$$

A maximum of thirty packages can be carried.

$$\begin{aligned}
 52. \quad & \text{Let } x = \text{the number of additional ounces per} \\
 & \text{package after the first ounce.} \\
 & 0.41 + 0.23x \leq 8.46 \\
 & 0.23x \leq 8.05 \\
 & x \leq 35
 \end{aligned}$$

A box could not weigh more than $35 + 1 = 36$ ounces.

Cumulative Review

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

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

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

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

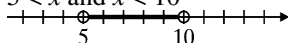
Classroom Quiz 2.6

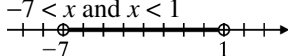
$$\begin{aligned}
 1. \quad 9x - 2 &> 4x + 8 \\
 9x - 4x - 2 &> 4x - 4x + 8 \\
 5x - 2 &> 8 \\
 5x - 2 + 2 &> 8 + 2 \\
 5x &> 10 \\
 \frac{5x}{5} &> \frac{10}{5} \\
 x &> 2
 \end{aligned}$$

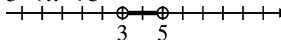
$$\begin{aligned}
 2. \quad -6(x+3) &> -3x - 8 \\
 -6x - 18 &> -3x - 8 \\
 -6x + 3x - 18 &> -3x + 3x - 8 \\
 -3x - 18 &> -8 \\
 -3x - 18 + 18 &> -8 + 18 \\
 -3x &> 10 \\
 \frac{-3x}{-3} &< \frac{10}{-3} \\
 x &< -\frac{10}{3}
 \end{aligned}$$

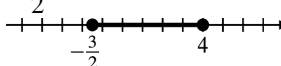
$$\begin{aligned}
 3. \quad \frac{1}{3}(x-2) &\leq \frac{1}{7}(7x-14) - 2 \\
 21 \left[\frac{1}{3}(x-2) \right] &\leq 21 \left[\frac{1}{7}(7x-14) - 2 \right] \\
 7(x-2) &\leq 3(7x-14) - 42 \\
 7x - 14 &\leq 21x - 42 - 42 \\
 7x - 14 &\leq 21x - 84 \\
 7x - 21x &\leq -84 + 14 \\
 -14x &\leq -70 \\
 \frac{-14x}{-14} &\geq \frac{-70}{-14} \\
 x &\geq 5
 \end{aligned}$$

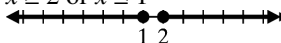
2.7 Exercises

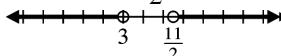
$$2. \quad 5 < x \text{ and } x < 10$$


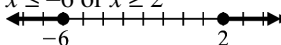
$$4. \quad -7 < x \text{ and } x < 1$$



$$6. \quad 3 < x < 5$$


$$8. \quad -\frac{3}{2} \leq x \leq 4$$


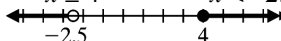
$$10. \quad x \geq 2 \text{ or } x \leq 1$$


$$12. \quad x < 3 \text{ or } x > \frac{11}{2}$$


$$14. \quad x \leq -6 \text{ or } x \geq 2$$


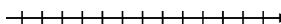
$$\begin{aligned}
 16. \quad 4x - 1 < 7 \quad \text{and} \quad x &\geq -1 \\
 -1 \leq x \quad \text{and} \quad 4x - 1 < 7 \\
 4x < 8 \\
 x < 2
 \end{aligned}$$


$$18. \quad x + 1 \geq 5 \quad \text{or} \quad x + 5 < 2.5$$

$$x \geq 4 \quad \text{or} \quad x < -2.5$$


$$20. \quad x < 6 \quad \text{and} \quad x > 9$$

These two graphs do not overlap.
No solution



$$22. \quad s < 10 \text{ or } s > 12$$

$$24. \quad 490 \leq c \leq 2000$$

$$26. \quad 16 \leq C \leq 24$$

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

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

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

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

$$28. \quad 23,000 \leq Y \leq 28,000$$

$$23,000 \leq 107(d - 5) \leq 28,000$$

$$214.95 \leq d - 5 \leq 216.68$$

$$\$219.95 \leq d \leq \$266.68$$

30. $x+3 < 7$ and $x-2 < -3$
 $x < 4$ $x < -1$
 $x < -1$ is the solution.

32. $8-x \geq 6$ and $10x+9 \geq -11$
 $-x \geq -2$ $10x \geq -20$
 $x \leq 2$ $x \geq -2$
 $-2 \leq x \leq 2$ 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.
 $-3x - 4 \geq x$ or $2x + 3 \leq -4x$
 $-4x \geq 4$ $6x \leq -3$
 $x \leq -1$ $x \leq -0.5$
 $x \leq -0.5$ contains $x \leq -1$.
 $x \leq -0.5$ is the solution.

38. $\frac{5x}{3} - 2 < \frac{14}{3}$ and $3x + \frac{5}{2} < -\frac{1}{2}$
 $5x - 6 < 14$ $6x + 5 < -1$
 $5x < 20$ $6x < -6$
 $x < 4$ $x < -1$
 $x < -1$ is the solution.

40. $6x - 10 < 8$ and $2x + 1 > 9$
 $6x < 18$ $2x > 8$
 $x < 3$ $x > 4$
 $x < 3$ and $x > 4$ do not overlap.
 No solution

42. $6x - 3 \geq 8x + 5$ and $x + 6 \geq 2$
 $-2x \geq 8$ $x \geq -4$
 $x \leq -4$
 $x \leq -4$ and $x \geq -4$ overlap at $x = -4$.
 $x = -4$ is the solution.

44. $\frac{x-4}{6} - \frac{x-2}{9} \leq \frac{5}{18}$ or $-\frac{2}{5}(x+3) < -\frac{6}{5}$
 $3x - 12 - 2x + 4 \leq 5$ $-2x - 6 < -6$
 $x - 8 \leq 5$ $-2x < 0$
 $x \leq 13$ $x > 0$

The solution is all real numbers.

Cumulative Review

45. $3y - 5x = 8$
 $-5x = 8 - 3y$
 $(-1)(-5x) = (-1)(8 - 3y) = -8 + 3y$
 $5x = 3y - 8$
 $x = \frac{3y - 8}{5}$

46. $7x + 6y = -12$
 $6y = -12 - 7x$
 $y = \frac{-12 - 7x}{6}$

47. $x^2 + 5x - |x + 3| = (-2)^2 + 5(-2) - |-2 + 3|$
 $= (-2)^2 + 5(-2) - |1|$
 $= 4 - 10 - 1$
 $= -6 - 1$
 $= -7$

48. $3x^3 - x^2 - \sqrt{8x+9} = 3(2)^3 - 2^2 - \sqrt{8 \cdot 2 + 9}$
 $= 3(2)^3 - 2^2 - \sqrt{16+9}$
 $= 3(8) - 4 - \sqrt{25}$
 $= 24 - 4 - 5$
 $= 20 - 5$
 $= 15$

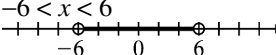
Classroom Quiz 2.7

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.

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.

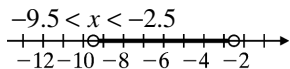
2.8 Exercises

2. $|x| < 6$
 $-6 < x < 6$


$$4. |x + 6| < 3.5$$

$$-3.5 < x + 6 < 3.5$$

$$-9.5 < x < -2.5$$



$$6. |x - 7| \leq 10$$

$$-10 \leq x - 7 \leq 10$$

$$-3 \leq x \leq 17$$

$$8. |4x - 3| \leq 9$$

$$-9 \leq 4x - 3 \leq 9$$

$$-6 \leq 4x \leq 12$$

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

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

$$2 \leq 2x \leq 4$$

$$1 \leq x \leq 2$$

$$12. |0.9 - 0.2x| < 2 \Leftrightarrow -2 < 0.9 - 0.2x < 2$$

$$-2.9 < -0.2x < 1.1$$

$$14.5 > x > -5.5$$

$$-5.5 < x < 14.5$$

$$14. \left| \frac{1}{5}x + 1 \right| < 5$$

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

$$-25 < x + 5 < 25$$

$$-30 < x < 20$$

$$16. \left| \frac{3}{5}(x - 1) \right| < 3$$

$$-3 < \frac{3}{5}(x - 1) < 3$$

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

$$-4 < x < 6$$

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

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

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

$$-5 < 5x < 11$$

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

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

$$20. |x| \geq 7$$

$$x \geq 7 \text{ or } x \leq -7$$

$$22. |x + 4| > 7$$

$$x + 4 < -7 \quad \text{or} \quad x + 4 > 7$$

$$x < -11 \quad \quad \quad x > 3$$

$$24. |x - 2| \geq 3$$

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

$$x \leq -1 \quad \quad \quad x \geq 5$$

$$26. |6x - 5| \geq 7$$

$$6x - 5 \leq -7 \quad \text{or} \quad 6x - 5 \geq 7$$

$$6x \leq -2 \quad \quad \quad 6x \geq 12$$

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

$$28. |0.4 - 0.2x| > 3$$

$$0.4 - 0.2x < -3 \quad \text{or} \quad 0.4 - 0.2x > 3$$

$$-0.2x < -3.4 \quad \quad \quad -0.2x > 2.6$$

$$x > 17 \quad \quad \quad x < -13$$

$$30. \left| \frac{1}{4}x - \frac{3}{8} \right| > 1$$

$$\frac{1}{4}x - \frac{3}{8} < -1 \quad \text{or} \quad \frac{1}{4}x - \frac{3}{8} > 1$$

$$2x - 3 < -8 \quad \quad \quad 2x - 3 > 8$$

$$2x < -5 \quad \quad \quad 2x > 11$$

$$x < -\frac{5}{2} \quad \quad \quad x > \frac{11}{2}$$

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

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

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

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

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

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

$$34. |2x + 3| < 5$$

$$-5 < 2x + 3 < 5$$

$$-8 < 2x < 2$$

$$-4 < x < 1$$

$$36. |2 - 5x| > 2$$

$$2 - 5x < -2 \quad \text{or} \quad 2 - 5x > 2$$

$$-5x < -4 \quad \quad \quad -5x > 0$$

$$x > \frac{4}{5} \quad \quad \quad x < 0$$

$$\begin{aligned}
 38. \quad & |m-s| \leq 0.12 \\
 & |m-17.48| \leq 0.12 \\
 & -0.12 \leq m-17.48 \leq 0.12 \\
 & 17.36 \leq m \leq 17.60
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & |n-p| \leq 0.05 \\
 & |n-7.84| \leq 0.05 \\
 & -0.05 \leq n-7.84 \leq 0.05 \\
 & 7.79 \leq n \leq 7.89
 \end{aligned}$$

Cumulative Review

$$\begin{aligned}
 41. \quad & 4^2 + (5-2)^3 \div (-9) = 4^2 + (3)^3 \div (-9) \\
 & = 16 + 27 \div (-9) \\
 & = 16 - 3 \\
 & = 13
 \end{aligned}$$

$$\begin{aligned}
 42. \quad & (-4)(7) \div 2 + (-8) - 12 = -28 \div 2 + (-8) - 12 \\
 & = -14 + (-8) - 12 \\
 & = -22 - 12 \\
 & = -34
 \end{aligned}$$

$$\begin{aligned}
 43. \quad \text{distance} &= 2 \left[\frac{1}{8} \cdot \text{circumference} \right] \\
 &= 2 \left[\frac{1}{8} (2\pi \cdot \text{radius}) \right] \\
 &= 2 \left[\frac{1}{8} (2 \cdot 3.14 \cdot 19) \right] \\
 &= 29.83
 \end{aligned}$$

The end of the rope travels 29.83 meters.

$$\begin{aligned}
 44. \quad \text{distance} &= 2 \cdot \frac{1}{6} (2\pi \cdot 30) \\
 &= 2 \cdot \frac{1}{6} (2 \cdot 3.14 \cdot 30) \\
 &= 62.8
 \end{aligned}$$

The end of the wire travels 62.8 feet.

Classroom Quiz 2.8

$$\begin{aligned}
 1. \quad & \left| \frac{1}{3}x - \frac{1}{6} \right| < 2 \\
 & -2 < \frac{1}{3}x - \frac{1}{6} < 2 \\
 & 6(-2) < 6\left(\frac{1}{3}x - \frac{1}{6}\right) < 6(2) \\
 & -12 < 2x - 1 < 12 \\
 & -11 < 2x < 13 \\
 & -\frac{11}{2} < x < \frac{13}{2} \\
 & -5\frac{1}{2} < x < 6\frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & |3x + 12| \leq 10 \\
 & -10 \leq 3x + 12 \leq 10 \\
 & -22 \leq 3x \leq -2 \\
 & -\frac{22}{3} \leq x \leq -\frac{2}{3} \\
 & -7\frac{1}{3} \leq x \leq -\frac{2}{3}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & |4x - 3| > 21 \\
 & 4x - 3 < -21 \quad \text{or} \quad 4x - 3 > 21 \\
 & 4x < -18 \qquad \qquad 4x > 24 \\
 & x < -\frac{18}{4} \qquad \qquad x > 6 \\
 & x < -4\frac{1}{2}
 \end{aligned}$$

Putting Your Skills to Work

$$\begin{aligned}
 1. \quad & 950 + 200 + 90 + 60 + 300 = 1600 \\
 & \text{The monthly costs would total \$1600.}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & \frac{1600}{2} = 800 \\
 & \text{Her new expected costs would be \$800.} \\
 & 800 - 475 = 325 \\
 & \text{It is \$325 more than she expected to pay.}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & 15 \times 130 = 1950 \\
 & \text{She will earn \$1950.} \\
 & \text{Yes, she can pay for these expenses since} \\
 & \text{\$1950} > \text{\$800.}
 \end{aligned}$$

4. Answers may vary.

5. Answers may vary.

Chapter 2 Review Problems

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

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

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

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

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

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

$$\begin{aligned}
 6. \quad & \frac{x-4}{2} - \frac{1}{5} = \frac{7x+1}{20} \\
 & 20\left(\frac{x-4}{2} - \frac{1}{5}\right) = 20\left(\frac{7x+1}{20}\right) \\
 & 10(x-4) - 4 = 7x+1 \\
 & 10x - 40 - 4 = 7x+1 \\
 & 10x - 44 = 7x+1 \\
 & 10x - 7x = 1 + 44 \\
 & 3x = 45 \\
 & x = 15
 \end{aligned}$$

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

$$\begin{aligned}
 8. \quad & 1.2x - 1 = 2(1.6x + 1.5) \\
 & 1.2x - 1 = 3.2x + 3 \\
 & 1.2x - 3.2x = 3 + 1 \\
 & -2x = 4 \\
 & x = -2
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & 6x - 11y = 8 \\
 & -11y = -6x + 8 \\
 & y = \frac{-6x + 8}{-11} \\
 & y = \frac{6x - 8}{11}
 \end{aligned}$$

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

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

$$\begin{aligned}
 12. \quad & \frac{1}{2}a + 3b = \frac{2}{3}(2b - 1) \\
 & 3a + 18b = 8b - 4 \\
 & 10b = -3a - 4 \\
 & b = \frac{-3a - 4}{10}
 \end{aligned}$$

$$\begin{aligned}
 13. \text{ a. } \quad C &= \frac{5F - 160}{9} \\
 9C &= 5F - 160 \\
 5F - 160 &= 9C \\
 5F &= 9C + 160 \\
 F &= \frac{9C + 160}{5}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } \quad F &= \frac{9(10) + 160}{5} = \frac{250}{5} = 50 \\
 F &= 50^\circ \text{ when } C = 10^\circ.
 \end{aligned}$$

$$\begin{aligned}
 14. \text{ a. } \quad P &= 2W + 2L \\
 P - 2L &= 2W \\
 2W &= P - 2L \\
 W &= \frac{P - 2L}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. } \quad W &= \frac{100 - 2(20.5)}{2} \\
 &= \frac{100 - 41}{2} \\
 &= \frac{59}{2} \\
 &= 29.5 \\
 W &= 29.5 \text{ meters}
 \end{aligned}$$

$$\begin{aligned}
 15. \quad |2x - 7| &= 9 \\
 2x - 7 &= 9 \quad \text{or} \quad 2x - 7 = -9 \\
 2x &= 16 \quad \quad \quad 2x = -2 \\
 x &= 8 \quad \quad \quad x = -1
 \end{aligned}$$

$$\begin{aligned}
 16. \quad |5x + 2| &= 7 \\
 5x + 2 &= 7 \quad \text{or} \quad 5x + 2 = -7 \\
 5x &= 5 \quad \quad \quad 5x = -9 \\
 x &= 1 \quad \quad \quad x = -\frac{9}{5}
 \end{aligned}$$

$$\begin{aligned}
 17. \quad |3 - x| &= |5 - 2x| \\
 3 - x &= 5 - 2x \quad \text{or} \quad 3 - x = -(5 - 2x) \\
 x &= 2 \quad \quad \quad 3 - x = -5 + 2x \\
 & \quad \quad \quad -3x &= -8 \\
 & \quad \quad \quad x &= \frac{8}{3}
 \end{aligned}$$

$$\begin{aligned}
 18. \quad |x + 8| &= |2x - 4| \\
 x + 8 &= 2x - 4 \quad \text{or} \quad x + 8 = -2x + 4 \\
 -x &= -12 \quad \quad \quad 3x = -4 \\
 x &= 12 \quad \quad \quad x = -\frac{4}{3}
 \end{aligned}$$

$$\begin{aligned}
 19. \quad \left| \frac{1}{4}x - 3 \right| &= 8 \\
 \frac{1}{4}x - 3 &= 8 \quad \text{or} \quad \frac{1}{4}x - 3 = -8 \\
 x - 12 &= 32 \quad \quad \quad x - 12 = -32 \\
 x &= 44 \quad \quad \quad x = -20
 \end{aligned}$$

$$\begin{aligned}
 20. \quad |4 - 7x| &= 25 \\
 4 - 7x &= 25 \quad \text{or} \quad 4 - 7x = -25 \\
 -7x &= 21 \quad \quad \quad -7x = -29 \\
 x &= -3 \quad \quad \quad x = \frac{29}{7}
 \end{aligned}$$

$$\begin{aligned}
 21. \quad |2x - 8| + 7 &= 12 \\
 |2x - 8| &= 5 \\
 2x - 8 &= 5 \quad \text{or} \quad 2x - 8 = -5 \\
 2x &= 13 \quad \quad \quad 2x = 3 \\
 x &= \frac{13}{2} \quad \quad \quad x = \frac{3}{2}
 \end{aligned}$$

$$\begin{aligned}
 22. \quad |0.2x - 1| + 1.2 &= 2.3 \\
 |0.2x - 1| &= 1.1 \\
 0.2x - 1 &= 1.1 \quad \text{or} \quad 0.2x - 1 = -1.1 \\
 0.2x &= 2.1 \quad \quad \quad 0.2x = -0.1 \\
 x &= \frac{21}{2} \quad \quad \quad x = -\frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 23. \quad P &= 2L + 2W \\
 42 &= 2(2W + 3) + 2W \\
 21 &= 2W + 3 + W \\
 3W &= 18 \\
 W &= 6 \\
 2W + 3 &= 15 \\
 \text{The width is 6 feet and the length is 15 feet.}
 \end{aligned}$$

$$\begin{aligned}
 24. \quad \text{Let } x &= \text{the number of women.} \\
 \text{Then } 2x - 200 &= \text{the number of men.} \\
 2x - 200 + x &= 280 \\
 3x - 200 &= 280 \\
 3x &= 480 \\
 x &= 160 \\
 2x - 200 &= 120 \\
 \text{There are 160 women and 120 men attending} \\
 &\text{Western Tech.}
 \end{aligned}$$

25. Let x = miles she drove.
 $3(38) + 0.15x = 150$
 $114 + 0.15x = 150$
 $0.15x = 36$
 $x = 240$
 She drove 240 miles.
26. Let x = number of miles from airport to hotel.
 $\$2.50 + \frac{\$0.35}{\frac{1}{5} \text{ mile}} \left(x - \frac{1}{5} \right) \text{ mile} = \14.75
 $0.5 + 0.35 \left(x - \frac{1}{5} \right) = 2.95$
 $0.35x - 0.07 = 2.45$
 $0.35x = 2.52$
 $x = 7.2$
 It is 7.2 miles or $7\frac{1}{5}$ miles from the airport to the hotel.
27. 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.
 $x + x + 13 + 3(x + 13) = 102$
 $2x + 13 + 3x + 39 = 102$
 $5x + 52 = 102$
 $5x = 50$
 $x = 10$
 $x + 13 = 23$
 $3(x + 13) = 69$
 \$10 is withheld for retirement, \$23 for state tax,
 and \$69 for federal tax.
28. 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.
29. 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.
30. Let x = the number of two-door sedans.
 Then $3x$ = the number of four-door sedans.
 $3x + x = 260,000$
 $4x = 260,000$
 $x = 65,000$
 $3x = 195,000$
 They should manufacture 65,000 two-door sedans and 195,000 four-door sedans.
31. 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%.
32. 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.
33. 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.
 $4.25x + 4.50(30 - x) = 4.40(30)$
 $4.25x + 135 - 4.5x = 132$
 $-0.25x = -3$
 $x = 12$
 $30 - x = 18$
 12 pounds of \$4.25 and 18 pounds of \$4.50 should be used.
34. 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.

$$\begin{aligned}
 35. \quad & 7x+8 < 5x \\
 & 2x < -8 \\
 & \frac{2x}{2} < \frac{-8}{2} \\
 & x < -4
 \end{aligned}$$

$$\begin{aligned}
 36. \quad & 9x+3 < 12x \\
 & -3x < -3 \\
 & \frac{-3x}{-3} > \frac{-3}{-3} \\
 & x > 1
 \end{aligned}$$

$$\begin{aligned}
 37. \quad & 4x-1 < 3(x+2) \\
 & 4x-1 < 3x+6 \\
 & 4x-3x < 6+1 \\
 & x < 7
 \end{aligned}$$

$$\begin{aligned}
 38. \quad & 3(3x-2) < 4x-16 \\
 & 9x-6 < 4x-16 \\
 & 9x-4x < -16+6 \\
 & 5x < -10 \\
 & \frac{5x}{5} < \frac{-10}{5} \\
 & x < -2
 \end{aligned}$$

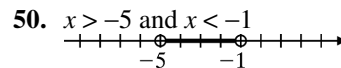
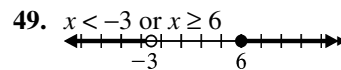
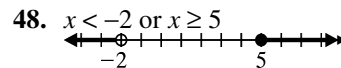
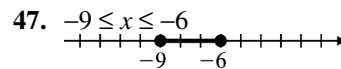
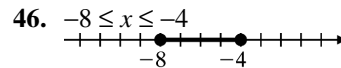
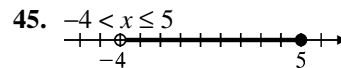
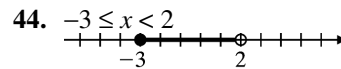
$$\begin{aligned}
 39. \quad & \frac{7}{8}x - \frac{1}{4} > \frac{1}{2} \\
 & 8\left(\frac{7}{8}x - \frac{1}{4}\right) > 8\left(\frac{1}{2}\right) \\
 & 7x - 2 > 4 \\
 & 7x > 6 \\
 & x > \frac{6}{7}
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & \frac{5}{3} - x \geq -\frac{1}{6}x + \frac{5}{6} \\
 & 6\left(\frac{5}{3} - x\right) \geq 6\left(-\frac{1}{6}x + \frac{5}{6}\right) \\
 & 10 - 6x \geq -x + 5 \\
 & -6x + x \geq 5 - 10 \\
 & -5x \geq -5 \\
 & \frac{-5x}{-5} \leq \frac{-5}{-5} \\
 & x \leq 1
 \end{aligned}$$

$$\begin{aligned}
 41. \quad & \frac{1}{3}(x-2) < \frac{1}{4}(x+5) - \frac{5}{3} \\
 & 12\left[\frac{1}{3}(x-2)\right] < 12\left[\frac{1}{4}(x+5) - \frac{5}{3}\right] \\
 & 4(x-2) < 3(x+5) - 20 \\
 & 4x - 8 < 3x + 15 - 20 \\
 & 4x - 8 < 3x - 5 \\
 & 4x - 3x < -5 + 8 \\
 & x < 3
 \end{aligned}$$

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

$$\begin{aligned}
 43. \quad & 7x - 6 \leq \frac{1}{3}(-2x + 5) \\
 & 3(7x - 6) \leq 3\left[\frac{1}{3}(-2x + 5)\right] \\
 & 21x - 18 \leq -2x + 5 \\
 & 21x + 2x \leq 5 + 18 \\
 & 23x \leq 23 \\
 & x \leq 1
 \end{aligned}$$



51. $x > -8$ and $x < -3$

52. $x + 3 > 8$ or $x + 2 < 6$

$x > 5$ or $x < 4$

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

$x > 9$ or $x < -1$

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

$x > 5$ and $x < 2$

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

55. $-1 < x + 5 < 8$

$-6 < x < 3$

56. $0 \leq 5 - 3x \leq 17$

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

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

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

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

57. $2x - 7 < 3$ and $5x - 1 \geq 8$

$2x < 10$ and $5x \geq 9$

$x < 5$ and $x \geq \frac{9}{5}$

$\frac{9}{5} \leq x < 5$

$1\frac{4}{5} \leq x < 5$

58. $4x - 2 < 8$ or $3x + 1 > 4$

$4x < 10$ or $3x > 3$

$x < \frac{5}{2}$ or $x > 1$

The solution is all real numbers.

59. $|x + 7| < 15$

$-15 < x + 7 < 15$

$-22 < x < 8$

60. $|x + 9| < 18$

$-18 < x + 9 < 18$

$-27 < x < 9$

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

$-\frac{7}{4} < \frac{1}{2}x + 2 < \frac{7}{4}$

$-7 < 2x + 8 < 7$

$-15 < 2x < -1$

$-\frac{15}{2} < x < -\frac{1}{2}$

$-7\frac{1}{2} < x < -\frac{1}{2}$

62. $\left| \frac{1}{5}x + 3 \right| < \frac{11}{5}$

$-\frac{11}{5} < \frac{1}{5}x + 3 < \frac{11}{5}$

$-11 < x + 15 < 11$

$-26 < x < -4$

63. $|2x - 1| \geq 9$

$2x - 1 \leq -9$ or $2x - 1 \geq 9$

$2x \leq -8$ or $2x \geq 10$

$x \leq -4$ or $x \geq 5$

64. $|3x - 1| \geq 2$

$3x - 1 \leq -2$ or $3x - 1 \geq 2$

$3x \leq -1$ or $3x \geq 3$

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

65. $|4(x + 1)| \geq 3$

$4(x + 1) \leq -3$ or $4(x + 1) \geq 3$

$4x + 4 \leq -3$ or $4x + 4 \geq 3$

$4x \leq -7$ or $4x \geq -1$

$x \leq -\frac{7}{4}$ or $x \geq -\frac{1}{4}$

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

66. $|2(x - 5)| \geq 2$

$2(x - 5) \leq -2$ or $2(x - 5) \geq 2$

$2x - 10 \leq -2$ or $2x - 10 \geq 2$

$2x \leq 8$ or $2x \geq 12$

$x \leq 4$ or $x \geq 6$

67. Let x = the number of minutes he talks.

$3.95 + 0.64(x - 1) \leq 13.05$

$3.95 + 0.64x - 0.64 \leq 13.05$

$0.64x \leq 9.74$

$x \leq 15.21875$

He can talk for a maximum of 15 minutes.

68. 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.

69. 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.

70. Let x = the weight of the envelope.
 $0.41 + 0.28(x - 1) \leq 4.6$
 $0.41 + 0.28x - 0.28 \leq 4.6$
 $0.13 + 0.28x \leq 4.6$
 $0.28x \leq 4.47$
 $x \leq 15.96$

The envelope could weigh a maximum of 15 ounces.

71. Let n = number of bolts per box.
 $1.5 + 2.5n \leq 14$
 $2.5n \leq 12.5$
 $n \leq 5$

5 is the maximum number of bolts per box.

72. $1.04(2,312,000) \leq x \leq 1.06(2,854,000)$
 $2,404,480 \leq x \leq 3,025,240$

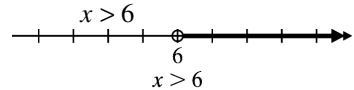
73. $4 - 7x = 3(x + 3)$
 $4 - 7x = 3x + 9$
 $-7x - 3x = 9 - 4$
 $-10x = 5$
 $\frac{-10x}{-10} = \frac{5}{-10}$
 $x = -\frac{1}{2}$ or -0.5

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

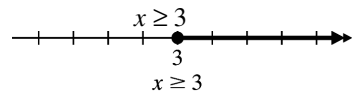
75. Let x = number of grams of 77% copper.
 Then $100 - x$ = number of grams of 92% copper.
 $0.77x + 0.92(100 - x) = 0.80(100)$
 $0.77x + 92 - 0.92x = 80$
 $-0.15x = -12$
 $x = 80$

$100 - x = 20$
 She should use 80 grams of 77% copper and 20 grams of 92% copper.

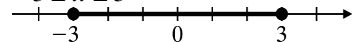
76. $7x + 12 < 9x$
 $-2x < -12$
 $x > 6$



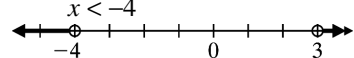
77. $\frac{2}{3}x - \frac{5}{6}x - 3 \leq \frac{1}{2}x - 5$
 $4x - 5x - 18 \leq 3x - 30$
 $-x - 18 \leq 3x - 30$
 $-4x \leq -12$



78. $-2 \leq x + 1 \leq 4$
 $-3 \leq x \leq 3$



79. $2x + 3 < -5$ or $x - 2 > 1$
 $2x < -8$ or $x > 3$
 $x < -4$



80. $|2x - 7| + 4 = 5$
 $|2x - 7| = 1$
 $2x - 7 = -1$ or $2x - 7 = 1$
 $2x = 6$ or $2x = 8$
 $x = 3$ or $x = 4$

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

$$82. \begin{array}{l} |2 - 5x - 4| > 13 \\ 2 - 5x - 4 > 13 \quad \text{or} \quad 2 - 5x - 4 < -13 \\ -5x > 15 \qquad \qquad -5x < -11 \\ x < -3 \qquad \qquad \qquad x > \frac{11}{5} \end{array}$$

How Am I Doing? Chapter 2 Test

$$1. \begin{array}{l} 5x - 8 = -6x - 10 \\ 5x + 6x - 8 = -6x + 6x - 10 \\ 11x - 8 = -10 \\ 11x - 8 + 8 = -10 + 8 \\ 11x = -2 \\ \frac{11x}{11} = \frac{-2}{11} \\ x = -\frac{2}{11} \end{array}$$

$$2. \begin{array}{l} 3(7 - 2x) = 14 - 8(x - 1) \\ 21 - 6x = 14 - 8x + 8 \\ 21 - 6x = 22 - 8x \\ 21 - 6x + 8x = 22 - 8x + 8x \\ 21 + 2x = 22 \\ 21 - 21 + 2x = 22 - 21 \\ 2x = 1 \\ x = \frac{1}{2} \text{ or } 0.5 \end{array}$$

$$3. \begin{array}{l} \frac{1}{3}(-x + 1) + 4 = 4(3x - 2) \\ 3\left[\frac{1}{3}(-x + 1) + 4\right] = 3[4(3x - 2)] \\ 1(-x + 1) + 12 = 12(3x - 2) \\ -x + 1 + 12 = 36x - 24 \\ -x + 13 = 36x - 24 \\ -x - 36x = -24 - 13 \\ -37x = -37 \\ x = 1 \end{array}$$

$$4. \begin{array}{l} 0.5x + 1.2 = 4x - 3.05 \\ 100(0.5x + 1.2) = 100(4x - 3.05) \\ 50x + 120 = 400x - 305 \\ 120 + 305 = 400x - 50x \\ 425 = 350x \Rightarrow 350x = 425 \\ x = \frac{425}{350} = \frac{17(25)}{14(25)} = \frac{17}{14} \\ x = 1\frac{3}{14} \end{array}$$

$$5. \begin{array}{l} L = a + d(n - 1) \\ L = a + dn - d \\ L - a + d = dn \\ n = \frac{L - a + d}{d} \end{array}$$

$$6. \begin{array}{l} A = \frac{1}{2}bh \\ 2A = bh \\ bh = 2A \\ b = \frac{2A}{h} \end{array}$$

$$7. \begin{array}{l} b = \frac{2A}{h} \\ b = \frac{2(15) \text{ cm}^2}{10 \text{ cm}} \\ b = 3 \text{ cm} \end{array}$$

$$8. \begin{array}{l} H = \frac{1}{2}r + 3b - \frac{1}{4} \\ 4H = 2r + 12b - 1 \\ 2r = 4H - 12b + 1 \\ r = \frac{4H - 12b + 1}{2} \end{array}$$

$$9. \begin{array}{l} |5x - 2| = 37 \\ 5x - 2 = 37 \quad \text{or} \quad 5x - 2 = -37 \\ 5x = 39 \qquad \qquad 5x = -35 \\ x = \frac{39}{5} \qquad \qquad x = -7 \end{array}$$

$$10. \begin{array}{l} \left|\frac{1}{2}x + 3\right| - 2 = 4 \\ \left|\frac{1}{2}x + 3\right| = 6 \\ \frac{1}{2}x + 3 = 6 \quad \text{or} \quad \frac{1}{2}x + 3 = -6 \\ x + 6 = 12 \qquad \qquad x + 6 = -12 \\ x = 6 \qquad \qquad \qquad x = -18 \end{array}$$

$$11. \begin{array}{l} \text{Let } x = \text{the length of first side.} \\ \text{Then } 2x = \text{the length of the second side,} \\ \text{and } x + 5 = \text{the length of the third side.} \\ x + 2x + x + 5 = 69 \\ 4x = 64 \\ x = 16 \\ 2x = 32 \\ x + 5 = 21 \\ \text{The first side is 16 meters, the second side is} \\ \text{32 meters, and the third side is 21 meters.} \end{array}$$

12. Let x = electric bill for August.
 $x - 0.05x = 2489$
 $0.95x = 2489$
 $x = 2620$

The electric bill for August was \$2620.

13. Let x = gallons of 50% antifreeze.
 Then $10 - x$ = gallons of 90% antifreeze.
 $0.50x + 0.90(10 - x) = 0.60(10)$
 $0.5x + 9 - 0.9x = 6$
 $-0.4x = -3$
 $x = 7.5$

$$10 - 7.5 = 2.5$$

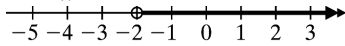
She should use 2.5 gallons of 90% and 7.5 gallons of 50%.

14. Let x = amount invested at 6%.
 Then $5000 - x$ = amount invested at 10%.
 $0.06x + 0.10(5000 - x) = 428$
 $0.06x + 500 - 0.1x = 428$
 $-0.04x = -72$
 $x = 1800$

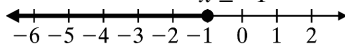
$$5000 - x = 3200$$

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

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



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

Cumulative Test for Chapters 1–2

1. $-12, -3, 0, \frac{1}{4}, 2.16, 2.333\dots, -\frac{5}{8}, 3$
2. $7 + (6 + 3) = (7 + 6) + 3$
 Associative property of addition
3. $\sqrt{100} + 4(3 - 5)^3 - (-20) = 10 + 4(-2)^3 - (-20)$
 $= 10 + 4(-8) - (-20)$
 $= 10 - 32 + 20$
 $= -22 + 20$
 $= -2$
4. $\left(-\frac{2}{3}x^4y^{-2}z^0\right)(6x^{-1}y^6z^2) = -4x^{4-1}y^{2+6}z^{0+2}$
 $= -4x^3y^4z^2$
5. $\frac{6a^{-1}b^3}{-18a^5b} = -\frac{6}{18}a^{-1-5}b^{3-1} = -\frac{1}{3}a^{-6}b^2 = -\frac{b^2}{3a^6}$
6. $2x^2 + 3xy - y^2 = 2(-2)^2 + 3(-2)(1) - 1^2$
 $= 2(4) - 6 - 1$
 $= 8 - 6 - 1$
 $= 2 - 1$
 $= 1$
7. $A = \pi r^2 = 3.14(7)^2 = 153.86$ sq in.
8. $2x - [6x - 3(x + 5y)] = 2x - [6x - 3x - 15y]$
 $= 2x - [3x - 15y]$
 $= 2x - 3x + 15y$
 $= -x + 15y$

$$\begin{aligned}
 9. \quad & \frac{1}{4}(x+5) - \frac{5}{3} = \frac{1}{3}(x-2) \\
 & 12 \left[\frac{1}{4}(x+5) - \frac{5}{3} \right] = 12 \left[\frac{1}{3}(x-2) \right] \\
 & 3(x+5) - 4(5) = 4(x-2) \\
 & 3x + 15 - 20 = 4x - 8 \\
 & 3x - 5 = 4x - 8 \\
 & 3x - 4x = -8 + 5 \\
 & -x = -3 \\
 & x = 3
 \end{aligned}$$

$$\begin{aligned}
 10. \quad & h = \frac{2}{3}(b+d) \\
 & 3h = 3 \left[\frac{2}{3}(b+d) \right] \\
 & 3h = 2(b+d) \\
 & 3h = 2b + 2d \\
 & 2b = 3h - 2d \\
 & b = \frac{3h - 2d}{2}
 \end{aligned}$$

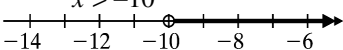
$$\begin{aligned}
 11. \quad & \text{Let } x = \text{length of first side.} \\
 & \text{Then } x + 15 = \text{length of second side and} \\
 & 2x - 7 = \text{length of third side.} \\
 & x + x + 15 + 2x - 7 = 112 \\
 & 4x + 8 = 112 \\
 & 4x = 104 \\
 & x = 26
 \end{aligned}$$

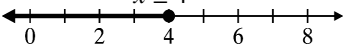
$$\begin{aligned}
 x + 15 &= 41 \\
 2x - 7 &= 45 \\
 \text{1st side} &= 26 \text{ inches} \\
 \text{2nd side} &= 41 \text{ inches} \\
 \text{3rd side} &= 45 \text{ inches}
 \end{aligned}$$

$$\begin{aligned}
 12. \quad & \text{Let } x = \text{original price.} \\
 & 0.85x = \$68 \\
 & \frac{0.85x}{0.85} = \frac{\$68}{0.85} \\
 & x = \$80, \text{ original price of saw}
 \end{aligned}$$

$$\begin{aligned}
 13. \quad & \text{Let } x = \text{the number of gallons at } 50\%. \\
 & \text{Then } 9 - x = \text{the number of gallons at } 80\%. \\
 & 0.50x + 0.80(9 - x) = 0.70(9) \\
 & 0.5x + 7.2 - 0.8x = 6.3 \\
 & -0.3x = -0.9 \\
 & x = 3 \\
 & 9 - x = 6 \\
 & \text{He should use 3 gallons of } 50\% \text{ and 6 gallons of } 80\%.
 \end{aligned}$$

$$\begin{aligned}
 14. \quad & \text{Let } x = \text{amount invested at } 12\%. \\
 & \text{Then } 6500 - x = \text{amount invested at } 10\%. \\
 & 0.12x + 0.10(6500 - x) = 690 \\
 & 0.12x + 650 - 0.1x = 690 \\
 & 0.02x = 40 \\
 & x = 2000 \\
 & 6500 - x = 4500 \\
 & \text{She invested } \$2000 \text{ at } 12\% \text{ and } \$4500 \text{ at } 10\%.
 \end{aligned}$$

$$\begin{aligned}
 15. \quad & -4 - 3x < -2x + 6 \\
 & -x < 10 \\
 & x > -10
 \end{aligned}$$


$$\begin{aligned}
 16. \quad & \frac{1}{3}(x+2) \leq \frac{1}{5}(x+6) \\
 & 15 \left[\frac{1}{3}(x+2) \right] \leq 15 \left[\frac{1}{5}(x+6) \right] \\
 & 5(x+2) \leq 3(x+6) \\
 & 5x + 10 \leq 3x + 18 \\
 & 5x - 3x \leq 18 - 10 \\
 & 2x \leq 8 \\
 & \frac{2x}{2} \leq \frac{8}{2} \\
 & x \leq 4
 \end{aligned}$$


$$\begin{aligned}
 17. \quad & -13 < 4x - 5 < 3 \\
 & -8 < 4x < 8 \\
 & -2 < x < 2
 \end{aligned}$$

$$\begin{aligned}
 18. \quad & x + 5 \leq -4 \quad \text{or} \quad 2 - 7x \leq 16 \\
 & x \leq -9 \quad \quad \quad -7x \leq 14 \\
 & \quad \quad \quad \quad \quad \quad \quad x \geq -2
 \end{aligned}$$

$$\begin{aligned}
 19. \quad & \left| \frac{1}{2}x + 2 \right| \leq 8 \\
 & -8 \leq \frac{1}{2}x + 2 \leq 8 \\
 & -16 \leq x + 4 \leq 16 \\
 & -20 \leq x \leq 12
 \end{aligned}$$

$$\begin{aligned}
 20. \quad & |3x - 4| > 11 \\
 & 3x - 4 < -11 \quad \text{or} \quad 3x - 4 > 11 \\
 & 3x < -7 \quad \quad \quad 3x > 15 \\
 & x < -\frac{7}{3} \quad \quad \quad x > 5 \\
 & x < -2\frac{1}{3}
 \end{aligned}$$