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

Yes: when you replace y by $\dfrac{3}{5}$ 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 $\dfrac{1}{4}$ to both sides of

the equation since the coefficient of x is 1.

10.
$$26 + x = -35$$
$$26 + x - 26 = -35 - 26$$
$$x = -61$$
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.
$$-15x = 75$$
$$\frac{-15x}{-15} = \frac{75}{-15}$$
$$x = -5$$
Check: $-15(-5) \stackrel{?}{=} 75$
$$75 = 75$$

16.
$$10x + 3 = 15$$
$$10x + 3 - 3 = 15 - 3$$
$$10x = 12$$
$$\frac{10x}{10} = \frac{12}{10}$$
$$x = \frac{6}{5} \text{ or } 1\frac{1}{5} \text{ or } 1.2$$
Check: $10\left(\dfrac{6}{5}\right) + 3 \stackrel{?}{=} 15$
$$15 = 15$$

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: $16(-1) + 5 \stackrel{?}{=} 10(-1) - 1$
$$-16 + 5 \stackrel{?}{=} -10 - 1$$
$$-11 = -11$$

20.
$$-11x - 8 = 2x + 5$$
$$-11x - 2x - 8 = 2x - 2x + 5$$
$$-13x - 8 = 5$$
$$-13x - 8 + 8 = 5 + 8$$
$$-13x = 13$$
$$\frac{-13x}{-13} = \frac{13}{-13}$$
$$x = -1$$
Check: $-11(-1) - 8 \stackrel{?}{=} 2(-1) + 5$
$$11 - 8 \stackrel{?}{=} -2 + 5$$
$$3 = 3$$

22.
$$6a + 5 - a = 3a - 9$$
$$5a + 5 = 3a - 9$$
$$5a - 3a + 5 = 3a - 3a - 9$$
$$2a + 5 = -9$$
$$2a + 5 - 5 = -9 - 5$$
$$2a = -14$$
$$\frac{2a}{2} = \frac{-14}{2}$$
$$a = -7$$
Check: $6(-7) + 5 - (-7) \stackrel{?}{=} 3(-7) - 9$
$$-42 + 5 + 7 \stackrel{?}{=} -21 - 9$$
$$-30 = -30$$

24.
$$3(5 - y) = 3(y + 4)$$
$$15 - 3y = 3y + 12$$
$$15 - 3y - 3y = 3y - 3y + 12$$
$$15 - 6y = 12$$
$$15 - 15 - 6y = 12 - 15$$
$$-6y = -3$$
$$\frac{-6y}{-6} = \frac{-3}{-6}$$
$$y = \frac{1}{2} \text{ or } 0.5$$

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Check: $3\left(5-\dfrac{1}{2}\right) \stackrel{?}{=} 3\left(\dfrac{1}{2}+4\right)$

$\qquad 3\left(\dfrac{9}{2}\right) \stackrel{?}{=} 3\left(\dfrac{9}{2}\right)$

$\qquad \dfrac{27}{2} = \dfrac{27}{2}$

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

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

$\qquad 4y+5 = 5y+18$

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

$\qquad -y+5 = 18$

$\qquad -y+5-5 = 18-5$

$\qquad -y = 13$

$\qquad y = -13$

Check: $4(-13)+5 \stackrel{?}{=} 6(-13+3)-(-13)$

$\qquad -52+5 \stackrel{?}{=} 6(-10)+13$

$\qquad -47 \stackrel{?}{=} -60+13$

$\qquad -47 = -47$

28. $\qquad -\dfrac{5}{6}x = 5$

$\qquad -\dfrac{5}{6}x\left(-\dfrac{6}{5}\right) = 5\left(-\dfrac{6}{5}\right)$

$\qquad x = -6$

Check: $-\dfrac{5}{6}(-6) \stackrel{?}{=} 5$

$\qquad 5 = 5$

30. $\qquad \dfrac{y}{3}+2 = \dfrac{4}{5}$

$\qquad 15\left(\dfrac{y}{3}+2\right) = 15\left(\dfrac{4}{5}\right)$

$\qquad 5y+30 = 12$

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

$\qquad 5y = -18$

$\qquad \dfrac{5y}{5} = \dfrac{-18}{5}$

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

Check: $\dfrac{-3.6}{3}+2 \stackrel{?}{=} \dfrac{4}{5}$

$\qquad -1.2+2 \stackrel{?}{=} 0.8$

$\qquad 0.8 = 0.8$

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

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

$\qquad 8x+15 = 20x$

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

$\qquad 15 = 12x$

$\qquad \dfrac{15}{12} = \dfrac{12x}{12}$

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

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

$\qquad 1+\dfrac{3}{2} \stackrel{?}{=} \dfrac{5}{2}$

$\qquad \dfrac{5}{2} = \dfrac{5}{2}$

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

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

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

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

$\qquad -2x+11 = 9$

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

$\qquad -2x = -2$

$\qquad \dfrac{-2x}{-2} = \dfrac{-2}{-2}$

$\qquad x = 1$

Check: $5-\dfrac{2}{3}(1+2) \stackrel{?}{=} 3$

$\qquad 5-\dfrac{2}{3}(3) \stackrel{?}{=} 3$

$\qquad 5-2 \stackrel{?}{=} 3$

$\qquad 3 = 3$

36.
$$6 + 2(x-1) = \frac{3x}{5} + 4$$
$$6 + 2x - 2 = \frac{3x}{5} + 4$$
$$2x + 4 = \frac{3x}{5} + 4$$
$$5(2x+4) = 5\left(\frac{3x}{5} + 4\right)$$
$$10x + 20 = 3x + 20$$
$$10x - 3x + 20 = 3x - 3x + 20$$
$$7x + 20 = 20$$
$$7x + 20 - 20 = 20 - 20$$
$$7x = 0$$
$$\frac{7x}{7} = \frac{0}{7}$$
$$x = 0$$
Check: $6 + 2(0-1) \overset{?}{=} \dfrac{3(0)}{5} + 4$
$$6 + (-2) \overset{?}{=} 0 + 4$$
$$4 = 4$$

38.
$$0.8x - 0.1 = 0.4x + 0.7$$
$$10(0.8x - 0.1) = 10(0.4x + 0.7)$$
$$8x - 1 = 4x + 7$$
$$8x - 4x - 1 = 4x - 4x + 7$$
$$4x - 1 = 7$$
$$4x - 1 + 1 = 7 + 1$$
$$4x = 8$$
$$\frac{4x}{4} = \frac{8}{4}$$
$$x = 2$$
Check: $0.8(2) - 0.1 \overset{?}{=} 0.4(2) + 0.7$
$$1.6 - 0.1 \overset{?}{=} 0.8 + 0.7$$
$$1.5 = 1.5$$

40.
$$0.1x - 0.12 = 0.04x + 0.03$$
$$100(0.1x - 0.12) = 100(0.04x + 0.03)$$
$$10x - 12 = 4x + 3$$
$$10x - 4x - 12 = 4x - 4x + 3$$
$$6x - 12 = 3$$
$$6x - 12 + 12 = 3 + 12$$
$$6x = 15$$
$$\frac{6x}{6} = \frac{15}{6}$$
$$x = 2.5 \text{ or } 2\frac{1}{2} \text{ or } \frac{5}{2}$$
Check: $0.1(2.5) - 0.12 \overset{?}{=} 0.04(2.5) + 0.03$
$$0.25 - 0.12 \overset{?}{=} 0.1 + 0.03$$
$$0.13 = 0.13$$

42.
$$0.5(3x+5) = 1$$
$$1.5x + 2.5 = 1$$
$$10(1.5x + 2.5) = 10(1)$$
$$15x + 25 = 10$$
$$15x + 25 - 25 = 10 - 25$$
$$15x = -15$$
$$\frac{15x}{15} = \frac{-15}{15}$$
$$x = -1$$
Check: $0.5[3(-1) + 5] \overset{?}{=} 1$
$$0.5[-3 + 5] \overset{?}{=} 1$$
$$0.5[2] \overset{?}{=} 1$$
$$1 = 1$$

44.
$$0.3(x+2) - 2 = 0.05x$$
$$0.3x + 0.6 - 2 = 0.05x$$
$$100(0.3x + 0.6 - 2) = 100(0.05x)$$
$$30x + 60 - 200 = 5x$$
$$30x - 140 = 5x$$
$$30x - 140 + 140 = 5x + 140$$
$$30x - 5x = 5x - 5x + 140$$
$$25x = 140$$
$$\frac{25x}{25} = \frac{140}{25}$$
$$x = 5.6 \text{ or } \frac{28}{5} \text{ or } 5\frac{3}{5}$$
Check: $0.3(5.6 + 2) - 2 \overset{?}{=} 0.05(5.6)$
$$2.28 - 2 \overset{?}{=} 0.28$$
$$0.28 = 0.28$$

46.
$$8y + 15 - 4y = 20 - 13$$
$$4y + 15 = 7$$
$$4y + 15 - 15 = 7 - 15$$
$$4y = -8$$
$$\frac{4y}{4} = \frac{-8}{4}$$
$$y = -2$$

48.
$$\frac{1}{2} - \frac{x}{8} = \frac{x-3}{4}$$
$$8\left(\frac{1}{2} - \frac{x}{8}\right) = 8\left(\frac{x-3}{4}\right)$$
$$4 - x = 2(x-3)$$
$$4 - x = 2x - 6$$
$$4 - x + x = 2x + x - 6$$
$$4 = 3x - 6$$
$$4 + 6 = 3x - 6 + 6$$
$$10 = 3x$$
$$\frac{10}{3} = x \text{ or } x = 3\frac{1}{3}$$

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

52.
$$1.7 + 3(0.2x - 0.3) = 0.2(4 - x)$$
$$1.7 + 0.6x - 0.9 = 0.8 - 0.2x$$
$$10(1.7 + 0.6x - 0.9) = 10(0.8 - 0.2x)$$
$$17 + 6x - 9 = 8 - 2x$$
$$8 + 6x = 8 - 2x$$
$$8 + 6x + 2x = 8 - 2x + 2x$$
$$8 + 8x = 8$$
$$8 - 8 + 8x = 8 - 8$$
$$8x = 0$$
$$\frac{8x}{8} = \frac{0}{8}$$
$$x = 0$$

54.
$$7x - 5 = -2x - 15 + 10x + 6$$
$$7x - 5 = 8x - 9$$
$$7x - 8x - 5 = 8x - 8x - 9$$
$$-x - 5 = -9$$
$$-x - 5 + 5 = -9 + 5$$
$$-x = -4$$
$$x = 4$$

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

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.

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

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

Cumulative Review

63.
$$5 - (4 - 2)^2 + 3(-2) = 5 - (2)^2 + (-6)$$
$$= 5 - 4 + (-6)$$
$$= 1 + (-6)$$
$$= -5$$

64.
$$(-2)^4 - 12 - 6(-2) = 16 - 12 + (-6)(-2)$$
$$= 16 - 12 + 12$$
$$= 4 + 12$$
$$= 16$$

65.
$$\left(\frac{3xy^2}{2x^2y}\right)^3 = \frac{3^3 x^3 y^{2\cdot3}}{2^3 x^{2\cdot3} y^3}$$
$$= \frac{27x^3 y^6}{8x^6 y^3}$$
$$= \frac{27y^{6-3}}{8x^{6-3}}$$
$$= \frac{27y^3}{8x^3}$$

66. $(2x^{-2}y^{-3})^2(4xy^{-2})^{-2}$

$= 2^2 x^{-2\cdot2}y^{-3\cdot2}\cdot 4^{-2}x^{-2}y^{-2(-2)}$

$= 4x^{-4}y^{-6}\cdot\dfrac{1}{16}\cdot x^{-2}y^4$

$= \dfrac{4}{16}x^{-4-2}y^{-6+4}$

$= \dfrac{1}{4}x^{-6}y^{-2}$

$= \dfrac{1}{4x^6y^2}$

Classroom Quiz 2.1

1.　$3(8-2x) = 10-4(x-3)$

$24-6x = 10-4x+12$

$24-6x = 22-4x$

$24-6x+4x = 22-4x+4x$

$24-2x = 22$

$24-24-2x = 22-24$

$-2x = -2$

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

$x = 1$

2.　$\dfrac{3}{4}(x-1)+2 = 2(x-4)$

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

$3(x-1)+4\cdot2 = 8(x-4)$

$3x-3+8 = 8x-32$

$3x+5 = 8x-32$

$3x-8x+5 = 8x-8x-32$

$-5x+5 = -32$

$-5x+5-5 = -32-5$

$-5x = -37$

$\dfrac{-5x}{-5} = \dfrac{-37}{-5}$

$x = \dfrac{37}{5}$ or $7\dfrac{2}{5}$ or 7.4

3.　$0.6x+1.2 = 4x-3.56$

$100(0.6x+1.2) = 100(4x-3.56)$

$60x+120 = 400x-356$

$60x-400x+120 = 400x-400x-356$

$-340x+120 = -356$

$-340x+120-120 = -356-120$

$-340x = -476$

$\dfrac{-340x}{-340} = \dfrac{-476}{-340}$

$x = 1.4$ or $\dfrac{7}{5}$ or $1\dfrac{2}{5}$

2.2 Exercises

2.　$9x+y = 4$

$9x = 4-y$

$x = \dfrac{4-y}{9}$

4.　$7x-9 = 6y-x$

$7x+x = 6y+9$

$8x = 6y+9$

$x = \dfrac{6y+9}{8}$

6.　$y = -\dfrac{1}{4}x+3$

$4(y) = 4\left(-\dfrac{1}{4}x+3\right)$

$4y = -x+12$

$x = 12-4y$

8.　$x = \dfrac{5}{8}y-\dfrac{1}{4}$

$8x = 8\left(\dfrac{5}{8}y-\dfrac{1}{4}\right)$

$8x = 5y-2$

$8x+2 = 5y$

$\dfrac{8x+2}{5} = y$

10.　$V = lwh$

$\dfrac{V}{lh} = \dfrac{lwh}{lh}$

$\dfrac{V}{lh} = w$ or $w = \dfrac{V}{lh}$

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

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. $C = \dfrac{5F-160}{9} = \dfrac{5(23)-160}{9} = -5°$

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

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

24.
$$y = 0.27x+72$$
$$y-72 = 0.27x$$
$$\frac{y-72}{0.27} = x \text{ or } x = \frac{100y-7200}{27}$$
$$y = 87: \ x = \frac{100(87)-7200}{27} = \frac{1500}{27} \approx 55.6$$
$$1970 + 55.6 = 2025.6$$
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. $D = \dfrac{12.48-6.1275}{0.7649} \approx 8.3$

The disposable income is $8.3 billion.

Cumulative Review

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

30. $\left(\dfrac{5x^2 y^{-3}}{x^{-4} y^2}\right)^{-3} = \dfrac{5^{-3} x^{2(-3)} y^{-3(-3)}}{x^{-4(-3)} y^{2(-3)}}$

$= \dfrac{5^{-3} x^{-6} y^9}{x^{12} y^{-6}}$

$= \dfrac{y^{9+6}}{5^3 x^{12+6}}$

$= \dfrac{y^{15}}{125 x^{18}}$

31. $1 + 16 \div (2-4)^3 - 3 = 1 + 16 \div (-2)^3 - 3$

$= 1 + 16 \div (-8) - 3$

$= 1 + (-2) - 3$

$= -1 - 3$

$= -4$

32. $2[a - (3-2b)] + 5a = 2(a-3+2b) + 5a$

$= 2a - 6 + 4b + 5a$

$= 7a + 4b - 6$

33. $5000 investment: $I = prt = 5000(0.05)(1) = 250$
$4000 investment: $I = prt = 4000(0.09)(1) = 360$
Total = $5000 + $250 + $4000 + $360 = $9610
They would have $9610 after 1 year.

34. $\dfrac{46,622.1 - 45,711.3}{9.9 + 11.7 + 10.6 + 5.8 + 8} = \dfrac{910.8}{46} = 19.8$
The car got 19.8 miles per gallon.

Classroom Quiz 2.2

1. $A = 3b + 6(x-2)$

$A = 3b + 6x - 12$

$A - 3b + 12 = 6x$

$\dfrac{A - 3b + 12}{6} = \dfrac{6x}{6}$

$x = \dfrac{A - 3b + 12}{6}$

2. $M = \dfrac{2}{3} gh$

$\dfrac{3}{2} M = gh$

$\dfrac{3M}{2g} = h$ or $h = \dfrac{3M}{2g}$

3. $B = 3a + \dfrac{3}{4} w - \dfrac{1}{8}$

$8B = 8\left(3a + \dfrac{3}{4} w - \dfrac{1}{8}\right)$

$8B = 24a + 6w - 1$

$8B - 24a + 1 = 6w$

$\dfrac{8B - 24a + 1}{6} = \dfrac{6w}{6}$

$w = \dfrac{8B - 24a + 1}{6}$

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 $x = \dfrac{10}{3}$, $x = -\dfrac{8}{3}$.

6. $|x| = 14$
$x = 14$ or $x = -14$
Check: $|14| \overset{?}{=} 14$ $\qquad$ $|-14| \overset{?}{=} 14$
$\qquad\quad 14 = 14$ $\qquad\qquad 14 = 14$

8. $|x + 6| = 13$
$x + 6 = 13$ $\quad$ or $\quad$ $x + 6 = -13$
$x = 7$ $\qquad\qquad$ $x = -19$
Check: $|7 + 6| \overset{?}{=} 13$ $\qquad$ $|-19 + 6| \overset{?}{=} 13$
$\qquad\quad |13| \overset{?}{=} 13$ $\qquad\qquad |-13| \overset{?}{=} 13$
$\qquad\quad 13 = 13$ $\qquad\qquad\quad 13 = 13$

10. $|4x - 7| = 9$
$4x - 7 = 9$ $\quad$ or $\quad$ $4x - 7 = -9$
$4x = 16$ $\qquad\qquad$ $4x = -2$
$x = 4$ $\qquad\qquad$ $x = \dfrac{-2}{4} = -\dfrac{1}{2}$
Check: $|4(4) - 7| \overset{?}{=} 9$ $\qquad$ $\left|4\left(-\dfrac{1}{2}\right) - 7\right| \overset{?}{=} 9$
$\qquad\quad |16 - 7| \overset{?}{=} 9$ $\qquad\qquad |-2 - 7| \overset{?}{=} 9$
$\qquad\quad |9| \overset{?}{=} 9$ $\qquad\qquad\qquad |-9| \overset{?}{=} 9$
$\qquad\quad 9 = 9$ $\qquad\qquad\qquad\quad 9 = 9$

12. $|3-x|=7$

$3-x=7 \quad$ or $\quad 3-x=-7$

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

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

Check: $|3-(-4)|\overset{?}{=}7 \qquad |3-10|\overset{?}{=}7$

$\qquad\qquad |3+4|\overset{?}{=}7 \qquad\quad |-7|\overset{?}{=}7$

$\qquad\qquad\quad |7|\overset{?}{=}7 \qquad\qquad\quad 7=7$

$\qquad\qquad\qquad 7=7$

14. $\left|\dfrac{1}{4}x+5\right|=3$

$\dfrac{1}{4}x+5=3 \quad$ or $\quad \dfrac{1}{4}x+5=-3$

$x+20=12 \qquad\qquad x+20=-12$

$\quad\quad x=-8 \qquad\qquad\quad\quad x=-32$

Check: $\left|\dfrac{1}{4}(-8)+5\right|\overset{?}{=}3 \qquad \left|\dfrac{1}{4}(-32)+5\right|\overset{?}{=}3$

$\qquad\qquad |-2+5|\overset{?}{=}3 \qquad\qquad |-8+5|\overset{?}{=}3$

$\qquad\qquad\quad |3|\overset{?}{=}3 \qquad\qquad\qquad |-3|\overset{?}{=}3$

$\qquad\qquad\qquad 3=3 \qquad\qquad\qquad\qquad 3=3$

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

$2.4-0.8x=2 \qquad$ or $\quad 2.4-0.8x=-2$

$24-8x=20 \qquad\qquad\quad 24-8x=-20$

$\quad -8x=-4 \qquad\qquad\qquad -8x=-44$

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

Check: $\left|2.4-0.8\left(\dfrac{1}{2}\right)\right|\overset{?}{=}2 \qquad \left|2.4-0.8\left(\dfrac{11}{2}\right)\right|\overset{?}{=}2$

$\qquad\qquad |2.4-0.4|\overset{?}{=}2 \qquad\quad |2.4-4.4|\overset{?}{=}2$

$\qquad\qquad\quad |2|\overset{?}{=}2 \qquad\qquad\qquad |-2|\overset{?}{=}2$

$\qquad\qquad\qquad 2=2 \qquad\qquad\qquad\qquad 2=2$

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

$\quad |x+3|=12$

$x+3=12 \quad$ or $\quad x+3=-12$

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

Check: $|9+3|-4\overset{?}{=}8 \qquad |-15+3|-4\overset{?}{=}8$

$\qquad\quad |12|-4\overset{?}{=}8 \qquad\quad |-12|-4\overset{?}{=}8$

$\qquad\quad 12-4\overset{?}{=}8 \qquad\qquad 12-4\overset{?}{=}8$

$\qquad\qquad 8=8 \qquad\qquad\qquad\quad 8=8$

20. $\left|\dfrac{2}{3}-\dfrac{1}{2}x\right|-2=-1$

$\quad \left|\dfrac{2}{3}-\dfrac{1}{2}x\right|=1$

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

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

$\quad -3x=2 \qquad\qquad\quad -3x=-10$

$\qquad x=-\dfrac{2}{3} \qquad\qquad\qquad x=\dfrac{10}{3}$

Check:

$\left|\dfrac{2}{3}-\dfrac{1}{2}\cdot\dfrac{-2}{3}\right|-2\overset{?}{=}-1 \qquad \left|\dfrac{2}{3}-\dfrac{1}{2}\cdot\dfrac{10}{3}\right|-2\overset{?}{=}-1$

$\left|\dfrac{2}{3}+\dfrac{1}{3}\right|-2\overset{?}{=}-1 \qquad\quad \left|\dfrac{2}{3}-\dfrac{5}{3}\right|-2\overset{?}{=}-1$

$|1|-2\overset{?}{=}-1 \qquad\qquad\quad |-1|-2\overset{?}{=}-1$

$1-2\overset{?}{=}-1 \qquad\qquad\qquad 1-2\overset{?}{=}-1$

$-1=-1 \qquad\qquad\qquad\qquad -1=-1$

22. $\left|5-\dfrac{7}{2}x\right|+1=11$

$\quad \left|5-\dfrac{7}{2}x\right|=10$

$5-\dfrac{7}{2}x=10 \quad$ or $\quad 5-\dfrac{7}{2}x=-10$

$\quad -\dfrac{7}{2}x=5 \qquad\qquad\quad -\dfrac{7}{2}x=-15$

$\qquad x=-\dfrac{10}{7} \qquad\qquad\qquad x=\dfrac{30}{7}$

Check: $\left|5-\dfrac{7}{2}\left(-\dfrac{10}{7}\right)\right|+1\overset{?}{=}11$

$\qquad\qquad |5+5|+1\overset{?}{=}11$

$\qquad\qquad\quad |10|+1\overset{?}{=}11$

$\qquad\qquad\quad 10+1\overset{?}{=}11$

$\qquad\qquad\qquad 11=11$

$\left|5-\dfrac{7}{2}\left(\dfrac{30}{7}\right)\right|+1\overset{?}{=}11$

$\qquad |5-15|+1\overset{?}{=}11$

$\qquad\quad |-10|+1\overset{?}{=}11$

$\qquad\quad 10+1\overset{?}{=}11$

$\qquad\qquad 11=11$

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

$\dfrac{2x-1}{4} = \dfrac{1}{3}$ or $\dfrac{2x-1}{4} = -\dfrac{1}{3}$

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

$6x = 7$ $6x = -1$

$x = \dfrac{7}{6}$ $x = -\dfrac{1}{6}$

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

$\left|\dfrac{1}{3}\right| \overset{?}{=} \dfrac{1}{3}$ $\left|-\dfrac{1}{3}\right| \overset{?}{=} \dfrac{1}{3}$

$\dfrac{1}{3} = \dfrac{1}{3}$ $\dfrac{1}{3} = \dfrac{1}{3}$

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

$x-7 = 3x-1$ or $x-7 = -(3x-1)$

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

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

$x = -3$ $4x = 8$

                       $x = 2$

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

$\dfrac{2x+3}{3} = x+4$ or $\dfrac{2x+3}{3} = -(x+4) = -x-4$

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

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

$-x = 9$ $5x = -15$

$x = -9$ $x = -3$

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

$2.2x+2 = 1-2.8x$ or $2.2x+2 = -1+2.8x$

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

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

$x = -\dfrac{1}{5}$ $x = 5$

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

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

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

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

$x = 0$ $x = \dfrac{10}{3}$

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

$|4x-4| = 10$

$4x-4 = 10$ or $4x-4 = -10$

$4x = 14$ $4x = -6$

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

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

$\left|4\left(\dfrac{5}{2}\right)\right|+5 \overset{?}{=} 15$

$|10|+5 \overset{?}{=} 15$

$10+5 \overset{?}{=} 15$

$15 = 15$

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

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

$|-10|+5 \overset{?}{=} 15$

$10+5 \overset{?}{=} 15$

$15 = 15$

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

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

$3x+36 = 0$

$3x = -36$

$x = -12$

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

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

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

$0 = 0$

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

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

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

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

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

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

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

Check: $\left|\dfrac{5\left(\frac{1}{10}\right)+1}{2}\right| \overset{?}{=} \dfrac{3}{4}$ $\left|\dfrac{5\left(-\frac{1}{2}\right)+1}{2}\right| \overset{?}{=} \dfrac{3}{4}$

$\left|\dfrac{\frac{1}{2}+1}{2}\right| \overset{?}{=} \dfrac{3}{4}$ $\left|\dfrac{-\frac{5}{2}+1}{2}\right| \overset{?}{=} \dfrac{3}{4}$

$\left|\dfrac{\frac{3}{2}}{2}\right| \overset{?}{=} \dfrac{3}{4}$ $\left|\dfrac{-\frac{3}{2}}{2}\right| \overset{?}{=} \dfrac{3}{4}$

$\dfrac{3}{4} = \dfrac{3}{4}$ $\dfrac{3}{4} = \dfrac{3}{4}$

Cumulative Review

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

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

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

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

$= \dfrac{6}{10}$

$= \dfrac{3}{5}$

Classroom Quiz 2.3

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

$2x + 5 = 55$ or $2x + 5 = -55$

$2x = 50$ $2x = -60$

$x = 25$ $x = -30$

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

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

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

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

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

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

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

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

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

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

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

2.4 Exercises

2. Let x = the number.

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

$5x = -600$

$x = -120$

The number is -120.

4. Let x = the monthly fee last year.

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

$196 = 3x - 20$

$216 = 3x$

$72 = x$

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

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

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

$78 + 24x - 48 = 174$

$30 + 24x = 174$

$24x = 144$

$x = 6$

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
   Apartment 2: $850 + $90 + $90 + $25 = $1055
   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
   with free rent: $13,380 − $800 = $12,580
   Divide by 12 to find monthly cost:
   $$\frac{\$12,580}{12} \approx \$1048.33$$

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

4. Divide the monthly expenses for Apartment 3 by
   2.
   $$\frac{\$1035}{2} = \$517.50$$
   Each person's share is $517.50.

How Am I Doing? Sections 2.1–2.4
(Available online through MyMathLab or from the
Instructor's Resource Center.)

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 $-\dfrac{37}{10}$ or $-3\dfrac{7}{10}$

2.　　$\dfrac{x-2}{4} = \dfrac{1}{2}x + 4$
$4\left(\dfrac{x-2}{4}\right) = 4\left(\dfrac{1}{2}x + 4\right)$
$x - 2 = 2x + 16$
$x - 2x - 2 = 2x - 2x + 16$
$-x - 2 = 16$
$-x - 2 + 2 = 16 + 2$
$-x = 18$
$x = -18$

3.　　　$4(x - 3) = x + 2(5x - 1)$
$4x - 12 = x + 10x - 2$
$4x - 12 = 11x - 2$
$4x - 11x - 12 = 11x - 11x - 2$
$-7x - 12 = -2$
$-7x - 12 + 12 = -2 + 12$
$-7x = 10$
$x = -\dfrac{10}{7} = -1\dfrac{3}{7}$

4.　　　$0.6x + 3 = 0.5x - 7$
$10(0.6x + 3) = 10(0.5x - 7)$
$6x + 30 = 5x - 70$
$6x - 5x + 30 = 5x - 5x - 70$
$x + 30 = -70$
$x + 30 - 30 = -70 - 30$
$x = -100$

5.　　　$-5x + 9y = 18$
$-5x + 5x + 9y = 5x + 18$
$9y = 5x + 18$
$$\frac{9y}{9} = \frac{5x + 18}{9}$$
$y = \dfrac{5x + 18}{9}$ 　or 　$y = \dfrac{5}{9}x + 2$

6.　$5ab - 2b = 16ab - 3(8 + b)$
$5ab - 2b = 16ab - 24 - 3b$
$-11ab = -b - 24$
$11ab = b + 24$
$a = \dfrac{b + 24}{11b}$

7.　　$A = P + Prt$
$Prt = A - P$
$\dfrac{Prt}{Pt} = \dfrac{A - P}{Pt}$
$r = \dfrac{A - P}{Pt}$

8.　$r = \dfrac{A - P}{Pt}$
$r = \dfrac{118 - 100}{(100)3} = \dfrac{18}{300} = \dfrac{3}{50}$ or 0.06

9.　$|5x + 8| = 3$
$5x + 8 = 3$ 　or 　$5x + 8 = -3$
$5x = -5$ 　　　　　$5x = -11$
$x = -1$ 　　　　　　$x = -\dfrac{11}{5}$

10.　　$|9 - x| + 2 = 5$
$|9 - x| + 2 - 2 = 5 - 2$
$|9 - x| = 3$
$9 - x = 3$ 　or 　$9 - x = -3$
$-x = -6$ 　　　　　$-x = -12$
$x = 6$ 　　　　　　$x = 12$

11.　$\left|\dfrac{2x + 3}{4}\right| = 2$
$\dfrac{2x + 3}{4} = 2$ 　　or 　$\dfrac{2x + 3}{4} = -2$
$2x + 3 = 8$ 　　　　　$2x + 3 = -8$
$2x = 5$ 　　　　　　　$x = -11$
$x = \dfrac{5}{2} = 2.5$ 　　　$x = -\dfrac{11}{2} = -5.5$

12.　$|5x - 8| = |3x + 2|$
$5x - 8 = 3x + 2$ 　or 　$5x - 8 = -3x - 2$
$2x = 10$ 　　　　　　$8x = 6$
$x = 5$ 　　　　　　　$x = \dfrac{6}{8} = 0.75$

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%.

     29

20. Let x = amount invested at 5%.
Then $8000 - x$ = amount invested at 7%.
$0.05x + 0.07(8000 - x) = 496$
$\quad 0.05x + 560 - 0.07x = 496$
$\qquad\qquad\qquad -0.02x = -64$
$\qquad\qquad\qquad\qquad x = 3200$
$8000 - x = 4800$
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.
$0.16x + 0.09(350 - x) = 0.12(350)$
$\quad 0.16x + 31.5 - 0.09x = 42$
$\qquad\qquad\qquad 0.07x = 10.5$
$\qquad\qquad\qquad\qquad x = 150$
$350 - x = 200$
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.
$7x + 9(32 - x) = 8.50(32)$
$\quad 7x + 288 - 9x = 272$
$\qquad\qquad\quad -2x = -16$
$\qquad\qquad\qquad x = 8$
$32 - x = 24$
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.
$0.90x + 0.10(10 - x) = 0.3(10)$
$\qquad 0.9x + 1 - 0.1x = 3$
$\qquad\qquad\qquad 0.8x = 2$
$\qquad\qquad\qquad\quad x = 2.5$
$10 - x = 10 - 2.5 = 7.5$
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.
$3x + 2(x - 60) = 930$
$\quad 3x + 2x - 120 = 930$
$\qquad\qquad\quad 5x = 1050$
$\qquad\qquad\qquad x = 210$
Maximum flying speed is 210 mph.

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

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

Cumulative Review

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

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

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

34. $\dfrac{\sqrt{7^2 - 24}}{2^3(-1) + 7(4)} = \dfrac{\sqrt{49 - 24}}{8(-1) + 7(4)}$
$\qquad\qquad\qquad = \dfrac{\sqrt{25}}{-8 + 28}$
$\qquad\qquad\qquad = \dfrac{5}{20}$
$\qquad\qquad\qquad = \dfrac{1}{4}$

Classroom Quiz 2.5

1. Let x = price one month ago.
$x - 0.07x = 1302$
$\quad 0.93x = 1302$
$\qquad\ x = 1400$
The price was \$1400 a month ago.

2. Let x = amount of 45% fertilizer.
Then $120 - x$ = amount of 18% fertilizer.
$0.45x + 0.18(120 - x) = 0.36(120)$
$\quad 0.45x + 21.6 - 0.18x = 43.2$
$\qquad\qquad 0.27x + 21.6 = 43.2$
$\qquad\qquad\qquad 0.27x = 21.6$
$\qquad\qquad\qquad\quad x = 80$
$120 - x = 40$
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. $\dfrac{5}{6} > \dfrac{5}{7}$ because $\dfrac{5}{6}$ is to the right of $\dfrac{5}{7}$ on a number line.

14. $-\dfrac{5}{12} = -0.41\overline{6} > -0.\overline{428571} = -\dfrac{3}{7}$

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

36. $4x + 7 + 5(x - 5) < 0$
$4x + 7 + 5x - 25 < 0$
$9x - 18 < 0$
$9x < 18$
$\dfrac{9x}{9} < \dfrac{18}{9}$
$x < 2$

38. $-3(x+1) - \dfrac{x}{2} + \dfrac{3}{2} < 0$
$-3x - 3 - \dfrac{x}{2} + \dfrac{3}{2} < 0$
$2\left(-3x - 3 - \dfrac{x}{2} + \dfrac{3}{2}\right) < 2(0)$
$-6x - 6 - x + 3 < 0$
$-7x - 3 < 0$
$-7x < 3$
$\dfrac{-7x}{-7} > \dfrac{3}{-7}$
$x > -\dfrac{3}{7}$

40. $0.3x + 1.2 \geq 3.8 - x$
$10(0.3x + 1.2) \geq 10(3.8 - x)$
$3x + 12 \geq 38 - 10x$
$3x + 10x \geq 38 - 12$
$13x \geq 26$
$\dfrac{13x}{13} \geq \dfrac{26}{13}$
$x \geq 2$

42. $1.2 - 0.8x \leq 0.3(4 - x)$
$1.2 - 0.8x \leq 1.2 - 0.3x$
$-0.8x + 0.3x \leq 1.2 - 1.2$
$-0.5x \leq 0$
$\dfrac{-0.5x}{-0.5} \geq \dfrac{0}{-0.5}$
$x \geq 0$

44. $\dfrac{3}{4} + \dfrac{1}{2}(x - 7) \leq 1 - \dfrac{x}{4}$
$4\left[\dfrac{3}{4} + \dfrac{1}{2}(x - 7)\right] \leq 4\left(1 - \dfrac{x}{4}\right)$
$3 + 2(x - 7) \leq 4 - x$
$3 + 2x - 14 \leq 4 - x$
$2x - 11 \leq 4 - x$
$2x + x \leq 4 + 11$
$3x \leq 15$
$\dfrac{3x}{3} \leq \dfrac{15}{3}$
$x \leq 5$

46. $1 - \dfrac{2x+1}{2} > \dfrac{x}{4} + \dfrac{4}{3}$
$12\left(1 - \dfrac{2x+1}{2}\right) > 12\left(\dfrac{x}{4} + \dfrac{4}{3}\right)$
$12 - 12x - 6 > 3x + 16$
$-12x + 6 > 3x + 16$
$-15x > 10$
$\dfrac{-15x}{-15} < \dfrac{10}{-15}$
$x < -\dfrac{2}{3}$

48. Let x = number of new customers.
$(7.50)(20) + 25x > 600$
$150 + 25x > 600$
$25x > 450$
$\dfrac{25x}{25} > \dfrac{450}{25}$
$x > 18$
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.
$0.50 + 0.25x \leq 8.00$
$0.25x \leq 7.50$
$\dfrac{0.25x}{0.25} \leq \dfrac{7.50}{0.25}$
$x \leq 30$
A box could not weigh more than
$30 + 1 = 31$ ounces.

Cumulative Review

53. $3xy(x + 2) - 4x^2(y - 1)$
$= 3x^2y + 6xy - 4x^2y + 4x^2$
$= 6xy - x^2y + 4x^2$

54. $\dfrac{2}{3}ab(6a - 2b + 9)$
$= \dfrac{2}{3}ab(6a) - \dfrac{2}{3}ab(2b) + \dfrac{2}{3}ab(9)$
$= 4a^2b - \dfrac{4}{3}ab^2 + 6ab$

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55. $\left(\dfrac{4x^2}{3yw^{-1}}\right)^3 = \dfrac{4^3 x^{2\cdot3}}{3^3 y^3 w^{-1(3)}} = \dfrac{64x^6}{27y^3 w^{-3}} = \dfrac{64x^6 w^3}{27y^3}$

56. $(-3a^0 b^{-3} c^5)^{-2} = (-3b^{-3}c^5)^{-2}$
$= (-3)^{-2} b^{-3(-2)} c^{5(-2)}$
$= \dfrac{1}{9} b^6 c^{-10}$
$= \dfrac{b^6}{9c^{10}}$
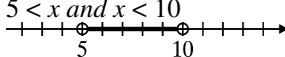
Classroom Quiz 2.6
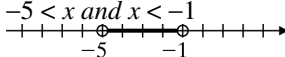
1. $9x - 2 > 4x + 8$
  $9x - 4x - 2 > 4x - 4x + 8$
     $5x - 2 > 8$
  $5x - 2 + 2 > 8 + 2$
       $5x > 10$
      $\dfrac{5x}{5} > \dfrac{10}{5}$
        $x > 2$
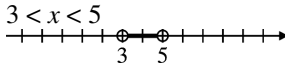
2. $-6(x+3) > -3x - 8$
    $-6x - 18 > -3x - 8$
 $-6x + 3x - 18 > -3x + 3x - 8$
    $-3x - 18 > -8$
 $-3x - 18 + 18 > -8 + 18$
      $-3x > 10$
     $\dfrac{-3x}{-3} < \dfrac{10}{-3}$
       $x < -\dfrac{10}{3}$
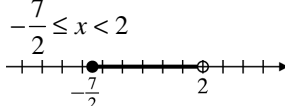
3. $\dfrac{1}{3}(x-2) \le \dfrac{1}{7}(7x-14) - 2$
 $21\left[\dfrac{1}{3}(x-2)\right] \le 21\left[\dfrac{1}{7}(7x-14) - 2\right]$
    $7(x-2) \le 3(7x-14) - 42$
    $7x - 14 \le 21x - 42 - 42$
    $7x - 14 \le 21x - 84$
   $7x - 21x \le -84 + 14$
      $-14x \le -70$
     $\dfrac{-14x}{-14} \ge \dfrac{-70}{-14}$
       $x \ge 5$
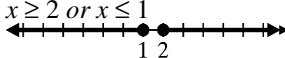
2.7 Exercises
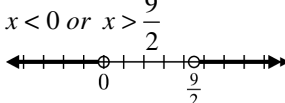
2. $5 < x$ and $x < 10$
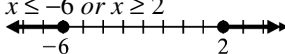
4. $-5 < x$ and $x < -1$
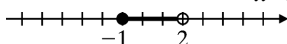
6. $3 < x < 5$
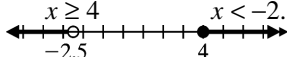
8. $-\dfrac{7}{2} \le x < 2$
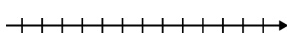
10. $x \ge 2$ or $x \le 1$

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

14. $x \le -6$ or $x \ge 2$

16. $4x - 1 < 7$ *and* $x \ge -1$
    $-1 \le x$ *and* $4x - 1 < 7$
                      $4x < 8$
                        $x < 2$

18. $x + 1 \ge 5$ *or* $x + 5 < 2.5$
    $x \ge 4$ $x < -2.5$

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

22. $s < 10$ or $s > 12$

24. $490 \le c \le 2000$

26. $16 \le C \le 24$
      $16 \le \dfrac{5}{9}(F - 32) \le 24$
 $\dfrac{9}{5}(16) \le \dfrac{9}{5} \cdot \dfrac{5}{9}(F - 32) \le \dfrac{9}{5}(24)$
    $28.8 \le F - 32 \le 43.2$
    $60.8° \le F \le 75.2°$

28. Carrie will need between 69,000 yen and
84,000 yen for 3 weeks.
$$69,000 \le Y \le 84,000$$
$$69,000 \le 119(d-5) \le 84,000$$
$$579.83 \le d-5 \le 705.88$$
$$\$584.83 \le d \le 710.88$$

30. $x-2<9 \quad and \quad x+3<6$
$\qquad x<11 \qquad\qquad x<3$
$x<3$ is the solution.

32. $5x+6 \ge -9 \quad and \quad 10-x \ge 3$
$\qquad 5x \ge -15 \qquad\qquad -x \ge -7$
$\qquad x \ge -3 \qquad\qquad\quad x \le 7$
$-3 \le x \le 7$ is the solution.

34. $5x+1<1 \quad or \quad 3x-9>9$
$\qquad 5x<0 \qquad\qquad 3x>18$
$\qquad x<0 \qquad\qquad\quad x>6$
$x<0$ or $x>6$ is the solution.

36. $-0.3x-0.4 \ge 0.1x$ *or* $0.2x+0.3 \le -0.4x$
Multiply by 10 on both sides of both inequalities
to clear decimals.
$-3x-4 \ge x \quad or \quad 2x+3 \le -4x$
$\qquad -4x \ge 4 \qquad\qquad 6x \le -3$
$\qquad\quad x \le -1 \qquad\qquad x \le -0.5$
$x \le -0.5$ contains $x \le -1$.
$x \le -0.5$ is the solution.

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

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

42. $7x+2 \ge 11x+14 \quad and \quad x+9 \ge 6$
$\qquad -4x \ge 12 \qquad\qquad\qquad x \ge -3$
$\qquad\quad x \le -3$
$x \le -3$ *and* $x \ge -3$ overlap at $x=-3$. $x=-3$ is the
solution.

44. $\dfrac{x-4}{6}-\dfrac{x-2}{9} \le \dfrac{5}{18} \quad or \quad -\dfrac{2}{5}(x+3)<-\dfrac{6}{5}$
$\quad 3x-12-2x+4 \le 5 \qquad\qquad -2x-6<-6$
$\qquad\qquad x-8 \le 5 \qquad\qquad\qquad -2x<0$
$\qquad\qquad\quad x \le 13 \qquad\qquad\qquad\quad x>0$
The solution is all real numbers.

Cumulative Review

45. $-3(x+5)+2(2x-1)=-3x-15+4x-2=x-17$

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

47. $\quad 3y-5x=8$
$\qquad -5x=8-3y$
$\;(-1)(-5x)=(-1)(8-3y)=-8+3y$
$\qquad 5x=3y-8$
$\qquad\;\; x=\dfrac{3y-8}{5}$

48. $7x+6y=-12$
$\qquad 6y=-12-7x$
$\qquad\; y=\dfrac{-12-7x}{6}$
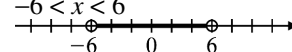
Classroom Quiz 2.7

1. $2x-5<25 \quad and \quad 2x>-6$
$\quad 2x<30 \qquad\qquad\quad x>-3$
$\quad\; x<15$
$-3<x<15$ is the solution.

2. $x>7 \quad and \quad 3x-1<29$
$\qquad\qquad\qquad\quad 3x<30$
$\qquad\qquad\qquad\quad\; x<10$
$7<x<10$ is the solution.

3. $x-2 \le -20 \quad or \quad 4x+3 \ge 19$
$\qquad x \le -18 \qquad\qquad 4x \ge 16$
$\qquad\qquad\qquad\qquad\quad x \ge 4$
$x \le -18$ *or* $x \ge 4$ 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. $|x-8| \le 12$
$-12 \le x-8 \le 12$
$-4 \le x \le 20$
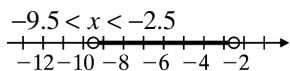
8. $|2x+3| \le 11$
$-11 \le 2x+3 \le 11$
$-14 \le 2x \le 8$
$-7 \le x \le 4$

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

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. $\left|\dfrac{1}{3}x+4\right| < 7$

$-7 < \dfrac{1}{3}x+4 < 7$
$-21 < x+12 < 21$
$-33 < x < 9$

16. $\left|\dfrac{3}{4}(x+1)\right| < 2$

$-2 < \dfrac{3}{4}(x+1) < 2$
$-\dfrac{8}{3} < x+1 < \dfrac{8}{3}$
$-\dfrac{11}{3} < x < \dfrac{5}{3}$

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

$-4 < \dfrac{5x-3}{2} < 4$
$-8 < 5x-3 < 8$
$-5 < 5x < 11$
$-1 < x < \dfrac{11}{5}$
$-1 < x < 2\dfrac{1}{5}$

20. $|x| \ge 7$
$x \ge 7 \ or \ x \le -7$

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

24. $|x-6| \ge 4$
$x-6 \le -4 \quad or \quad x-6 \ge 4$
$x \le 2 \qquad\qquad x \ge 10$
$x \le 2 \ or \ x \ge 10$

26. $|6x-5| \ge 7$
$6x-5 \le -7 \quad or \quad 6x-5 \ge 7$
$6x \le -2 \qquad\qquad 6x \ge 12$
$x \le -\dfrac{1}{3} \qquad\qquad x \ge 2$

$x \le -\dfrac{1}{3} \ or \ x \ge 2$

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

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

$\dfrac{1}{4}x - \dfrac{3}{8} < -1 \quad or \quad \dfrac{1}{4}x - \dfrac{3}{8} > 1$
$2x - 3 < -8 \qquad\qquad 2x - 3 > 8$
$2x < -5 \qquad\qquad\quad 2x > 11$
$x < -\dfrac{5}{2} \qquad\qquad\quad x > \dfrac{11}{2}$
$x < -2\dfrac{1}{2} \qquad\qquad\quad x > 5\dfrac{1}{2}$

$x < -2\dfrac{1}{2} \ or \ x > 5\dfrac{1}{2}$

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

$-4 \le \dfrac{2}{5}(x-2) \le 4$
$-20 \le 2x-4 \le 20$
$-16 \le 2x \le 24$
$-8 \le x \le 12$

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

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

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

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

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

Cumulative Review

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

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

43. $\text{distance} = 2\left[\dfrac{1}{8} \cdot \text{circumference}\right]$
$= 2\left[\dfrac{1}{8}(2\pi \cdot \text{radius})\right]$
$\approx 2\left[\dfrac{1}{3}(2 \cdot 3.14 \cdot 19)\right]$
≈ 29.83
The end of the rope travels 29.83 meters.

44. $\text{distance} = 2 \cdot \dfrac{1}{6}(2\pi \cdot 30)$
$\approx 2 \cdot \dfrac{1}{6}(2 \cdot 3.14 \cdot 30)$
≈ 62.8
The end of the wire travels 62.8 feet.

Classroom Quiz 2.8

1. $\left|\dfrac{1}{3}x - \dfrac{1}{6}\right| < 2$

$-2 < \dfrac{1}{3}x - \dfrac{1}{6} < 2$
$6(-2) < 6\left(\dfrac{1}{3}x - \dfrac{1}{6}\right) < 6(2)$
$-12 < 2x - 1 < 12$
$-11 < 2x < 13$
$-\dfrac{11}{2} < x < \dfrac{13}{2}$
$-5\dfrac{1}{2} < x < 6\dfrac{1}{2}$

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

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

$x < -4\dfrac{1}{2} \ or \ x > 6$

Career Exploration Problems

1. Let x = liters of 60% solution used.
Then $14 - x$ = liters of 25% solution.
$0.60x + 0.25(14 - x) = 0.40(14)$
$0.6x + 3.5 - 0.25x = 5.6$
$0.35x = 2.1$
$x = 6$
$14 - x = 14 - 6 = 8$
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.
$$|x - 40| \le 1.3$$
$$-1.3 \le x - 40 < 1.3$$
$$38.7 \le x \le 41.3$$
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.
$$|x - 15| \le 0.7$$
$$-0.7 \le x - 15 \le 0.7$$
$$14.3 \le x \le 15.7$$
The minimum alcohol content is 14.3% and the maximum alcohol content is 15.7%.

You Try It

1.
$$\frac{1}{4}(x+5) = 6 - \frac{1}{3}(2x - 5)$$
$$\frac{1}{4}x + \frac{5}{4} = 6 - \frac{2}{3}x + \frac{5}{3}$$
$$12\left(\frac{1}{4}x\right) + 12\left(\frac{5}{4}\right) = 12(6) - 12\left(\frac{2}{3}x\right) + 12\left(\frac{5}{3}\right)$$
$$3x + 15 = 72 - 8x + 20$$
$$3x + 15 = 92 - 8x$$
$$11x = 77$$
$$x = 7$$

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

3. $|3x + 5| = 11$
$$3x + 5 = 11 \quad \text{or} \quad 3x + 5 = -11$$
$$3x = 6 \qquad\qquad 3x = -16$$
$$x = 2 \qquad\qquad x = -\frac{16}{3}$$

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. $8 - 2(3x + 1) \le 18$
$$8 - 6x - 2 \le 18$$
$$-6x + 6 \le 18$$
$$-6x \le 12$$
$$\frac{-6x}{-6} \ge \frac{12}{-6}$$
$$x \ge -2$$

$x \ge -2$
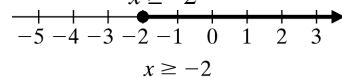
b. $\dfrac{1}{2}(x - 6) < \dfrac{2}{5}(x - 2)$
$$\frac{1}{2}x - 3 < \frac{2}{5}x - \frac{4}{5}$$
$$5x - 30 < 4x - 8$$
$$x - 30 < -8$$
$$x < 22$$

$x < 22$
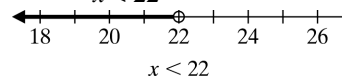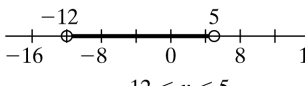
6. $x + 7 > -1 \quad and \quad 3x + 4 < 10$
$$x > -8 \qquad\qquad 3x < 6$$
$$\qquad\qquad\qquad x < 2$$

$x > -8 \ and \ x < 2$
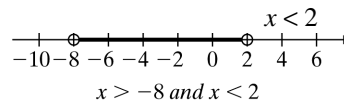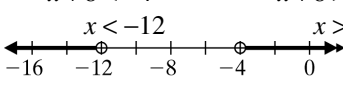
7. $5x + 2 \le -8 \quad or \quad 4x - 3 \ge 9$
$$5x \le -10 \qquad\qquad 4x \ge 12$$
$$x \le -2 \qquad\qquad x \ge 3$$

$x \le -2 \ or \ x \ge 3$
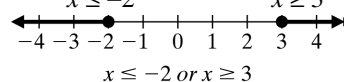
8. $|2x + 7| < 17$

$-17 < 2x + 7 < 17$

$-17 - 7 < 2x + 7 - 7 < 17 - 7$

$-24 < 2x < 10$

$\dfrac{-24}{2} < \dfrac{2x}{2} < \dfrac{10}{2}$

$-12 < x < 5$

$-12 < x < 5$

9. $\left|\dfrac{1}{4}(x+8)\right| > 1$

$\dfrac{1}{4}(x+8) < -1 \quad or \quad \dfrac{1}{4}(x+8) > 1$

$\dfrac{1}{4}x + 2 < -1 \qquad\qquad \dfrac{1}{4}x + 2 > 1$

$x + 8 < -4 \qquad\qquad x + 8 > 4$

$x < -12 \qquad\qquad x > -4$

$x < -12 \ or \ x > -4$

Chapter 2 Review Problems

1. $7x - 3 = -5x - 18$

$7x + 5x - 3 = -5x + 5x - 18$

$12x - 3 = -18$

$12x - 3 + 3 = -18 + 3$

$12x = -15$

$\dfrac{12x}{12} = \dfrac{-15}{12}$

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

2. $8 - 2(x+3) = 24 - (x-6)$

$8 - 2x - 6 = 24 - x + 6$

$2 - 2x = 30 - x$

$-2x + x = 30 - 2$

$-x = 28$

$x = -28$

3. $5(x-2) + 4 = x + 9 - 2x$

$5x - 10 + 4 = -x + 9$

$5x - 6 = -x + 9$

$5x + x - 6 = -x + x + 9$

$6x - 6 = 9$

$6x - 6 + 6 = 9 + 6$

$6x = 15$

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

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

4. $x - \dfrac{4}{3} = \dfrac{11}{12} + \dfrac{3}{4}x$

$12\left(x - \dfrac{4}{3}\right) = 12\left(\dfrac{11}{12} + \dfrac{3}{4}x\right)$

$12x - 16 = 11 + 9x$

$12x - 9x = 11 + 16$

$3x = 27$

$x = 9$

5. $\dfrac{1}{9}x - 1 = \dfrac{1}{2}\left(x + \dfrac{1}{3}\right)$

$18\left(\dfrac{1}{9}x - 1\right) = 18\left[\dfrac{1}{2}\left(x + \dfrac{1}{3}\right)\right]$

$2x - 18 = 9x + 3$

$2x - 9x = 3 + 18$

$-7x = 21$

$x = -3$

6. $5x = 3(1.6x - 4.2)$

$5x = 4.8x - 12.6$

$0.2x = -12.6$

$x = -63$

7. $P = \dfrac{1}{2}ab$

$2P = ab$

$\dfrac{2P}{b} = \dfrac{ab}{b}$

$\dfrac{2P}{b} = a \text{ or } a = \dfrac{2P}{b}$

8. $2(3ax - 2y) - 6ax = -3(ax + 2y)$

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

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

$2y = -3ax$

$3ax = -2y$

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

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

b. $F = \dfrac{9(10) + 160}{5} = \dfrac{250}{5} = 50$
$F = 50°$ when $C = 10°$.

10. a.
$$P = 2W + 2L$$
$$P - 2L = 2W$$
$$2W = P - 2L$$
$$W = \frac{P - 2L}{2}$$

b. $W = \dfrac{100 - 2(20.5)}{2}$
$$= \frac{100 - 41}{2}$$
$$= \frac{59}{2}$$
$$= 29.5$$
$W = 29.5$ 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 $5x + 2 = -7$
$5x = 5$ $5x = -9$
$x = 1$ $x = -\dfrac{9}{5}$

13. $|3 - x| = |5 - 2x|$
$3 - x = 5 - 2x$ or $3 - x = -(5 - 2x)$
$x = 2$ $3 - x = -5 + 2x$
                      $-3x = -8$
                      $x = \dfrac{8}{3}$

14. $|x + 8| = |2x - 4|$
$x + 8 = 2x - 4$ or $x + 8 = -2x + 4$
$-x = -12$ $3x = -4$
$x = 12$ $x = -\dfrac{4}{3}$

15. $\left| \dfrac{1}{4}x - 3 \right| = 8$

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

16. $|2x - 8| + 7 = 12$
$|2x - 8| = 5$
$2x - 8 = 5$ or $2x - 8 = -5$
$2x = 13$ $2x = 3$
$x = \dfrac{13}{2}$ $x = \dfrac{3}{2}$

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.
$$3(38) + 0.15x = 150$$
$$114 + 0.15x = 150$$
$$0.15x = 36$$
$$x = 240$$
She drove 240 miles.

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.
$$x + x + 13 + 3(x + 13) = 102$$
$$2x + 13 + 3x + 39 = 102$$
$$5x + 52 = 102$$
$$5x = 50$$
$$x = 10$$
$x + 13 = 23$
$3(x + 13) = 69$
$10 is withheld for retirement, $23 for state tax, and $69 for federal tax.

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.
$$4.25x + 4.50(30 - x) = 4.40(30)$$
$$4.25x + 135 - 4.5x = 132$$
$$-0.25x = -3$$
$$x = 12$$
$30 - x = 18$
12 pounds of $4.25 and 18 pounds of $4.50 should be used.

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.
$$3(3x - 2) \le 4x - 16$$
$$9x - 6 \le 4x - 16$$
$$9x - 4x \le -16 + 6$$
$$5x \le -10$$
$$\frac{5x}{5} \le \frac{-10}{5}$$
$$x \le -2$$

30.
$$\frac{5}{3} - x \ge -\frac{1}{6}x + \frac{5}{6}$$
$$6\left(\frac{5}{3} - x\right) \ge 6\left(-\frac{1}{6}x + \frac{5}{6}\right)$$
$$10 - 6x \ge -x + 5$$
$$-6x + x \ge 5 - 10$$
$$-5x \ge -5$$
$$\frac{-5x}{-5} \le \frac{-5}{-5}$$
$$x \le 1$$

31.
$$\frac{1}{3}(x - 2) < \frac{1}{4}(x + 5) - \frac{5}{3}$$
$$12\left[\frac{1}{3}(x - 2)\right] < 12\left[\frac{1}{4}(x + 5) - \frac{5}{3}\right]$$
$$4(x - 2) < 3(x + 5) - 20$$
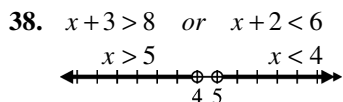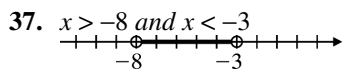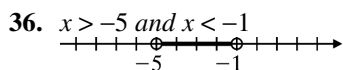$$4x - 8 < 3x + 15 - 20$$
$$4x - 8 < 3x - 5$$
$$4x - 3x < -5 + 8$$
$$x < 3$$

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

33. $-3 \le x < 2$

34. $-8 \le x \le -4$

35. $x < -2$ or $x \ge 5$

36. $x > -5$ and $x < -1$

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

38. $x + 3 > 8$ *or* $x + 2 < 6$
$$x > 5 \qquad\qquad x < 4$$
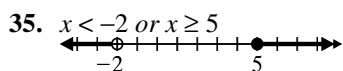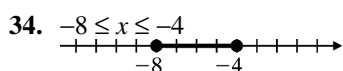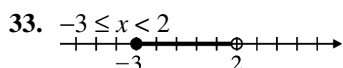
39. $x - 2 > 7$ *or* $x + 3 < 2$
$$x > 9 \qquad\qquad x < -1$$

40. $x + 3 > 8$ *and* $x - 4 < -2$
$$x > 5 \qquad\qquad x < 2$$
Since x cannot be both > 5 and < 2, there is no solution.

41. $-1 < x + 5 < 8$
$$-6 < x < 3$$

42. $0 \le 5 - 3x \le 17$
$$-5 \le -3x \le 12$$
$$\frac{5}{3} \ge x \ge -4$$
$$-4 \le x \le \frac{5}{3}$$
$$-4 \le x \le 1\frac{2}{3}$$

43. $2x - 7 < 3$ *and* $5x - 1 \ge 8$
$$2x < 10 \qquad\qquad 5x \ge 9$$
$$x < 5 \qquad\qquad\qquad x \ge \frac{9}{5}$$
$$\frac{9}{5} \le x < 5$$
$$1\frac{4}{5} \le x < 5$$

44. $4x - 2 < 8$ *or* $3x + 1 > 4$
$$4x < 10 \qquad\qquad 3x > 3$$
$$x < \frac{5}{2} \qquad\qquad\qquad x > 1$$
The solution is all real numbers.

45. $|x + 7| < 15$
$$-15 < x + 7 < 15$$
$$-22 < x < 8$$

46. $|x + 9| < 18$
$$-18 < x + 9 < 18$$
$$-27 < x < 9$$

47. $\left|\frac{1}{2}x + 2\right| < \frac{7}{4}$
$$-\frac{7}{4} < \frac{1}{2}x + 2 < \frac{7}{4}$$
$$-7 < 2x + 8 < 7$$
$$-15 < 2x < -1$$
$$-\frac{15}{2} < x < -\frac{1}{2}$$
$$-7\frac{1}{2} < x < -\frac{1}{2}$$

48. $|2x - 1| \ge 9$
$$2x - 1 \le -9 \quad or \quad 2x - 1 \ge 9$$
$$2x \le -8 \qquad\qquad 2x \ge 10$$
$$x \le -4 \qquad\qquad x \ge 5$$

49. $|3x - 1| \ge 2$
$$3x - 1 \le -2 \quad or \quad 3x - 1 \ge 2$$
$$3x \le -1 \qquad\qquad 3x \ge 3$$
$$x \le -\frac{1}{3} \qquad\qquad x \ge 1$$

50. $|2(x - 5)| \ge 2$
$$2(x - 5) \le -2 \quad or \quad 2(x - 5) \ge 2$$
$$2x - 10 \le -2 \qquad\qquad 2x - 10 \ge 2$$
$$2x \le 8 \qquad\qquad\qquad 2x \ge 12$$
$$x \le 4 \qquad\qquad\qquad x \ge 6$$

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

$3.95 + 0.65(x-1) \le 13.05$

$3.95 + 0.65x - 0.65 \le 13.05$

$0.65x \le 9.75$

$x \le 15$

He can talk for a maximum of 15 minutes.

52. Let x = the number of packages.

$170 + 200 + 77.5x \le 1765$

$77.5x \le 1395$

$x \le 18$

A maximum of eighteen packages can be carried.

53. Let x = number of cubic yards.

$40 + 28x \le 250$

$28x \le 210$

$x \le 7.5$

He can order a maximum of 7 cubic yards.

54. $1.04(2,312,000) \le x \le 1.06(2,854,000)$

$2,404,480 \le x \le 3,025,240$

55. $4 - 7x = 3(x+3)$

$4 - 7x = 3x + 9$

$-7x - 3x = 9 - 4$

$-10x = 5$

$\dfrac{-10x}{-10} = \dfrac{5}{-10}$

$x = -\dfrac{1}{2} \text{ or } -0.5$

56. $H = \dfrac{3}{4}B - 16$

$\dfrac{3}{4}B = H + 16$

$B = \dfrac{4}{3}(H+16)$

$B = \dfrac{4H + 64}{3}$

57. Let x = number of grams of 77% copper.

Then $100 - x$ = number of grams of 92% copper.

$0.77x + 0.92(100 - x) = 0.80(100)$
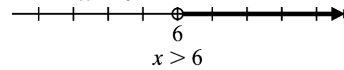
$0.77x + 92 - 0.92x = 80$

$-0.15x = -12$

$x = 80$

$100 - x = 20$

She should use 80 grams of 77% copper and 20 grams of 92% copper.
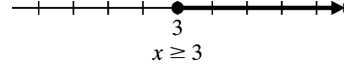
58. $7x + 12 < 9x$

$-2x < -12$

$x > 6$

$x > 6$

59. $\dfrac{2}{3}x - \dfrac{5}{6}x - 3 \le \dfrac{1}{2}x - 5$

$4x - 5x - 18 \le 3x - 30$

$-x - 18 \le 3x - 30$

$-4x \le -12$
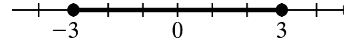
$x \ge 3$

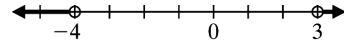

$x \ge 3$

60. $-2 \le x + 1 \le 4$

$-3 \le x \le 3$

61. $2x + 3 < -5 \quad or \quad x - 2 > 1$

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

$x < -4$

62. $|2x - 7| + 4 = 5$

$|2x - 7| = 1$

$2x - 7 = -1 \quad or \quad 2x - 7 = 1$

$2x = 6 \qquad\qquad 2x = 8$

$x = 3 \qquad\qquad x = 4$

63. $\left| \dfrac{2}{3}x - \dfrac{1}{2} \right| \le 3$

$-3 \le \dfrac{2}{3}x - \dfrac{1}{2} \le 3$

$-18 \le 4x - 3 \le 18$

$-15 \le 4x \le 21$

$-\dfrac{15}{4} \le x \le \dfrac{21}{4}$

64. $|2 - 5x - 4| > 13$

$2 - 5x - 4 > 13 \quad or \quad 2 - 5x - 4 < -13$

$-5x > 15 \qquad\qquad -5x < -11$

$x < -3 \qquad\qquad x > \dfrac{11}{5}$

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

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.
$$L = a + d(n - 1)$$
$$L = a + dn - d$$
$$L - a + d = dn$$
$$n = \frac{L - a + d}{d}$$

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

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

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

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.
$$x + 2x + x + 5 = 69$$
$$4x = 64$$
$$x = 16$$
$2x = 32$
$x + 5 = 21$
The first side is 16 meters, the second side is
32 meters, and the third side is 21 meters.
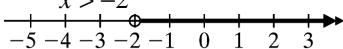
12. Let x = electric bill for August.
$$x - 0.05x = 2489$$
$$0.95x = 2489$$
$$x = 2620$$
The electric bill for August was $2620.
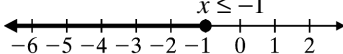
13. Let x = gallons of 50% antifreeze.
Then $10 - x$ = gallons of 90% antifreeze.
$$0.50x + 0.90(10 - x) = 0.60(10)$$
$$0.5x + 9 - 0.9x = 6$$
$$-0.4x = -3$$
$$x = 7.5$$
$10 - 7.5 = 2.5$
She should use 2.5 gallons of 90% and 7.5 gallons of 50%.

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

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

18. $x - 4 \le -6 \quad or \quad 2x + 1 \ge 3$
$$x \le -2 \qquad\qquad 2x \ge 2$$
$$x \ge 1$$

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

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