Chapter 2

2.1 Exercises

2. If the same number is added to both sides of an equation, the results on each side are equal in value.

4. The additive inverse of -20 is 20.

6. The additive inverse of a is $-a$.

8.
$$x+15=21$$
$$x+15+(-15)=21+(-15)$$
$$x=6$$
Check: $6+15 \stackrel{?}{=} 21$
$$21=21 \checkmark$$

10.
$$23=8+x$$
$$23+(-8)=8+x+(-8)$$
$$15=x$$
Check: $23 \stackrel{?}{=} 8+15$
$$23=23 \checkmark$$

12.
$$x-13=4$$
$$x-13+13=4+13$$
$$x=17$$
Check: $17-13 \stackrel{?}{=} 4$
$$4=4 \checkmark$$

14.
$$0=x+9$$
$$0+(-9)=x+9+(-9)$$
$$-9=x$$
Check: $0 \stackrel{?}{=} -9+9$
$$0=0 \checkmark$$

16.
$$x-11=-13$$
$$x-11+11=-13+11$$
$$x=-2$$
Check: $-2-11 \stackrel{?}{=} -13$
$$-13=-13 \checkmark$$

18.
$$-16+x=47$$
$$-16+16+x=47+16$$
$$x=63$$
Check: $-16+63 \stackrel{?}{=} 47$
$$47=47 \checkmark$$

20.
$$8-2=x+5$$
$$6=x+5$$
$$6+(-5)=x+5+(-5)$$
$$1=x$$
Check: $8-2 \stackrel{?}{=} 1+5$
$$6=6 \checkmark$$

22.
$$32-11=x-4$$
$$21=x-4$$
$$21+4=x-4+4$$
$$25=x$$
Check: $32-11 \stackrel{?}{=} 25-4$
$$21=21 \checkmark$$

24.
$$19-3+x=10+6$$
$$16+x=16$$
$$16+x+(-16)=16+(-16)$$
$$x=0$$
Check: $19-3+0 \stackrel{?}{=} 10+6$
$$16=16 \checkmark$$

26.
$$3-17+8=8+x-3$$
$$-6=5+x$$
$$-6+(-5)=5+(-5)+x$$
$$-11=x$$
Check: $3-17+8 \stackrel{?}{=} 8+(-11)-3$
$$-6=-6 \checkmark$$

28.
$$-19+x-7=20-42+10$$
$$-26+x=-12$$
$$-26+26+x=-12+26$$
$$x=14$$
Check: $-19+14-7 \stackrel{?}{=} 20-42+10$
$$-12=-12 \checkmark$$

30. $-13+x=4,\ x \stackrel{?}{=} 7$
$$-13+7 \stackrel{?}{=} 4$$
$$-6 \neq 4$$
$x=7$ is not the solution.
$$-13+x=4$$
$$-13+13+x=4+13$$
$$x=17$$

32. $-13-4=x-8,\ x \stackrel{?}{=} -9$
$$-13-4 \stackrel{?}{=} -9-8$$
$$-17=-17$$
$x=-9$ is the solution.

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34. $-39 = x - 47,\ x \stackrel{?}{=} -8$

$-39 \stackrel{?}{=} -8 - 47$

$-39 \neq -55$

$x = -8$ is not the solution.

$$-39 = x - 47$$
$$-39 + 47 = x - 47 + 47$$
$$8 = x$$

36. $x + 8 = 12 - 19 + 3,\ x \stackrel{?}{=} -12$

$-12 + 8 \stackrel{?}{=} 12 - 19 + 3$

$-4 = -4$

$x = -12$ is the solution.

38.
$$8.2 + x = 3.2$$
$$8.2 + x + (-8.2) = 3.2 + (-8.2)$$
$$x = -5$$

40.
$$4.3 + x - 2.6 = 3.4$$
$$1.7 + x = 3.4$$
$$1.7 + (-1.7) + x = 3.4 + (-1.7)$$
$$x = 1.7$$

42.
$$x + \frac{1}{3} = \frac{2}{3}$$
$$x + \frac{1}{3} + \left(-\frac{1}{3}\right) = \frac{2}{3} + \left(-\frac{1}{3}\right)$$
$$x = \frac{1}{3}$$

44.
$$\frac{2}{5} + x = \frac{1}{2} - \frac{3}{10}$$
$$\frac{4}{10} + x = \frac{5}{10} - \frac{3}{10}$$
$$\frac{4}{10} + x = \frac{2}{10}$$
$$\frac{4}{10} + \left(-\frac{4}{10}\right) + x = \frac{2}{10} + \left(-\frac{4}{10}\right)$$
$$x = -\frac{2}{10}$$
$$x = -\frac{1}{5}$$

46.
$$12 + x = -7 + 20$$
$$12 + x = 13$$
$$12 + (-12) + x = 13 + (-12)$$
$$x = 1$$

48.
$$3\frac{3}{4} + x = 9$$
$$3\frac{3}{4} + \left(-3\frac{3}{4}\right) + x = 9 + \left(-3\frac{3}{4}\right)$$
$$x = \frac{36}{4} + \left(-\frac{15}{4}\right)$$
$$x = \frac{21}{4} \text{ or } 5\frac{1}{4}$$

50.
$$\frac{3}{16} - \frac{1}{4} = x - \frac{3}{8}$$
$$\frac{3}{16} - \frac{4}{16} = x - \frac{3}{8}$$
$$-\frac{1}{16} = x - \frac{3}{8}$$
$$-\frac{1}{16} + \frac{3}{8} = x - \frac{3}{8} + \frac{3}{8}$$
$$-\frac{1}{16} + \frac{6}{16} = x$$
$$\frac{5}{16} = x$$

52.
$$1.8 + x - 4.6 = -3 + 4.2$$
$$x - 2.8 = 1.2$$
$$x - 2.8 + 2.8 = 1.2 + 2.8$$
$$x = 4$$

54.
$$x - 10.012 = -16.835$$
$$x - 10.012 + 10.012 = -16.835 + 10.012$$
$$x = -6.823$$

Cumulative Review

55.
$$x + 3y - 5x - 7y + 2x = (1 - 5 + 2)x + (3 - 7)y$$
$$= -2x - 4y$$

56.
$$y^2 + y - 12 - 3y^2 - 5y + 16$$
$$= (1 - 3)y^2 + (1 - 5)y - 12 + 16$$
$$= -2y^2 - 4y + 4$$

Classroom Quiz 2.1

1.
$$x - 8.3 = 12.8$$
$$x - 8.3 + 8.3 = 12.8 + 8.3$$
$$x = 21.1$$

2.
$$-7.8 + x = -14.2$$
$$-7.8 + x + 7.8 = -14.2 + 7.8$$
$$x = -6.4$$

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3. $5-16+3=-9+x+3$
$-8=x-6$
$-8+6=x-6+6$
$-2=x$

2.2 Exercises

2. To solve the equation $-7x=56$, divide each side of the equation by -7.

4. To solve the equation $\frac{1}{9}x=5$, multiply each side of the equation by 9.

6. $\frac{1}{5}x=12$
$5\left(\frac{1}{5}x\right)=5(12)$
$x=60$
Check: $\frac{1}{5}(60) \stackrel{?}{=} 12$
$12=12$ ✓

8. $\frac{1}{9}x=-8$
$9\left(\frac{1}{9}x\right)=9(-8)$
$x=-72$
Check: $\frac{1}{9}(-72) \stackrel{?}{=} -8$
$-8=-8$ ✓

10. $\frac{x}{12}=-7$
$12\left(\frac{x}{12}\right)=12(-7)$
$x=-84$
Check: $\frac{-84}{12} \stackrel{?}{=} -7$
$-7=-7$ ✓

12. $\frac{x}{6}=-2$
$6\left(\frac{x}{6}\right)=6(-2)$
$x=-12$
Check: $\frac{-12}{6} \stackrel{?}{=} -2$
$-2=-2$ ✓

14. $15x=60$
$\frac{15x}{15}=\frac{60}{15}$
$x=4$
Check: $15(4) \stackrel{?}{=} 60$
$60=60$ ✓

16. $46=2x$
$\frac{46}{2}=\frac{2x}{2}$
$23=x$
Check: $46 \stackrel{?}{=} 2(23)$
$46=46$ ✓

18. $-35=21x$
$\frac{-35}{21}=\frac{21x}{21}$
$-\frac{5}{3}=x$
Check: $-35 \stackrel{?}{=} 21\left(-\frac{5}{3}\right)$
$-35=-35$ ✓

20. $2x=0.36$
$\frac{2x}{2}=\frac{0.36}{2}$
$x=0.18$
Check: $2(0.18) \stackrel{?}{=} 0.36$
$0.36=0.36$ ✓

22. $32=-x$
$\frac{32}{-1}=\frac{-x}{-1}$
$-32=x$
Check: $32 \stackrel{?}{=} (-1)(-32)$
$32=32$ ✓

24. $-108=-18x$
$\frac{-108}{-18}=\frac{-18x}{-18}$
$6=x$
Check: $-108 \stackrel{?}{=} -18(6)$
$-108=-108$ ✓

26. $2.5x=0.5$
$\frac{2.5x}{2.5}=\frac{0.5}{2.5}$
$x=0.2$
Check: $2.5(0.2) \stackrel{?}{=} 0.5$
$0.5=0.5$ ✓

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28. $-4.7x = -14.1$

$$\frac{-4.7x}{-4.7} = \frac{-14.1}{-4.7}$$

$$x = 3$$

Check: $(-4.7)(3) \stackrel{?}{=} -14.1$

$-14.1 = -14.1$ ✓

30. $5x = -40,\ x \stackrel{?}{=} 8$

$5(8) \stackrel{?}{=} -40$

$40 \neq -40$

$x = 8$ is not the solution.

$5x = -40$

$$\frac{5x}{5} = \frac{-40}{5}$$

$x = -8$

32. $-11x = 88,\ x \stackrel{?}{=} -8$

$-11(-8) \stackrel{?}{=} 88$

$88 = 88$ ✓

$x = -8$ is the solution.

34. $-6y = 2.16$

$$\frac{-6y}{-6} = \frac{2.16}{-6}$$

$y = -0.36$

36. $26 = -39t$

$$\frac{26}{-39} = \frac{-39t}{-39}$$

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

38. $-2.8y = -3.08$

$$\frac{-2.8y}{-2.8} = \frac{-3.08}{-2.8}$$

$y = 1.1$

40. $5x + 4x = 36$

$9x = 36$

$$\frac{9x}{9} = \frac{36}{9}$$

$x = 4$

42. $3x - 9x = 18$

$-6x = 18$

$$\frac{-6x}{-6} = \frac{18}{-6}$$

$x = -3$

44. $$\frac{1}{5}x = -4$$

$$5\left(\frac{1}{5}x\right) = 5(-4)$$

$x = -20$

46. $24 - 27 = -9x$

$-3 = -9x$

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

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

48. $8x = 26 - 50$

$8x = -24$

$$\frac{8x}{8} = \frac{-24}{8}$$

$x = -3$

50. $$\frac{5}{6}x = 40$$

$$\frac{6}{5}\left(\frac{5}{6}x\right) = \frac{6}{5}(40)$$

$x = 48$

52. $-5.42102x = -45.536568$

$$\frac{-5.42102x}{-5.42102} = \frac{-45.536568}{-5.42102}$$

$x = 8.4$

Cumulative Review

53. $-3y(2x + y) + 5(3xy - y^2)$

$= -6xy - 3y^2 + 15xy - 5y^2$

$= (-6 + 15)xy + (-3 - 5)y^2$

$= 9xy - 8y^2$

54. $-\{2(x - 3) + 3[x - (2x - 5)]\}$

$= -\{2(x - 3) + 3[x - 2x + 5]\}$

$= -\{2(x - 3) + 3[-x + 5]\}$

$= -\{2x - 6 - 3x + 15\}$

$= -\{-x + 9\}$

$= x - 9$

55. Find 25% of 30.

25% of $30 = 0.25 \times 30 = 7.5$

The whale will lose 7.5 tons.

$30 - 7.5 = 22.5$

The whale will weigh 22.5 tons.

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56. Find 35% of 20.
35% of $20 = 0.35 \times 20 = 7$
The number of earthquakes is expected to increase by 7.
$20 + 7 = 27$
A total of 27 earthquakes can be expected.

Classroom Quiz 2.2

1. $2.2x = -88$
$\frac{2.2x}{2.2} = \frac{-88}{2.2}$
$x = -40$

2. $-5.2x = -62.4$
$\frac{-5.2x}{-5.2} = \frac{-62.4}{-5.2}$
$x = 12$

3. $15x - 18x = 21$
$-3x = 21$
$\frac{-3x}{-3} = \frac{21}{-3}$
$x = -7$

2.3 Exercises

2. $4x + 7 = 35$
$4x + 7 + (-7) = 35 + (-7)$
$4x = 28$
$\frac{4x}{4} = \frac{28}{4}$
$x = 7$
Check: $4(7) + 7 \stackrel{?}{=} 35$
$28 + 7 \stackrel{?}{=} 35$
$35 = 35$ ✓

4. $5x - 9 = 36$
$5x - 9 + 9 = 36 + 9$
$5x = 45$
$\frac{5x}{5} = \frac{45}{5}$
$x = 9$
Check: $5(9) - 9 \stackrel{?}{=} 36$
$45 - 9 \stackrel{?}{=} 36$
$36 = 36$ ✓

6. $8x - 15 = -47$
$8x - 15 + 15 = -47 + 15$
$8x = -32$
$\frac{8x}{8} = \frac{-32}{8}$
$x = -4$
Check: $8(-4) - 15 \stackrel{?}{=} -47$
$-32 - 15 \stackrel{?}{=} -47$
$-47 = -47$ ✓

8. $-6x + 25 = -83$
$-6x + 25 + (-25) = -83 + (-25)$
$-6x = -108$
$\frac{-6x}{-6} = \frac{-108}{-6}$
$x = 18$
Check: $-6(18) + 25 \stackrel{?}{=} -83$
$-108 + 25 \stackrel{?}{=} -83$
$-83 = -83$ ✓

10. $4x + 4.6 = 9.2$
$4x + 4.6 + (-4.6) = 9.2 + (-4.6)$
$4x = 4.6$
$\frac{4x}{4} = \frac{4.6}{4}$
$x = 1.15$
Check: $4(1.15) + 4.6 \stackrel{?}{=} 9.2$
$4.6 + 4.6 \stackrel{?}{=} 9.2$
$9.2 = 9.2$ ✓

12. $\frac{1}{2}x + 1 = 7$
$\frac{1}{2}x + 1 - 1 = 7 - 1$
$\frac{1}{2}x = 6$
$2\left(\frac{1}{2}x\right) = 2(6)$
$x = 12$
Check: $\frac{1}{2}(12) + 1 \stackrel{?}{=} 7$
$6 + 1 \stackrel{?}{=} 7$
$7 = 7$ ✓

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14. $\frac{1}{8}x-3=-9$

$\frac{1}{8}x-3+3=-9+3$

$\frac{1}{8}x=-6$

$8\left(\frac{1}{8}x\right)=8(-6)$

$x=-48$

Check: $\frac{1}{8}(-48)-3 \stackrel{?}{=} -9$

$-6-3 \stackrel{?}{=} -9$

$-9=-9$ ✓

16. $5x=22+3x$

$5x+(-3x)=22+3x+(-3x)$

$2x=22$

$\frac{2x}{2}=\frac{22}{2}$

$x=11$

Check: $5(11) \stackrel{?}{=} 22+3(11)$

$55 \stackrel{?}{=} 22+33$

$55=55$ ✓

18. $-7x=-26+6x$

$-7x+(-6x)=-26+6x+(-6x)$

$-13x=-26$

$\frac{-13x}{-13}=\frac{-26}{-13}$

$x=2$

Check: $-7(2) \stackrel{?}{=} -26+6(2)$

$-14 \stackrel{?}{=} -26+12$

$-14=-14$ ✓

20. $21-5x=7x$

$21-5x+5x=7x+5x$

$21=12x$

$\frac{21}{12}=\frac{12x}{12}$

$\frac{7}{4}=x$ or $x=1.75$

Check: $21-5\left(\frac{7}{4}\right) \stackrel{?}{=} 7\left(\frac{7}{4}\right)$

$\frac{84}{4}-\frac{35}{4} \stackrel{?}{=} \frac{49}{4}$

$\frac{49}{4}=\frac{49}{4}$ ✓

22. $72-4x=-12x$

$72-4x+4x=-12x+4x$

$72=-8x$

$\frac{72}{-8}=\frac{-8x}{-8}$

$-9=x$

Check: $72+36 \stackrel{?}{=} -12(-9)$

$72-4(-9) \stackrel{?}{=} 108$

$108=108$ ✓

24. $5y+2=6y-6+y,\ y \stackrel{?}{=} 4$

$5(4)+2 \stackrel{?}{=} 6(4)-6+4$

$20+2 \stackrel{?}{=} 24-2$

$22=22$

$y=4$ is the solution.

26. $9x+2-5x=-8+5x-2,\ x \stackrel{?}{=} -12$

$9(-12)+2-5(-12) \stackrel{?}{=} -8+5(-12)-2$

$-108+2+60 \stackrel{?}{=} -8-60-2$

$-46 \neq -70$

$x=-12$ is not the solution.

$9x+2-5x=-8+5x-2$

$4x+2=5x-10$

$4x+(-4x)+2=5x+(-4x)-10$

$2=x-10$

$2+10=x-10+10$

$12=x$

28. $8-3x=7x+8$

$8-3x+3x=7x+3x+8$

$8=10x+8$

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

$0=10x$

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

$0=x$

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

$-x+x+12=-4+x+x$

$12=-4+2x$

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

$16=2x$

$\frac{16}{2}=\frac{2x}{2}$

$8=x$

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32.
$$\begin{aligned} 1.1y+0.3 &= -1.3+0.3y \\ 1.1y+0.3-0.3y &= -1.3+0.3y-0.3y \\ 0.8y+0.3 &= -1.3 \\ 0.8y+0.3-0.3 &= -1.3-0.3 \\ 0.8y &= -1.6 \\ \frac{0.8y}{0.8} &= \frac{-1.6}{0.8} \\ y &= -2 \end{aligned}$$

34.
$$\begin{aligned} 9x-5 &= 7x+43 \\ 9x+(-7x)-5 &= 7x+(-7x)+43 \\ 2x-5 &= 43 \\ 2x-5+5 &= 43+5 \\ 2x &= 48 \\ \frac{2x}{2} &= \frac{48}{2} \\ x &= 24 \end{aligned}$$

36. $7y + 21 - 5y = 5y - 7 + y$

Left
$$\begin{aligned} 2y+21 &= 6y-7 \\ 2y+(-6y)+21 &= 6y+(-6y)-7 \\ -4y+21 &= -7 \\ -4y+21+(-21) &= -7+(-21) \\ -4y &= -28 \\ \frac{-4y}{-4} &= \frac{-28}{-4} \\ y &= 7 \end{aligned}$$

Right
$$\begin{aligned} 2y+21 &= 6y-7 \\ 2y+(-2y)+21 &= 6y+(-2y)-7 \\ 21 &= 4y-7 \\ 21+7 &= 4y-7+7 \\ 28 &= 4y \\ \frac{28}{4} &= \frac{4y}{4} \\ 7 &= y \end{aligned}$$

Neither approach is better.

38.
$$\begin{aligned} 7(x+3) &= 28 \\ 7x+21 &= 28 \\ 7x+21-21 &= 28-21 \\ 7x &= 7 \\ \frac{7x}{7} &= \frac{7}{7} \\ x &= 1 \end{aligned}$$

Check: $7(1+3) \stackrel{?}{=} 28$

$7(4) \stackrel{?}{=} 28$

$28 = 28$ ✓

40.
$$\begin{aligned} 4(2x+1)-7 &= 6-5 \\ 8x+4-7 &= 6-5 \\ 8x-3 &= 1 \\ 8x-3+3 &= 1+3 \\ 8x &= 4 \\ \frac{8x}{8} &= \frac{4}{8} \\ x &= \frac{1}{2} \end{aligned}$$

Check: $4\left[2\left(\frac{1}{2}\right)+1\right]-7 \stackrel{?}{=} 6-5$

$4(1+1)-7 \stackrel{?}{=} 1$

$4(2)-7 \stackrel{?}{=} 1$

$8-7 \stackrel{?}{=} 1$

$1 = 1$ ✓

42.
$$\begin{aligned} 8x-2(4-x) &= 14 \\ 8x-8+2x &= 14 \\ 10x-8 &= 14 \\ 10x-8+8 &= 14+8 \\ 10x &= 22 \\ \frac{10x}{10} &= \frac{22}{10} \\ x &= \frac{11}{5} \end{aligned}$$

Check: $8\left(\frac{11}{5}\right)-2\left(4-\frac{11}{5}\right) \stackrel{?}{=} 14$

$\frac{88}{5}-2\left(\frac{9}{5}\right) \stackrel{?}{=} 14$

$\frac{88}{5}-\frac{18}{5} \stackrel{?}{=} 14$

$14 = 14$ ✓

44.
$$\begin{aligned} 0.4x-0.2(3-x) &= 1.8 \\ 0.4x-0.6+0.2x &= 1.8 \\ 0.6x-0.6 &= 1.8 \\ 0.6x-0.6+0.6 &= 1.8+0.6 \\ 0.6x &= 2.4 \\ \frac{0.6x}{0.6} &= \frac{2.4}{0.6} \\ x &= 4 \end{aligned}$$

Check: $0.4(4)-0.2(3-4) \stackrel{?}{=} 1.8$

$1.6-0.2(-1) \stackrel{?}{=} 1.8$

$1.6+0.2 \stackrel{?}{=} 1.8$

$1.8 = 1.8$ ✓

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46. $6(a+3)-2=-4(a-4)$
$6a+18-2=-4a+16$
$6a+16=-4a+16$
$6a+16+4a=-4a+16+4a$
$10a+16=16$
$10a+16-16=16-16$
$10a=0$
$\frac{10a}{10}=\frac{0}{10}$
$a=0$
Check: $6(0+3)-2 \stackrel{?}{=} -4(0-4)$
$6(3)-2 \stackrel{?}{=} -4(-4)$
$18-2 \stackrel{?}{=} 16$
$16=16$ ✓

48. $-3(x+5)+2=4(x+6)-9$
$-3x-15+2=4x+24-9$
$-3x-13=4x+15$
$-3x+3x-13=4x+3x+15$
$-13=7x+15$
$-13+(-15)=7x+15+(-15)$
$-28=7x$
$\frac{-28}{7}=\frac{7x}{7}$
$-4=x$
Check: $-3(-4+5)+2 \stackrel{?}{=} 4(-4+6)-9$
$-3(1)+2 \stackrel{?}{=} 4(2)-9$
$-3+2 \stackrel{?}{=} 8-9$
$-1=-1$ ✓

50. $2(4x-x)+6=2(2x+x)+8-x$
$2(3x)+6=2(3x)+8-x$
$6x+6=6x+8-x$
$6x+6=5x+8$
$6x+6-6=5x+8-6$
$6x=5x+2$
$-5x+6x=-5x+5x+2$
$x=2$
Check: $2[4(2)-2]+6 \stackrel{?}{=} 2[2(2)+2]+8-2$
$2(8-2)+6 \stackrel{?}{=} 2(4+2)+6$
$2(6)+6 \stackrel{?}{=} 2(6)+6$
$12+6 \stackrel{?}{=} 12+6$
$18=18$ ✓

52. $4x-3.1=5.3-3x$
$4x+3x-3.1=5.3-3x+3x$
$7x-3.1=5.3$
$7x-3.1+3.1=5.3+3.1$
$7x=8.4$
$\frac{7x}{7}=\frac{8.4}{7}$
$x=1.2$

54. $8-7z+2z=20+5z$
$8-5z=20+5z$
$8-5z+5z=20+5z+5z$
$8=20+10z$
$-20+8=-20+20+10z$
$-12=10z$
$\frac{-12}{10}=\frac{10z}{10}$
$-\frac{6}{5}=z$

56. $-0.7b+1.6=-1.7-1.5b$
$-0.7b+1.5b+1.6=-1.7-1.5b+1.5b$
$0.8b+1.6=-1.7$
$0.8b+1.6+(-1.6)=-1.7+(-1.6)$
$0.8b=-3.3$
$\frac{0.8b}{0.8}=\frac{-3.3}{0.8}$
$b=-4.125$

58. $4-7x-13=8x-3-5x$
$-7x-9=3x-3$
$-7x-3x-9=3x-3x-3$
$-10x-9=-3$
$-10x-9+9=-3+9$
$-10x=6$
$\frac{-10x}{-10}=\frac{6}{-10}$
$x=-\frac{6}{10}$
$x=-\frac{3}{5}$

60. $1.4x-0.8=1.2x-0.2$
$1.4x-0.8+0.8=1.2x-0.2+0.8$
$1.4x=1.2x+0.6$
$1.4x-1.2x=1.2x-1.2x+0.6$
$0.2x=0.6$
$\frac{0.2x}{0.2}=\frac{0.6}{0.2}$
$x=3$

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62.
$$\begin{aligned} 5(2x-3) &= 3(3x+2)-17 \\ 10x-15 &= 9x+6-17 \\ 10x-15 &= 9x-11 \\ 10x-9x-15 &= 9x-9x-11 \\ x-15 &= -11 \\ x-15+15 &= -11+15 \\ x &= 4 \end{aligned}$$

64.
$$\begin{aligned} 6x-3.7-1.2x &= 0.8x+1.1 \\ 4.8x-3.7 &= 0.8x+1.1 \\ 4.8x-3.7+3.7 &= 0.8x+1.1+3.7 \\ 4.8x &= 0.8x+4.8 \\ 4.8x-0.8x &= 0.8x-0.8x+4.8 \\ 4x &= 4.8 \\ \frac{4x}{4} &= \frac{4.8}{4} \\ x &= 1.2 \end{aligned}$$

Cumulative Review

65. $(-6)(-8) + (-3)(2) = 48 - 6 = 42$

66.
$$\begin{aligned} (-3)^3 + (-20) \div 2 &= -27 + (-20) \div 2 \\ &= -27 + (-10) \\ &= -37 \end{aligned}$$

67. $5 + (2-6)^2 = 5 + (-4)^2 = 5 + 16 = 21$

68. We multiply and then add.
$35 \times \$9.11 = \$318.85$
$16 \times \$22.70 = \$363.20$
$5 \times \$100.46 = \$502.30$
$\$318.85 + \$363.20 + \$502.30 = \$1184.35$
The market value was \$1184.35 on May 1, 2015.

69. a. 30% of $\$899 = 0.30 \times \$899 = \$269.70$
$\$899 - \$269.70 = \$629.30$
With a total discount of 30%, the sale price is \$629.30.

b. 20% of $\$899 = 0.20 \times \$899 = \$179.80$
$\$899 - \$179.80 = \$719.20$
The price after the 20% discount is \$719.20.
10% of $\$719.20 = 0.10 \times \$719.20 = \$71.92$
$\$719.20 - \$71.92 = \$647.28$
The sale price after both discounts is \$647.28.

Classroom Quiz 2.3

1.
$$\begin{aligned} 8x+3 &= -12x-7 \\ 8x+3+12x &= -12x-7+12x \\ 20x+3 &= -7 \\ 20x+3-3 &= -7-3 \\ 20x &= -10 \\ \frac{20x}{20} &= \frac{-10}{20} \\ x &= -\frac{1}{2} \end{aligned}$$

2.
$$\begin{aligned} -7x+3.5 &= 16.8 \\ -7x+3.5-3.5 &= 16.8-3.5 \\ -7x &= 13.3 \\ \frac{-7x}{-7} &= \frac{13.3}{-7} \\ x &= -1.9 \end{aligned}$$

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

2.4 Exercises

2.
$$\begin{aligned} \frac{1}{3}x+\frac{5}{6} &= \frac{1}{2} \\ 6\left(\frac{1}{3}x\right)+6\left(\frac{5}{6}\right) &= 6\left(\frac{1}{2}\right) \\ 2x+5 &= 3 \\ 2x+5-5 &= 3-5 \\ 2x &= -2 \\ \frac{2x}{2} &= \frac{-2}{2} \\ x &= -1 \end{aligned}$$

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

$-\frac{1}{3}+\frac{5}{6} \stackrel{?}{=} \frac{1}{2}$

$-\frac{2}{6}+\frac{5}{6} \stackrel{?}{=} \frac{1}{2}$

$\frac{3}{6} \stackrel{?}{=} \frac{1}{2}$

$\frac{1}{2}=\frac{1}{2}$ ✓

4. $\frac{4}{15}x+\frac{1}{5}=\frac{2}{3}x$

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

$4x+3=10x$

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

$3=6x$

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

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

Check: $\frac{4}{15}\left(\frac{1}{2}\right)+\frac{1}{5} \stackrel{?}{=} \frac{2}{3}\left(\frac{1}{2}\right)$

$\frac{2}{15}+\frac{1}{5} \stackrel{?}{=} \frac{1}{3}$

$\frac{2}{15}+\frac{3}{15} \stackrel{?}{=} \frac{1}{3}$

$\frac{5}{15} \stackrel{?}{=} \frac{1}{3}$

$\frac{1}{3}=\frac{1}{3}$ ✓

6. $\frac{x}{8}+\frac{x}{4}=-\frac{3}{4}$

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

$x+2x=-6$

$3x=-6$

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

$x=-2$

Check: $\frac{-2}{8}+\frac{-2}{4} \stackrel{?}{=} -\frac{3}{4}$

$\frac{-1}{4}+\frac{-2}{4} \stackrel{?}{=} -\frac{3}{4}$

$-\frac{3}{4}=-\frac{3}{4}$ ✓

8. $15-\frac{1}{2}x=\frac{1}{4}x$

$4(15)-4\left(\frac{1}{2}x\right)=4\left(\frac{1}{4}x\right)$

$60-2x=x$

$60-2x+2x=x+2x$

$60=3x$

$\frac{60}{3}=\frac{3x}{3}$

$20=x$

Check: $15-\frac{1}{2}(20) \stackrel{?}{=} \frac{1}{4}(20)$

$15-10 \stackrel{?}{=} 5$

$5=5$ ✓

10. $\frac{x}{3}+3=\frac{5x}{6}+2$

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

$2x+18=5x+12$

$2x+18-2x=5x+12-2x$

$18=3x+12$

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

$6=3x$

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

$2=x$

Check: $\frac{2}{3}+3 \stackrel{?}{=} \frac{5(2)}{6}+2$

$\frac{2}{3}+\frac{9}{3} \stackrel{?}{=} \frac{10}{6}+\frac{12}{6}$

$\frac{11}{3} \stackrel{?}{=} \frac{22}{6}$

$\frac{11}{3}=\frac{11}{3}$ ✓

12. $\frac{y-5}{4}=1-\frac{y}{5}$

$20\left(\frac{y-5}{4}\right)=20(1)-20\left(\frac{y}{5}\right)$

$5(y-5)=20-4y$

$5y-25=20-4y$

$5y-25+4y=20-4y+4y$

$9y-25=20$

$9y-25+25=20+25$

$9y=45$

$\frac{9y}{9}=\frac{45}{9}$

$y=5$

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Check: $\frac{5-5}{4} \stackrel{?}{=} 1-\frac{5}{5}$

$\frac{0}{4} \stackrel{?}{=} 1-1$

$0 = 0$ ✓

14. $\frac{x-2}{3} = \frac{x}{12} + \frac{5}{4}$

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

$4(x-2) = x+15$

$4x-8 = x+15$

$4x-8-x = x+15-x$

$3x-8 = 15$

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

$3x = 23$

$\frac{3x}{3} = \frac{23}{3}$

$x = \frac{23}{3}$

Check: $\frac{\frac{23}{3}-2}{3} \stackrel{?}{=} \frac{\frac{23}{3}}{12} + \frac{5}{4}$

$\frac{\frac{17}{3}}{3} \stackrel{?}{=} \frac{23}{36} + \frac{45}{36}$

$\frac{17}{9} \stackrel{?}{=} \frac{68}{36}$

$\frac{17}{9} = \frac{17}{9}$ ✓

16. $-3.2x - 5.1 = 2.9$

$10(-3.2x) - 10(5.1) = 10(2.9)$

$-32x - 51 = 29$

$-32x - 51 + 51 = 29 + 51$

$-32x = 80$

$\frac{-32x}{-32} = \frac{80}{-32}$

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

Check: $-3.2(-2.5) - 5.1 \stackrel{?}{=} 2.9$

$8 - 5.1 \stackrel{?}{=} 2.9$

$2.9 = 2.9$ ✓

18. $\frac{1}{5}(y+2) = \frac{1}{10}y + \frac{3}{5}$, $y \stackrel{?}{=} 2$

$\frac{1}{5}(2+2) \stackrel{?}{=} \frac{1}{10}(2) + \frac{3}{5}$

$\frac{4}{5} \stackrel{?}{=} \frac{1}{5} + \frac{3}{5}$

$\frac{4}{5} = \frac{4}{5}$

Yes, $y = 2$ is a solution.

20. $\frac{1}{3}\left(x - \frac{1}{4}\right) = \frac{1}{8} + \frac{1}{3}x$, $x \stackrel{?}{=} \frac{1}{2}$

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

$\frac{1}{3}\left(\frac{2}{4} - \frac{1}{4}\right) \stackrel{?}{=} \frac{1}{8} + \frac{1}{6}$

$\frac{1}{3}\left(\frac{1}{4}\right) \stackrel{?}{=} \frac{3}{24} + \frac{4}{24}$

$\frac{1}{12} \neq \frac{7}{24}$

No, $x = \frac{1}{2}$ is not a solution.

22. $\frac{1}{4}(3x+1) = 2(2x-4) - 8$

$\frac{3}{4}x + \frac{1}{4} = 4x - 8 - 8$

$\frac{3}{4}x + \frac{1}{4} = 4x - 16$

$4\left(\frac{3}{4}x\right) + 4\left(\frac{1}{4}\right) = 4(4x) - 4(16)$

$3x + 1 = 16x - 64$

$3x + 1 - 3x = 16x - 64 - 3x$

$1 = 13x - 64$

$1 + 64 = 13x - 64 + 64$

$65 = 13x$

$\frac{65}{13} = \frac{13x}{13}$

$5 = x$

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24.
$$\begin{aligned}
2(x-4) &= \frac{5}{6}(x+6)-6\\
2x-8 &= \frac{5}{6}x+5-6\\
2x-8 &= \frac{5}{6}x-1\\
6(2x)-6(8) &= 6\left(\frac{5}{6}x\right)-6(1)\\
12x-48 &= 5x-6\\
12x-48-5x &= 5x-6-5x\\
7x-48 &= -6\\
7x-48+48 &= -6+48\\
7x &= 42\\
\frac{7x}{7} &= \frac{42}{7}\\
x &= 6
\end{aligned}$$

26.
$$\begin{aligned}
0.2(x+1)+0.5x &= -0.3(x-4)\\
0.2x+0.2+0.5x &= -0.3x+1.2\\
0.7x+0.2 &= -0.3x+1.2\\
0.7x+0.2+0.3x &= -0.3x+1.2+0.3x\\
x+0.2 &= 1.2\\
x+0.2-0.2 &= 1.2-0.2\\
x &= 1
\end{aligned}$$

28.
$$\begin{aligned}
0.6x+1.5 &= 0.3x-0.6(2x+5)\\
0.6x+1.5 &= 0.3x-1.2x-3\\
0.6x+1.5 &= -0.9x-3\\
10(0.6x)+10(1.5) &= 10(-0.9x)-10(3)\\
6x+15 &= -9x-30\\
6x+15+9x &= -9x-30+9x\\
15x+15 &= -30\\
15x+15-15 &= -30-15\\
15x &= -45\\
\frac{15x}{15} &= \frac{-45}{15}\\
x &= -3
\end{aligned}$$

30.
$$\begin{aligned}
\frac{1}{4}(y+6) &= 2y-3(y-3)\\
\frac{1}{4}y+\frac{3}{2} &= 2y-3y+9\\
\frac{1}{4}y+\frac{3}{2} &= -y+9\\
4\left(\frac{1}{4}y\right)+4\left(\frac{3}{2}\right) &= 4(-y)+4(9)\\
y+6 &= -4y+36\\
y+6+4y &= -4y+36+4y\\
5y+6 &= 36\\
5y+6-6 &= 36-6\\
5y &= 30\\
\frac{5y}{5} &= \frac{30}{5}\\
y &= 6
\end{aligned}$$

32.
$$\begin{aligned}
\frac{1+3x}{2}+\frac{2-x}{3} &= \frac{5}{6}\\
6\left(\frac{1+3x}{2}\right)+6\left(\frac{2-x}{3}\right) &= 6\left(\frac{5}{6}\right)\\
3(1+3x)+2(2-x) &= 5\\
3+9x+4-2x &= 5\\
7x+7 &= 5\\
7x+7-7 &= 5-7\\
7x &= -2\\
\frac{7x}{7} &= \frac{-2}{7}\\
x &= -\frac{2}{7}
\end{aligned}$$

34.
$$\begin{aligned}
\frac{2}{3}(x+4) &= 6-\frac{1}{4}(3x-2)-1\\
\frac{2}{3}x+\frac{8}{3} &= 6-\frac{3}{4}x+\frac{1}{2}-1\\
\frac{2}{3}x+\frac{8}{3} &= \frac{11}{2}-\frac{3}{4}x\\
12\left(\frac{2}{3}x\right)+12\left(\frac{8}{3}\right) &= 12\left(\frac{11}{2}\right)-12\left(\frac{3}{4}x\right)\\
8x+32 &= 66-9x\\
8x+32+9x &= 66-9x+9x\\
17x+32 &= 66\\
17x+32-32 &= 66-32\\
17x &= 34\\
\frac{17x}{17} &= \frac{34}{17}\\
x &= 2
\end{aligned}$$

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36.
$$\frac{1}{4}(x+5) = 3x - 2(3-x) - 7$$
$$\frac{1}{4}x + \frac{5}{4} = 3x - 6 + 2x - 7$$
$$\frac{1}{4}x + \frac{5}{4} = 5x - 13$$
$$4\left(\frac{1}{4}x\right) + 4\left(\frac{5}{4}\right) = 4(5x) - 4(13)$$
$$x + 5 = 20x - 52$$
$$x - x + 5 = 20x - x - 52$$
$$5 = 19x - 52$$
$$5 + 52 = 19x - 52 + 52$$
$$57 = 19x$$
$$\frac{57}{19} = \frac{19x}{19}$$
$$3 = x$$

38.
$$\frac{5}{12}x + \frac{1}{3} = \frac{2x-3}{4}$$
$$12\left(\frac{5}{12}x\right) + 12\left(\frac{1}{3}\right) = 12\left(\frac{2x-3}{4}\right)$$
$$5x + 4 = 3(2x-3)$$
$$5x + 4 = 6x - 9$$
$$5x - 5x + 4 = 6x - 5x - 9$$
$$4 = x - 9$$
$$4 + 9 = x - 9 + 9$$
$$13 = x$$

40.
$$0.7(x+3) = 0.2(x-5) + 0.1$$
$$0.7x + 2.1 = 0.2x - 1.0 + 0.1$$
$$10(0.7x) + 10(2.1) = 10(0.2x) - 10(1.0) + 10(0.1)$$
$$7x + 21 = 2x - 10 + 1$$
$$7x + 21 = 2x - 9$$
$$7x - 2x + 21 = 2x - 2x - 9$$
$$5x + 21 = -9$$
$$5x + 21 - 21 = -9 - 21$$
$$5x = -30$$
$$\frac{5x}{5} = \frac{-30}{5}$$
$$x = -6$$

42.
$$x + 3x - 2 + 3x = -11 + 7(x+2)$$
$$7x - 2 = -11 + 7x + 14$$
$$7x - 2 = 7x + 3$$
$$7x - 2 - 7x = 7x + 3 - 7x$$
$$-2 = 3, \text{ no solution}$$

44.
$$7(x+4) - 10 = 3x + 20 + 4x - 2$$
$$7x + 28 - 10 = 7x + 18$$
$$7x + 18 = 7x + 18$$
$$7x - 7x + 18 = 7x - 7x + 18$$
$$18 = 18$$
Infinite number of solutions

46.
$$11x - 8 = -4(x+3) + 4$$
$$11x - 8 = -4x - 12 + 4$$
$$11x - 8 = -4x - 8$$
$$11x - 8 + 4x = -4x - 8 + 4x$$
$$15x - 8 = -8$$
$$15x - 8 + 8 = -8 + 8$$
$$15x = 0$$
$$\frac{15x}{15} = \frac{0}{15}$$
$$x = 0$$

48.
$$5(-3+4x) = 4(2x+4) + 12x$$
$$-15 + 20x = 8x + 16 + 12x$$
$$-15 + 20x = 20x + 16$$
$$-15 + 20x - 20x = 20x + 16 - 20x$$
$$-15 = 16, \text{ no solution}$$

Cumulative Review

49.
$$\left(-3\frac{1}{4}\right)\left(5\frac{1}{3}\right) = \left(-\frac{13}{4}\right)\left(\frac{16}{3}\right)$$
$$= -\frac{13 \cdot \cancel{4} \cdot 4}{\cancel{4} \cdot 3}$$
$$= -\frac{52}{3} \text{ or } -17\frac{1}{3}$$

50.
$$5\frac{1}{2} \div 1\frac{1}{4} = \frac{11}{2} \div \frac{5}{4}$$
$$= \frac{11}{2} \cdot \frac{4}{5}$$
$$= \frac{11 \cdot \cancel{2} \cdot 2}{\cancel{2} \cdot 5}$$
$$= \frac{22}{5} \text{ or } 4\frac{2}{5}$$

51. 30% of 440 = 0.30 × 440 = 132
440 + 132 = 572
30% of 750 = 0.3 × 750 = 225
750 + 225 = 975
The weight range for females is 572 – 975 grams.

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52. Find the area of the seating area.

$$\text{Area} = \frac{1}{2}a(b_1 + b_2)$$
$$= \frac{1}{2}(200)(150+88)$$
$$= 100(238)$$
$$= 23{,}800 \text{ ft}^2$$

Find the area required for each seat.

$$\text{Area} = L \cdot W = 2.5 \cdot 3 = 7.5 \text{ ft}^2$$

Now divide.

$23{,}800 \div 7.5 \approx 3173$

The auditorium will hold approximately 3173 seats.

Classroom Quiz 2.4

1.
$$\frac{3}{7}x + \frac{5}{14} = \frac{1}{2}x - \frac{2}{7}$$
$$14\left(\frac{3}{7}x\right) + 14\left(\frac{5}{14}\right) = 14\left(\frac{1}{2}x\right) - 14\left(\frac{2}{7}\right)$$
$$6x + 5 = 7x - 4$$
$$6x + 5 - 6x = 7x - 4 - 6x$$
$$5 = x - 4$$
$$5 + 4 = x - 4 + 4$$
$$9 = x$$

2.
$$\frac{2}{5}x - \frac{3}{2} + \frac{4}{5} - \frac{7}{2}x = 2$$
$$10\left(\frac{2}{5}x\right) - 10\left(\frac{3}{2}\right) + 10\left(\frac{4}{5}\right) - 10\left(\frac{7}{2}x\right) = 10(2)$$
$$4x - 15 + 8 - 35x = 20$$
$$-31x - 7 = 20$$
$$-31x - 7 + 7 = 20 + 7$$
$$-31x = 27$$
$$\frac{-31x}{-31} = \frac{27}{-31}$$
$$x = -\frac{27}{31}$$

3.
$$\frac{3}{4}(x+3) - \frac{1}{2} = \frac{1}{8}(6-2x)$$
$$\frac{3}{4}x + \frac{9}{4} - \frac{1}{2} = \frac{3}{4} - \frac{1}{4}x$$
$$\frac{3}{4}x + \frac{7}{4} = \frac{3}{4} - \frac{1}{4}x$$
$$4\left(\frac{3}{4}x\right) + 4\left(\frac{7}{4}\right) = 4\left(\frac{3}{4}\right) - 4\left(\frac{1}{4}x\right)$$
$$3x + 7 = 3 - x$$
$$3x + 7 + x = 3 - x + x$$
$$4x + 7 = 3$$
$$4x + 7 - 7 = 3 - 7$$
$$4x = -4$$
$$\frac{4x}{4} = \frac{-4}{4}$$
$$x = -1$$

Use Math to Save Money

1. Shell: \$4.55
ARCO: \$4.43 + \$0.45 = \$4.88

2. Shell: 3(\$4.55) = \$13.65
ARCO: $3(\$4.43) + \$0.45 = \$13.29 + \$0.45$
$= \$13.74$

3. Shell: 4(\$4.55) = \$18.20
ARCO: $4(\$4.43) + \$0.45 = \$17.72 + \$0.45$
$= \$18.17$

4. Shell: 10(\$4.55) = \$45.50
ARCO: $10(\$4.43) + \$0.45 = \$44.30 + \$0.45$
$= \$44.75$

5. $4.55x = 4.43x + 0.45$
$0.12x = 0.45$
$x = 3.75$
The price is the same for 3.75 gallons of gas.

6. For less than four gallons, the SHELL station is less expensive.

7. For more than four gallons, the ARCO station is less expensive.

8. Answers will vary.

9. Answers will vary.

10. Answers will vary.

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

1.
$$\begin{aligned} 5-8+x &= -12 \\ -3+x &= -12 \\ -3+3+x &= -12+3 \\ x &= -9 \end{aligned}$$

2.
$$\begin{aligned} -2.8+x &= 4.7 \\ -2.8+2.8+x &= 4.7+2.8 \\ x &= 7.5 \text{ or } 7\frac{1}{2} \end{aligned}$$

3.
$$\begin{aligned} -45 &= -5x \\ \frac{-45}{-5} &= \frac{-5x}{-5} \\ 9 &= x \end{aligned}$$

4.
$$\begin{aligned} 12x-6x &= -48 \\ 6x &= -48 \\ \frac{6x}{6} &= \frac{-48}{6} \\ x &= -8 \end{aligned}$$

5.
$$\begin{aligned} -1.2x+3.5 &= 2.7 \\ -1.2x+3.5-3.5 &= 2.7-3.5 \\ -1.2x &= -0.8 \\ \frac{-1.2x}{-1.2} &= \frac{-0.8}{-1.2} \\ x &= \frac{2}{3} \end{aligned}$$

6.
$$\begin{aligned} -14x+9 &= 2x+7 \\ -14x-2x+9 &= 2x-2x+7 \\ -16x+9 &= 7 \\ -16x+9-9 &= 7-9 \\ -16x &= -2 \\ \frac{-16x}{-16} &= \frac{-2}{-16} \\ x &= \frac{1}{8} \end{aligned}$$

7.
$$\begin{aligned} 14x+2(7-2x) &= 20 \\ 14x+14-4x &= 20 \\ 10x+14 &= 20 \\ 10x+14-14 &= 20-14 \\ 10x &= 6 \\ \frac{10x}{10} &= \frac{6}{10} \\ x &= \frac{3}{5} \end{aligned}$$

8.
$$\begin{aligned} 0.5(1.2x-3.4) &= -1.4x+5.8 \\ 0.6x-1.7 &= -1.4x+5.8 \\ 0.6x+1.4x-1.7 &= -1.4x+1.4x+5.8 \\ 2x-1.7 &= 5.8 \\ 2x-1.7+1.7 &= 5.8+1.7 \\ 2x &= 7.5 \\ \frac{2x}{2} &= \frac{7.5}{2} \\ x &= 3.75 \text{ or } 3\frac{3}{4} \end{aligned}$$

9.
$$\begin{aligned} 3(x+6) &= -2(4x-1)+x \\ 3x+18 &= -8x+2+x \\ 3x+18 &= -7x+2 \\ 3x+7x+18 &= -7x+7x+2 \\ 10x+18 &= 2 \\ 10x+18-18 &= 2-18 \\ 10x &= -16 \\ \frac{10x}{10} &= -\frac{16}{10} \\ x &= -\frac{8}{5} \end{aligned}$$

10.
$$\begin{aligned} \frac{x}{3}+\frac{x}{4} &= \frac{5}{6} \\ 12\left(\frac{x}{3}\right)+12\left(\frac{x}{4}\right) &= 12\left(\frac{5}{6}\right) \\ 4x+3x &= 10 \\ 7x &= 10 \\ \frac{7x}{7} &= \frac{10}{7} \\ x &= \frac{10}{7} \end{aligned}$$

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11.
$$\frac{1}{4}(x+3)=4x-2(x-3)$$
$$\frac{1}{4}x+\frac{3}{4}=4x-2x+6$$
$$\frac{1}{4}x+\frac{3}{4}=2x+6$$
$$4\left(\frac{1}{4}x\right)+4\left(\frac{3}{4}\right)=4(2x)+4(6)$$
$$x+3=8x+24$$
$$x-x+3=8x-x+24$$
$$3=7x+24$$
$$3-24=7x+24-24$$
$$-21=7x$$
$$\frac{-21}{7}=\frac{7x}{7}$$
$$-3=x$$

12.
$$\frac{1}{2}(x-1)+2=3(2x-1)$$
$$\frac{1}{2}x-\frac{1}{2}+2=6x-3$$
$$\frac{1}{2}x+\frac{3}{2}=6x-3$$
$$2\left(\frac{1}{2}x\right)+2\left(\frac{3}{2}\right)=2(6x)-2(3)$$
$$x+3=12x-6$$
$$x-x+3=12x-x-6$$
$$3=11x-6$$
$$3+6=-11x-6+6$$
$$9=11x$$
$$\frac{9}{11}=\frac{11x}{11}$$
$$\frac{9}{11}=x$$

13.
$$\frac{1}{7}(7x-14)-2=\frac{1}{3}(x-2)$$
$$x-2-2=\frac{1}{3}x-\frac{2}{3}$$
$$x-4=\frac{1}{3}x-\frac{2}{3}$$
$$3(x)-3(4)=3\left(\frac{1}{3}x\right)-3\left(\frac{2}{3}\right)$$
$$3x-12=x-2$$
$$3x-x-12=x-x-2$$
$$2x-12=-2$$
$$2x-12+12=-2+12$$
$$2x=10$$
$$\frac{2x}{2}=\frac{10}{2}$$
$$x=5$$

14.
$$0.2(x-3)=4(0.2x-0.1)$$
$$0.2x-0.6=0.8x-0.4$$
$$10(0.2x)-10(0.6)=10(0.8x)-10(0.4)$$
$$2x-6=8x-4$$
$$2x-2x-6=8x-2x-4$$
$$-6=6x-4$$
$$-6+4=6x-4+4$$
$$-2=6x$$
$$\frac{-2}{6}=\frac{6x}{6}$$
$$-\frac{1}{3}=x$$

2.5 Exercises

2. Use the distributive property to obtain $A=\frac{9}{2}b+\frac{9}{2}c$. Multiply each term by 2. Subtract $9c$ from each side. Then divide each side by 9. We would obtain $\frac{2A-9c}{9}=b$ or $\frac{2A}{9}-c=b$.

4. a.
$$I=Prt$$
$$720=(3000)(0.06)t$$
$$720=180t$$
$$\frac{720}{180}=\frac{180t}{180}$$
$$4=t$$
It would take 4 years.

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b. $I = Prt$
$400 = (5000)r(2)$
$400 = 10,000r$
$\frac{400}{10,000} = \frac{10,000r}{10,000}$
$0.04 = r$
The rate of interest is 4%.

c. $I = Prt$
$120 = P(0.05)(3)$
$120 = 0.15P$
$\frac{120}{0.15} = \frac{0.15P}{0.15}$
$800 = P$
The investment is \$800.

6. a. $-3x + 8y = 24$
$-3x = 24 - 8y$
$\frac{-3x}{-3} = \frac{24 - 8y}{-3}$
$x = \frac{24 - 8y}{-3} = \frac{8y - 24}{3}$
$x = \frac{8y}{3} - \frac{24}{3}$
$x = \frac{8}{3}y - 8$

b. $y = 6$
$x = \frac{8}{3}(6) - 8 = 16 - 8 = 8$

8. $A = \frac{1}{2}bh$
$2(A) = 2\left(\frac{1}{2}bh\right)$
$2A = bh$
$\frac{2A}{b} = \frac{bh}{b}$
$\frac{2A}{b} = h$

10. $I = Prt$
$\frac{I}{Pr} = \frac{Prt}{Pr}$
$\frac{I}{Pr} = t$

12. $y = mx + b$
$y + (-mx) = mx + (-mx) + b$
$y - mx = b$

14. $2x - 7y = 14$
$-7y = 14 - 2x$
$\frac{-7y}{-7} = \frac{14 - 2x}{-7}$
$y = \frac{14}{-7} - \frac{2x}{-7}$
$y = -2 + \frac{2x}{7}$
$y = \frac{2}{7}x - 2$

16. $y = -\frac{5}{6}x + 10$
$6(y) = 6\left(-\frac{5}{6}x\right) + 6(10)$
$6y = -5x + 60$
$6y - 60 = -5x$
$\frac{6y - 60}{-5} = \frac{-5x}{-5}$
$\frac{6y}{-5} - \frac{60}{-5} = x$
$-\frac{6}{5}y + 12 = x$
$x = -\frac{6}{5}y + 12$

18. $ax + by = c$
$ax = -by + c$
$\frac{ax}{a} = \frac{-by + c}{a}$
$x = \frac{c - by}{a}$

20. $s = 4\pi r^2$
$\frac{s}{4\pi} = \frac{4\pi r^2}{4\pi}$
$\frac{s}{4\pi} = r^2$

22. $V = \frac{4}{3}\pi r^3$
$3(V) = 3\left(\frac{4}{3}\pi r^3\right)$
$3V = 4\pi r^3$
$\frac{3V}{4\pi} = \frac{4\pi r^3}{4\pi}$
$\frac{3V}{4\pi} = r^3$

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24.
$$A = \frac{1}{2}a(b_1 + b_2)$$
$$A = \frac{1}{2}ab_1 + \frac{1}{2}ab_2$$
$$2(A) = 2\left(\frac{1}{2}ab_1\right) + 2\left(\frac{1}{2}ab_2\right)$$
$$2A = ab_1 + ab_2$$
$$2A - ab_2 = ab_1 + ab_2 - ab_2$$
$$2A - ab_2 = ab_1$$
$$\frac{2A - ab_2}{a} = \frac{ab_1}{a}$$
$$\frac{2A - ab_2}{a} = b_1$$
$$b_1 = \frac{2A - ab_2}{a}$$

26.
$$H = 5as + 10a^2$$
$$H - 10a^2 = 5as$$
$$\frac{H - 10a^2}{5a} = \frac{5as}{5a}$$
$$\frac{H - 10a^2}{5a} = s$$
$$s = \frac{H - 10a^2}{5a}$$

28.
$$K = \frac{1}{2}mv^2$$
$$2(K) = 2\left(\frac{1}{2}mv^2\right)$$
$$2K = mv^2$$
$$\frac{2K}{m} = \frac{mv^2}{m}$$
$$\frac{2K}{m} = v^2$$

30.
$$V = LWH$$
$$\frac{V}{LW} = \frac{LWH}{LW}$$
$$\frac{V}{LW} = H$$

32.
$$V = \frac{1}{3}\pi r^2 h$$
$$3(V) = 3\left(\frac{1}{3}\pi r^2 h\right)$$
$$3V = \pi r^2 h$$
$$\frac{3V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$$
$$\frac{3V}{\pi r^2} = h$$

34.
$$N = F + d(n-1)$$
$$N - F = d(n-1)$$
$$\frac{N - F}{(n-1)} = \frac{d(n-1)}{(n-1)}$$
$$\frac{N - F}{n-1} = d$$

36.
$$c^2 = a^2 + b^2$$
$$c^2 - a^2 = a^2 + b^2 - a^2$$
$$c^2 - a^2 = b^2$$

38.
$$C = \frac{5}{9}(F - 32)$$
$$C = \frac{5}{9}F - \frac{160}{9}$$
$$9(C) = 9\left(\frac{5}{9}F\right) - 9\left(\frac{160}{9}\right)$$
$$9C = 5F - 160$$
$$9C + 160 = 5F$$
$$\frac{9C + 160}{5} = \frac{5F}{5}$$
$$\frac{9C}{5} + \frac{160}{5} = F$$
$$\frac{9}{5}C + 32 = F \text{ or } F = 1.8C + 32$$

40.
$$d = \frac{m}{v}$$
$$vd = v \cdot \frac{m}{v}$$
$$vd = m$$
$$\frac{vd}{d} = \frac{m}{d}$$
$$v = \frac{m}{d}$$

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42. $A = \dfrac{\pi r^2 S}{360}$

$360A = 360 \cdot \dfrac{\pi r^2 S}{360}$

$360A = \pi r^2 S$

$\dfrac{360A}{\pi S} = \dfrac{\pi r^2 S}{\pi S}$

$\dfrac{360A}{\pi S} = r^2$

44. $d = \dfrac{N-F}{n-1}$, $F = 6$, $n = 3$, $N = 24$

$d = \dfrac{24-6}{3-1} = \dfrac{18}{2} = 9$

The difference is 9.

46. $H = \dfrac{V}{LW}$, $V = 3024$, $W = 14$, $L = 18$

$H = \dfrac{3024}{(18)(14)} = 12$

The height of the tank is 12 inches.

48. a. $V = 1709x + 31{,}560$

$V - 31{,}560 = 1709x$

$\dfrac{V - 31{,}560}{1709} = x$

b. $V = 50{,}359$

$x = \dfrac{50{,}359 - 31{,}560}{1709}$

$x = \dfrac{18{,}799}{1709}$

$x = 11$

2009 + 11 = 2020

The year is 2020.

50. $A = \dfrac{1}{2}ab$, $a \to 2a$ and $b \to 2b$

$A \to \dfrac{1}{2}(2a)(2b) = 4A$

A quadruples.

52. $A = \pi r^2$

If $r \to \dfrac{r}{2}$, $A \to \pi\left(\dfrac{r}{2}\right)^2 = \dfrac{\pi r^2}{4} = \dfrac{A}{4}$

A is one-fourth of its original value.

Cumulative Review

53. 20% of \$80 = $0.20 \times \$80 = \$16$

54. 0.5% of 200 = $0.005 \times 200 = 1$

55. $\left(3\dfrac{1}{4}\right)(12{,}000) = \dfrac{13}{4}(12{,}000)$

$= 39{,}000$

The company needs 39,000 square feet of plastic.

56. $\text{Total} = 4\dfrac{1}{3} + 2\dfrac{3}{4} + 3\dfrac{1}{2}$

$= \dfrac{13}{3} + \dfrac{11}{4} + \dfrac{7}{2}$

$= \dfrac{52}{12} + \dfrac{33}{12} + \dfrac{42}{12}$

$= \dfrac{127}{12}$

$= 10\dfrac{7}{12}$

The spotlight was used $10\dfrac{7}{12}$ hours.

Classroom Quiz 2.5

1. $A = 4x + 5y$

$A - 4x = 5y$

$\dfrac{A - 4x}{5} = \dfrac{5y}{5}$

$\dfrac{A - 4x}{5} = y$

2. $A = \dfrac{1}{4}h(a+b)$

$A = \dfrac{1}{4}ha + \dfrac{1}{4}hb$

$4(A) = 4\left(\dfrac{1}{4}ha\right) + 4\left(\dfrac{1}{4}hb\right)$

$4A = ha + hb$

$4A - ha = hb$

$\dfrac{4A - ha}{h} = \dfrac{hb}{h}$

$\dfrac{4A - ha}{h} = b$

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3. $4ax = 2axy - 3$
$4ax + 3 = 2axy$
$\frac{4ax+3}{2ax} = \frac{2axy}{2ax}$
$\frac{4ax+3}{2ax} = y$

2.6 Exercises

2. $-8 < -3$ is equivalent to $-3 > -8$. Both statements imply that -3 is to the right of -8 on a number line.

4. $-10 \; ? \; 6$
Use <, since -10 is to the left of 6 on a number line.
$-10 < 6$

6. $-8 \; ? \; 0$
Use <, since -8 is to the left of 0 on a number line.
$-8 < 0$

8. $-5 \; ? \; -8$
Use >, since -5 is to the right of -8 on a number line.
$-5 > -8$

10. a. $-5 \; ? \; 11$
Use <, since -5 is to the left of 11 on a number line.
$-5 < 11$

b. $11 \; ? \; -5$
From part a, $11 > -5$ since $-5 < 11$ is equivalent to $11 > -5$.

12. a. $-17 \; ? \; 17$
Use <, since -17 is to the left of 17 on a number line.
$-17 < 17$

b. $17 \; ? \; -17$
From part a, $17 > -17$ since $-17 < 17$ is equivalent to $17 > -17$.

14. $\frac{4}{6} \; ? \; \frac{7}{9}$
$\frac{12}{18} \; ? \; \frac{14}{18}$
Use <, since $12 < 14$.
$\frac{4}{6} < \frac{7}{9}$

16. $\frac{9}{11} \; ? \; \frac{41}{53}$
$\frac{477}{583} \; ? \; \frac{451}{583}$
Use >, since 477 is to the right of 451 on a number line.
$\frac{9}{11} > \frac{41}{53}$

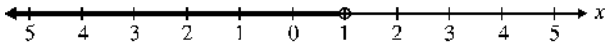
18. $-4.2 \; ? \; -7.3$
Use >, since -4.2 is to the right of -7.3 on a number line.
$-4.2 > -7.3$

20. $-3.7 \; ? \; 3.7$
Use <, since -3.7 is to the left of 3.7 on a number line.
$-3.7 < 3.7$

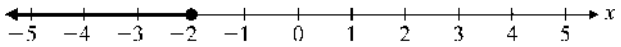
22. $-5 \; ? \; -\frac{29}{4}$
$-\frac{20}{4} \; ? \; -\frac{29}{4}$
Use >, since $-20 > -29$.
$-5 > -\frac{29}{4}$

24. $-\frac{2}{3} \; ? \; -\frac{1}{2}$
$-\frac{4}{6} \; ? \; -\frac{3}{6}$
Use <, since $-4 < -3$.
$-\frac{2}{3} < -\frac{1}{2}$

26. $x < 1$
x is less than 1. All of the points to the left of 1 are shaded.



28. $x \le -2$
x is less than or equal to -2. All of the points to the left of -2 are shaded. The closed circle indicates that we do include the point for -2.



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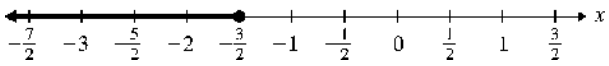
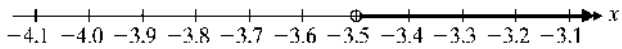
30. $x \le -\frac{3}{2}$

x is less than or equal to $-\frac{3}{2}$. All of the points to the left of $-\frac{3}{2}$ are shaded. The closed circle indicates that we do include the point for $-\frac{3}{2}$.



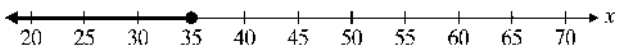
32. $x > -3.5$

x is greater than −3.5. All of the points to the right of −3.5 are shaded.



34. $35 \ge x$

35 is greater than or equal to x is equivalent to x is less than or equal to 35. All of the points to the left of 35 are shaded. The closed circle indicates that we do include the point for 35.



36. x is greater than −4.5.

$x > -4.5$

38. x is less than or equal to $\frac{5}{2}$.

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

40. x is greater than −10.

$x > -10$

42. Since the BMI measurement is smaller than 18.5, we have $B < 18.5$.

44. Since the weight must not exceed 126 pounds, the weight must be less than or equal to 126 pounds, so we have $w \le 126$.

46. $x < 4, x > -4, \ x \le \frac{7}{2}, \ x \ge -\frac{9}{2}$

x is less than 4.

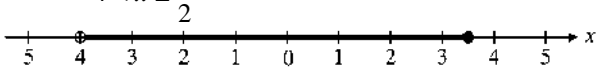
x is greater than −4.

x is less than or equal to $\frac{7}{2}$.

x is greater than or equal to $-\frac{9}{2}$.

Since $\frac{7}{2} = 3.5$ is less than 4, x must be less than or equal to $\frac{7}{2}$. Since −4 is greater than $-\frac{9}{2} = -4.5$, x must be greater than −4.

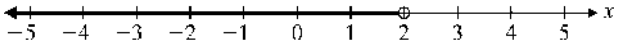
$-4 < x \le \frac{7}{2}$



48. $x - 5 < -3$

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

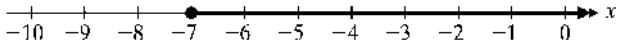
$x < 2$



50. $6x \ge -42$

$\frac{6x}{6} \ge \frac{-42}{6}$

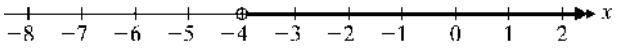
$x \ge -7$



52. $-7x < 28$

$\frac{-7x}{-7} > \frac{28}{-7}$

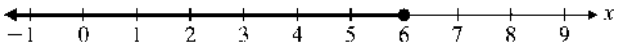
$x > -4$



54. $\frac{1}{3}x \le 2$

$3\left(\frac{1}{3}x\right) \le 3(2)$

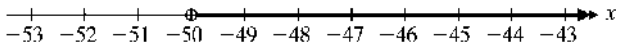
$x \le 6$



56. $-\frac{1}{5}x < 10$

$-5\left(-\frac{1}{5}x\right) > -5(10)$

$x > -50$



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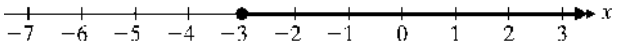
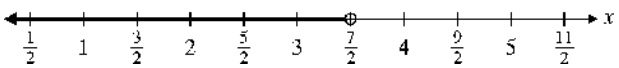
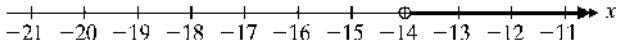
58.
$$\begin{aligned} 9-4x &\le 21 \\ 9-4x-9 &\le 21-9 \\ -4x &\le 12 \\ \frac{-4x}{-4} &\ge \frac{12}{-4} \\ x &\ge -3 \end{aligned}$$



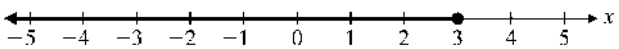
60.
$$\begin{aligned} -6-4x &< 1-6x \\ -6-4x+6x &< 1-6x+6x \\ -6+2x &< 1 \\ -6+2x+6 &< 1+6 \\ 2x &< 7 \\ \frac{2x}{2} &< \frac{7}{2} \\ x &< \frac{7}{2} \end{aligned}$$



62.
$$\begin{aligned} \frac{x}{4}-2 &< \frac{3x}{4}+5 \\ 4\left(\frac{x}{4}\right)-4(2) &< 4\left(\frac{3x}{4}\right)+4(5) \\ x-8 &< 3x+20 \\ x-8-3x &< 3x+20-3x \\ -2x-8 &< 20 \\ -2x-8+8 &< 20+8 \\ -2x &< 28 \\ \frac{-2x}{-2} &> \frac{28}{-2} \\ x &> -14 \end{aligned}$$



64.
$$\begin{aligned} 5(x-3) &\le 2(x-3) \\ 5x-15 &\le 2x-6 \\ 5x-15-2x &\le 2x-6-2x \\ 3x-15 &\le -6 \\ 3x-15+15 &\le -6+15 \\ 3x &\le 9 \\ \frac{3x}{3} &\le \frac{9}{3} \\ x &\le 3 \end{aligned}$$



66.
$$\begin{aligned} -21 &> -29 \\ \frac{-21}{-3} &< \frac{-29}{-3} \\ 7 &< \frac{29}{3} \end{aligned}$$

Dividing both sides of an inequality by a negative number reverses the direction of the inequality.

68.
$$\begin{aligned} 7x+8 &< 12x-2 \\ 7x+8-12x &< 12x-2-12x \\ -5x+8 &< -2 \\ -5x+8-8 &< -2-8 \\ -5x &< -10 \\ \frac{-5x}{-5} &> \frac{-10}{-5} \\ x &> 2 \end{aligned}$$

70.
$$\begin{aligned} 9x-8 &\le 7x+4 \\ 9x-8-7x &\le 7x+4-7x \\ 2x-8 &\le 4 \\ 2x-8+8 &\le 4+8 \\ 2x &\le 12 \\ \frac{2x}{2} &\le \frac{12}{2} \\ x &\le 6 \end{aligned}$$

72.
$$\begin{aligned} 0.4(2-x)+0.6 &> 0.2(x-2) \\ 0.8-0.4x+0.6 &> 0.2x-0.4 \\ 1.4-0.4x &> 0.2x-0.4 \\ 10(1.4)-10(0.4x) &> 10(0.2x)-10(0.4) \\ 14-4x &> 2x-4 \\ 14-4x-2x &> 2x-4-2x \\ 14-6x &> -4 \\ 14-6x-14 &> -4-14 \\ -6x &> -18 \\ \frac{-6x}{-6} &< \frac{-18}{-6} \\ x &< 3 \end{aligned}$$

74.
$$\begin{aligned} 9-3(2x-1) &\le 4(x+2) \\ 9-6x+3 &\le 4x+8 \\ 12-6x &\le 4x+8 \\ 12-6x-4x &\le 4x+8-4x \\ 12-10x &\le 8 \\ 12-10x-12 &\le 8-12 \\ -10x &\le -4 \\ \frac{-10x}{-10} &\ge \frac{-4}{-10} \\ x &\ge \frac{2}{5} \end{aligned}$$

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76.
$$\frac{3x+5}{4}-\frac{7}{12}>-\frac{x}{6}$$
$$12\left(\frac{3x+5}{4}\right)-12\left(\frac{7}{12}\right)>12\left(-\frac{x}{6}\right)$$
$$3(3x+5)-7>-2x$$
$$9x+15-7>-2x$$
$$9x+8>-2x$$
$$9x+8-9x>-2x-9x$$
$$8>-11x$$
$$\frac{8}{-11}<\frac{-11x}{-11}$$
$$-\frac{8}{11}<x$$
$$x>-\frac{8}{11}$$

78. x = amount of sales
$$0.08x>10{,}000$$
$$\frac{0.08x}{0.08}>\frac{10{,}000}{0.08}$$
$$x>125{,}000$$
She must have more than \$125,000 in sales.

80.
$$600+260x\geq 4500$$
$$260x\geq 3900$$
$$x\geq\frac{3900}{260}$$
$$x\geq 15$$
It will take 15 months.

Cumulative Review

81. 16% of 38 = $0.16\times 38 = 6.08$

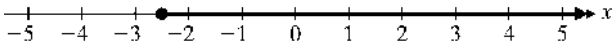
82. 18 is what percent of 120?
$$\frac{18}{120}=\frac{3}{20}=0.15=15\%$$

83. 16 is what percent of 800?
$$\frac{16}{800}=0.02=2\%$$
2% are accepted.

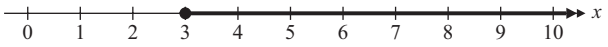
84. $\frac{3}{8}=0.375=37.5\%$

Classroom Quiz 2.6

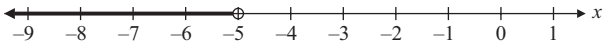
1. $x\geq -2.5$
x is greater than or equal to −2.5. All of the points to the right of −2.5 are shaded. The closed circle indicates that we do include the point for −2.5.



2.
$$-9+6x\geq 3x$$
$$-9+6x-6x\geq 3x-6x$$
$$-9\geq -3x$$
$$\frac{-9}{-3}\leq\frac{-3x}{-3}$$
$$3\leq x$$
$$x\geq 3$$



3.
$$\frac{x}{5}-2>\frac{4}{5}x+1$$
$$5\left(\frac{x}{5}\right)-5(2)>5\left(\frac{4}{5}x\right)+5(1)$$
$$x-10>4x+5$$
$$x-10-4x>4x+5-4x$$
$$-3x-10>5$$
$$-3x-10+10>5+10$$
$$-3x>15$$
$$\frac{-3x}{-3}<\frac{15}{-3}$$
$$x<-5$$



Career Exploration Problems

1. Solve for W
$$\text{BMR}=10W+6.25H-5A+5$$
$$\text{BMR}-6.25H+5A-5=10W$$
$$\frac{\text{BMR}-6.25H+5A-5}{10}=W$$
Solve for H.
$$\text{BMR}=10W+6.25H-5A+5$$
$$\text{BMR}-10W+5A-5=6.25H$$
$$\frac{\text{BMR}-10W+5A-5}{6.25}=H$$

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2. IBW = 106 lb + 6 (the number of inches over 5 feet tall)

$$\begin{aligned} 190 &= 106 + 6(x - 60) \\ 190 &= 106 + 6x - 360 \\ 190 &= 6x - 254 \\ 444 &= 6x \\ 74 &= x \end{aligned}$$

The male's height is 74 inches or 6 feet 2 inches.

3. IBW = 100 lb + 5 (the number of inches over 5 feet tall)

$$\begin{aligned} &= 100 + 5(5) \\ &= 100 + 25 \\ &= 125 \end{aligned}$$

Her ideal weight is 125 pounds.

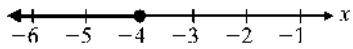
You Try It

1.
$$\begin{aligned} -8x - 1 + x &= 13 - 6x - 2 \\ -7x - 1 &= -6x + 11 \\ -7x - 1 + 6x &= -6x + 11 + 6x \\ -x - 1 &= 11 \\ -x - 1 + 1 &= 11 + 1 \\ -x &= 12 \\ \frac{-x}{-1} &= \frac{12}{-1} \\ x &= -12 \end{aligned}$$

2.
$$\begin{aligned} \frac{1}{3}(y + 5) &= \frac{1}{4}(5y - 8) \\ \frac{1}{3}y + \frac{5}{3} &= \frac{5}{4}y - 2 \\ 12\left(\frac{1}{3}y\right) + 12\left(\frac{5}{3}\right) &= 12\left(\frac{5}{4}y\right) - 12(2) \\ 4y + 20 &= 15y - 24 \\ 4y + 20 - 15y &= 15y - 24 - 15y \\ -11y + 20 &= -24 \\ -11y + 20 - 20 &= -24 - 20 \\ -11y &= -44 \\ \frac{-11y}{-11} &= \frac{-44}{-11} \\ y &= 4 \end{aligned}$$

3.
$$\begin{aligned} H &= \frac{1}{4}(ca + b) \\ H &= \frac{1}{4}ca + \frac{1}{4}b \\ 4(H) &= 4\left(\frac{1}{4}ca\right) + 4\left(\frac{1}{4}b\right) \\ 4H &= ca + b \\ 4H - b &= ca \\ \frac{4H - b}{c} &= a \\ a &= \frac{4H - b}{c} \end{aligned}$$

4.
$$\begin{aligned} 4 + 3x - 5 &\geq \frac{1}{3}(10x + 1) \\ 3x - 1 &\geq \frac{10}{3}x + \frac{1}{3} \\ 3(3x) - 3(1) &\geq 3\left(\frac{10}{3}x\right) + 3\left(\frac{1}{3}\right) \\ 9x - 3 &\geq 10x + 1 \\ 9x - 3 - 10x &\geq 10x + 1 - 10x \\ -x - 3 &\geq 1 \\ -x - 3 + 3 &\geq 1 + 3 \\ -x &\geq 4 \\ \frac{-x}{-1} &\leq \frac{4}{-1} \\ x &\leq -4 \end{aligned}$$



Chapter 2 Review Problems

1.
$$\begin{aligned} 3x + 2x &= -35 \\ 5x &= -35 \\ \frac{5x}{5} &= \frac{-35}{5} \\ x &= -7 \end{aligned}$$

2.
$$\begin{aligned} x - 19 &= -29 + 7 \\ x - 19 &= -22 \\ x - 19 + 19 &= -22 + 19 \\ x &= -3 \end{aligned}$$

3.
$$\begin{aligned} 18 - 10x &= 63 + 5x \\ 18 - 10x + 10x &= 63 + 5x + 10x \\ 18 &= 63 + 15x \\ 18 - 63 &= 63 - 63 + 15x \\ -45 &= 15x \\ \frac{-45}{15} &= \frac{15x}{15} \\ -3 &= x \end{aligned}$$

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4.
$$\begin{aligned} x-(0.5x+2.6)&=17.6\\ x-0.5x-2.6&=17.6\\ 0.5x-2.6&=17.6\\ 10(0.5x)-10(2.6)&=10(17.6)\\ 5x-26&=176\\ 5x-26+26&=176+26\\ 5x&=202\\ \frac{5x}{5}&=\frac{202}{5}\\ x&=40.4 \text{ or } 40\frac{2}{5}\end{aligned}$$

5.
$$\begin{aligned} 3(x-2)&=-4(5+x)\\ 3x-6&=-20-4x\\ 3x+4x-6&=-20-4x+4x\\ 7x-6&=-20\\ 7x-6+6&=-20+6\\ 7x&=-14\\ \frac{7x}{7}&=\frac{-14}{7}\\ x&=-2\end{aligned}$$

6.
$$\begin{aligned} 12-5x&=-7x-2\\ 12-5x+7x&=-7x+7x-2\\ 12+2x&=-2\\ 12-12+2x&=-2-12\\ 2x&=-14\\ \frac{2x}{2}&=\frac{-14}{2}\\ x&=-7\end{aligned}$$

7.
$$\begin{aligned} 2(3-x)&=1-(x-2)\\ 6-2x&=1-x+2\\ 6-2x+x&=3-x+x\\ 6-x&=3\\ 6+(-6)-x&=3+(-6)\\ -x&=-3\\ \frac{-x}{-1}&=\frac{-3}{-1}\\ x&=3\end{aligned}$$

8.
$$\begin{aligned} 4(x+5)-7&=2(x+3)\\ 4x+20-7&=2x+6\\ 4x+13&=2x+6\\ 4x+13-13&=2x+6-13\\ 4x&=2x-7\\ -2x+4x&=-2x+2x-7\\ 2x&=-7\\ \frac{2x}{2}&=\frac{-7}{2}\\ x&=-\frac{7}{2} \text{ or } -3\frac{1}{2} \text{ or } -3.5\end{aligned}$$

9.
$$\begin{aligned} 3&=2x+5-3(x-1)\\ 3&=2x+5-3x+3\\ 3&=-x+8\\ 3+(-8)&=-x+8+(-8)\\ -5&=-x\\ \frac{-5}{-1}&=\frac{-x}{-1}\\ 5&=x\end{aligned}$$

10.
$$\begin{aligned} 2(5x-1)-7&=3(x-1)+5-4x\\ 10x-2-7&=3x-3+5-4x\\ 10x-9&=-x+2\\ 10x+x-9&=-x+x+2\\ 11x-9&=2\\ 11x-9+9&=2+9\\ 11x&=11\\ \frac{11x}{11}&=\frac{11}{11}\\ x&=1\end{aligned}$$

11.
$$\begin{aligned} \frac{3}{4}x-3&=\frac{1}{2}x+2\\ 4\left(\frac{3}{4}x\right)-4(3)&=4\left(\frac{1}{2}x\right)+4(2)\\ 3x-12&=2x+8\\ 3x-12+12&=2x+8+12\\ 3x&=2x+20\\ -2x+3x&=-2x+2x+20\\ x&=20\end{aligned}$$

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12.
$$1=\frac{5x}{6}+\frac{2x}{3}$$
$$6(1)=6\left(\frac{5x}{6}\right)+6\left(\frac{2x}{3}\right)$$
$$6=5x+4x$$
$$6=9x$$
$$\frac{6}{9}=\frac{9x}{9}$$
$$\frac{2}{3}=x$$

13.
$$\frac{7x}{5}=5+\frac{2x}{5}$$
$$5\left(\frac{7x}{5}\right)=5(5)+5\left(+\frac{2x}{5}\right)$$
$$7x=25+2x$$
$$7x-2x=25+2x-2x$$
$$5x=25$$
$$\frac{5x}{5}=\frac{25}{5}$$
$$x=5$$

14.
$$\frac{7x-3}{2}-4=\frac{5x+1}{3}$$
$$6\left(\frac{7x-3}{2}\right)-6(4)=6\left(\frac{5x+1}{3}\right)$$
$$3(7x-3)-24=2(5x+1)$$
$$21x-9-24=10x+2$$
$$21x-33=10x+2$$
$$21x+(-10x)-33=10x+(-10x)+2$$
$$11x-33=2$$
$$11x-33+33=2+33$$
$$11x=35$$
$$\frac{11x}{11}=\frac{35}{11}$$
$$x=\frac{35}{11}\text{ or }3\frac{2}{11}$$

15.
$$\frac{3x-2}{2}+\frac{x}{4}=2+x$$
$$4\left(\frac{3x-2}{2}\right)+4\left(\frac{x}{4}\right)=4(2)+4(x)$$
$$2(3x-2)+x=8+4x$$
$$6x-4+x=8+4x$$
$$7x-4=4x+8$$
$$7x-4+4=4x+8+4$$
$$7x=4x+12$$
$$-4x+7x=-4x+4x+12$$
$$3x=12$$
$$\frac{3x}{3}=\frac{12}{3}$$
$$x=4$$

16.
$$\frac{-3}{2}(x+5)=1-x$$
$$-\frac{3}{2}x-\frac{15}{2}=1-x$$
$$2\left(-\frac{3}{2}x\right)-2\left(\frac{15}{2}\right)=2(1)-2(x)$$
$$-3x-15=2-2x$$
$$-3x+3x-15=2-2x+3x$$
$$-15=2+x$$
$$-15+(-2)=2+(-2)+x$$
$$-17=x$$

17.
$$-0.2(x+1)=0.3(x+11)$$
$$10[-0.2(x+1)]=10[0.3(x+11)]$$
$$-2(x+1)=3(x+11)$$
$$-2x-2=3x+33$$
$$-2x-2-33=3x+33-33$$
$$-2x-35=3x$$
$$2x-2x-35=2x+3x$$
$$-35=5x$$
$$\frac{-35}{5}=\frac{5x}{5}$$
$$-7=x$$

18.
$$1.2x-0.8=0.8x+0.4$$
$$1.2x-0.8-0.8x=0.8x+0.4-0.8x$$
$$0.4x-0.8=0.4$$
$$0.4x-0.8+0.8=0.4+0.8$$
$$0.4x=1.2$$
$$\frac{0.4x}{0.4}=\frac{1.2}{0.4}$$
$$x=3$$

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19.
$$\begin{aligned} 3.2-0.6x &= 0.4(x-2) \\ 3.2-0.6x &= 0.4x-0.8 \\ 3.2-0.6x+0.6x &= 0.4x-0.8+0.6x \\ 3.2 &= x-0.8 \\ 3.2+0.8 &= x-0.8+0.8 \\ 4 &= x \end{aligned}$$

20.
$$\begin{aligned} \frac{1}{3}(x-2) &= \frac{x}{4}+2 \\ \frac{1}{3}x-\frac{2}{3} &= \frac{x}{4}+2 \\ 12\left(\frac{1}{3}x\right)-12\left(\frac{2}{3}\right) &= 12\left(\frac{x}{4}\right)+12(2) \\ 4x-8 &= 3x+24 \\ 4x+(-3x)-8 &= 3x+(-3x)+24 \\ x-8 &= 24 \\ x-8+8 &= 24+8 \\ x &= 32 \end{aligned}$$

21.
$$\begin{aligned} \frac{3}{4}-\frac{2}{3}x &= \frac{1}{3}x+\frac{3}{4} \\ 12\left(\frac{3}{4}\right)-12\left(\frac{2}{3}x\right) &= 12\left(\frac{1}{3}x\right)+12\left(\frac{3}{4}\right) \\ 9-8x &= 4x+9 \\ 9-8x+8x &= 4x+9+8x \\ 9 &= 12x+9 \\ 9-9 &= 12x+9-9 \\ 0 &= 12x \\ \frac{0}{12} &= \frac{12x}{12} \\ 0 &= x \end{aligned}$$

22.
$$\begin{aligned} -\frac{8}{3}x-8+2x-5 &= -\frac{5}{3} \\ -\frac{8}{3}x-13+2x &= -\frac{5}{3} \\ 3\left(-\frac{8}{3}x\right)-3(13)+3(2x) &= 3\left(-\frac{5}{3}\right) \\ -8x-39+6x &= -5 \\ -2x-39 &= -5 \\ -2x-39+39 &= -5+39 \\ -2x &= 34 \\ \frac{-2x}{-2} &= \frac{34}{-2} \\ x &= -17 \end{aligned}$$

23.
$$\begin{aligned} \frac{1}{6}+\frac{1}{3}(x-3) &= \frac{1}{2}(x+9) \\ \frac{1}{6}+\frac{1}{3}x-1 &= \frac{1}{2}x+\frac{9}{2} \\ \frac{1}{3}x-\frac{5}{6} &= \frac{1}{2}x+\frac{9}{2} \\ 6\left(\frac{1}{3}x\right)-6\left(\frac{5}{6}\right) &= 6\left(\frac{1}{2}x\right)+6\left(\frac{9}{2}\right) \\ 2x-5 &= 3x+27 \\ 2x-2x-5 &= 3x-2x+27 \\ -5 &= x+27 \\ -5-27 &= x+27-27 \\ -32 &= x \end{aligned}$$

24.
$$\begin{aligned} \frac{1}{7}(x+5)-\frac{3}{7} &= \frac{1}{2}(x+3) \\ \frac{1}{7}x+\frac{5}{7}-\frac{3}{7} &= \frac{1}{2}x+\frac{3}{2} \\ \frac{1}{7}x+\frac{2}{7} &= \frac{1}{2}x+\frac{3}{2} \\ 14\left(\frac{1}{7}x\right)+14\left(\frac{2}{7}\right) &= 14\left(\frac{1}{2}x\right)+14\left(\frac{3}{2}\right) \\ 2x+4 &= 7x+21 \\ 2x-2x+4 &= 7x-2x+21 \\ 4 &= 5x+21 \\ 4-21 &= 5x+21-21 \\ -17 &= 5x \\ \frac{-17}{5} &= \frac{5x}{5} \\ -\frac{17}{5} &= x \text{ or } x=-3.4 \end{aligned}$$

25.
$$\begin{aligned} 3x-y &= 10 \\ 3x+(-3x)-y &= -3x+10 \\ -y &= -3x+10 \\ \frac{-y}{-1} &= \frac{-3x+10}{-1} \\ y &= 3x-10 \end{aligned}$$

26.
$$\begin{aligned} 5x+2y+7 &= 0 \\ 5x+2y &= -7 \\ 2y &= -5x-7 \\ y &= \frac{-5x-7}{2} \end{aligned}$$

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27.
$$A = P(1+rt)$$
$$A = P + Prt$$
$$A + (-P) = P + (-P) + Prt$$
$$A - P = Prt$$
$$\frac{A-P}{Pt} = \frac{Prt}{Pt}$$
$$\frac{A-P}{Pt} = r$$

28.
$$A = 4\pi r^2 + 2\pi rh$$
$$A - 4\pi r^2 = 2\pi rh$$
$$\frac{A-4\pi r^2}{2\pi r} = \frac{2\pi rh}{2\pi r}$$
$$\frac{A-4\pi r^2}{2\pi r} = h$$
$$h = \frac{A-4\pi r^2}{2\pi r}$$

29.
$$H = \frac{1}{3}(a+2p+3)$$
$$H = \frac{1}{3}a + \frac{2}{3}p + 1$$
$$3(H) = 3\left(\frac{1}{3}a\right) + 3\left(\frac{2}{3}p\right) + 3(1)$$
$$3H = a + 2p + 3$$
$$3H + (-a) + (-3) = a + (-a) + 2p + 3 + (-3)$$
$$3H - a - 3 = 2p$$
$$\frac{3H-a-3}{2} = \frac{2p}{2}$$
$$\frac{3H-a-3}{2} = p$$
$$p = \frac{3H-a-3}{2}$$

30.
$$ax + by = c$$
$$ax - ax + by = c - ax$$
$$by = c - ax$$
$$\frac{by}{b} = \frac{c-ax}{b}$$
$$y = \frac{c-ax}{b}$$

31. a.
$$x = \frac{ABC}{10}$$
$$10(x) = 10\left(\frac{ABC}{10}\right)$$
$$10x = ABC$$
$$\frac{10x}{BC} = \frac{ABC}{BC}$$
$$\frac{10x}{BC} = A$$

b. $A = \dfrac{10x}{BC} = \dfrac{10(6)}{(-1)(1.5)} = \dfrac{60}{-1.5} = -40$

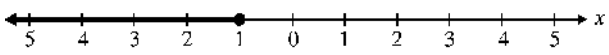
32. a.
$$2l + 2w = P$$
$$2w = P - 2l$$
$$\frac{2w}{2} = \frac{P-2l}{2}$$
$$w = \frac{P-2l}{2}$$

b.
$$w = \frac{P-2l}{2}$$
$$= \frac{34-2(10.5)}{2}$$
$$= \frac{34-21}{2}$$
$$= \frac{13}{2}$$
$$= 6.5$$

33. a.
$$V = lwh$$
$$\frac{V}{lw} = \frac{lwh}{lw}$$
$$\frac{V}{lw} = h$$

b. $V = 48$, $l = 2$, $w = 4$
$$h = \frac{48}{2(4)} = 6$$

34.
$$9 + 2x \le 6 - x$$
$$9 + 2x + x \le 6 - x + x$$
$$9 + 3x \le 6$$
$$9 + 3x - 9 \le 6 - 9$$
$$3x \le -3$$
$$\frac{3x}{3} \le \frac{-3}{3}$$
$$x \le -1$$



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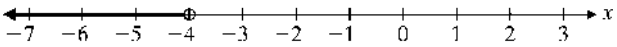
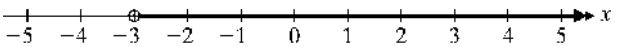
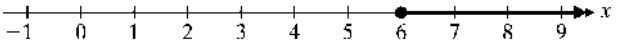
35. $2x-3+x>5(x+1)$
$3x-3>5x+5$
$3x-3-5x>5x+5-5x$
$-2x-3>5$
$-2x-3+3>5+3$
$-2x>8$
$\frac{-2x}{-2}<\frac{8}{-2}$
$x<-4$



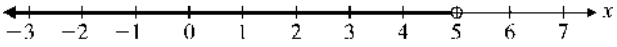
36. $-x+4<3x+16$
$-x+4-4<3x+16-4$
$-x<3x+12$
$-3x-x<-3x+3x+12$
$-4x<12$
$\frac{-4x}{-4}>\frac{12}{-4}$
$x>-3$



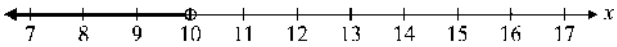
37. $8-\frac{1}{3}x\le x$
$3(8)-3\left(\frac{1}{3}x\right)\le 3x$
$24-x\le 3x$
$24-x+(-3x)\le 3x+(-3x)$
$24-4x\le 0$
$24+(-24)-4x\le 0+(-24)$
$-4x\le -24$
$\frac{-4x}{-4}\ge\frac{-24}{-4}$
$x\ge 6$



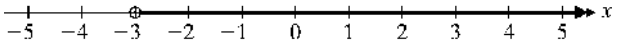
38. $7-\frac{3}{5}x>4$
$5(7)-5\left(\frac{3}{5}x\right)>5(4)$
$35-3x>20$
$35+(-35)-3x>20+(-35)$
$-3x>-15$
$\frac{-3x}{-3}<\frac{-15}{-3}$
$x<5$



39. $-4x-14<4-2(3x-1)$
$-4x-14<4-6x+2$
$-4x-14<6-6x$
$-4x-14+6x<6-6x+6x$
$2x-14<6$
$2x-14+14<6+14$
$2x<20$
$\frac{2x}{2}<\frac{20}{2}$
$x<10$



40. $3(x-2)+8<7x+14$
$3x-6+8<7x+14$
$3x+2<7x+14$
$3x-2+2<7x+14-2$
$3x<7x+12$
$-7x+3x<-7x+7x+12$
$-4x<12$
$\frac{-4x}{-4}>\frac{12}{-4}$
$x>-3$



41. $15h\le 480$
$\frac{15h}{15}\le\frac{480}{15}$
$h\le 32$
Julian can work a maximum of 32 hours.

42. $110n\le 2420$
$\frac{110n}{110}\le\frac{2420}{110}$
$n\le 22$
A substitute teacher can be hired a maximum of 22 times.

43. $10(2x+4)-13=8(x+7)-3$
$20x+40-13=8x+56-3$
$20x+27=8x+53$
$20x+27-8x=8x+53-8x$
$12x+27=53$
$12x+27-27=53-27$
$12x=26$
$\frac{12x}{12}=\frac{26}{12}$
$x=\frac{13}{6}$

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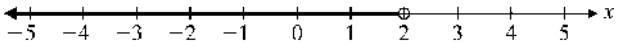
44.
$$\begin{aligned} -9x+15-2x &= 4-3x \\ -11x+15 &= 4-3x \\ -11x+15+3x &= 4-3x+3x \\ -8x+15 &= 4 \\ -8x+15-15 &= 4-15 \\ -8x &= -11 \\ \frac{-8x}{-8} &= \frac{-11}{-8} \\ x &= \frac{11}{8} \end{aligned}$$

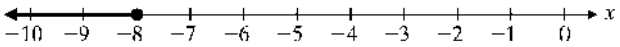
45.
$$\begin{aligned} -2(x-3) &= -4x+3(3x+2) \\ -2x+6 &= -4x+9x+6 \\ -2x+6 &= 5x+6 \\ -2x+6-6 &= 5x+6-6 \\ -2x &= 5x \\ 2x-2x &= 2x+5x \\ 0 &= 7x \\ \frac{0}{7} &= \frac{7x}{7} \\ 0 &= x \end{aligned}$$

46.
$$\begin{aligned} \frac{1}{2}+\frac{5}{4}x &= \frac{2}{5}x-\frac{1}{10}+4 \\ 20\left(\frac{1}{2}\right)+20\left(\frac{5}{4}x\right) &= 20\left(\frac{2}{5}x\right)-20\left(\frac{1}{10}\right)+20(4) \\ 10+25x &= 8x-2+80 \\ 10+25x &= 8x+78 \\ 10+25x+(-8x) &= 8x+(-8x)+78 \\ 10+17x &= 78 \\ 10+(-10)+17x &= 78+(-10) \\ 17x &= 68 \\ \frac{17x}{17} &= \frac{68}{17} \\ x &= 4 \end{aligned}$$

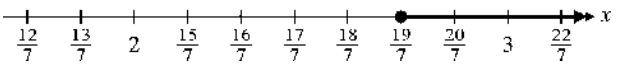
47.
$$\begin{aligned} 5-\frac{1}{2}x &> 4 \\ 2(5)-2\left(\frac{1}{2}x\right) &> 2(4) \\ 10-x &> 8 \\ -10+10-x &> -10+8 \\ -x &> -2 \\ \frac{-x}{-1} &< \frac{-2}{-1} \\ x &< 2 \end{aligned}$$



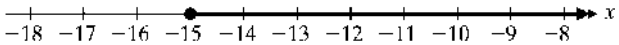
48.
$$\begin{aligned} 2(x-1) &\geq 3(2+x) \\ 2x-2 &\geq 6+3x \\ 2x-2-3x &> 6+3x-3x \\ -x-2 &\geq 6 \\ -x-2+2 &\geq 6+2 \\ -x &\geq 8 \\ x &\leq -8 \end{aligned}$$



49.
$$\begin{aligned} \frac{1}{3}(x+2) &\leq \frac{1}{2}(3x-5) \\ \frac{1}{3}x+\frac{2}{3} &\leq \frac{3}{2}x-\frac{5}{2} \\ 6\left(\frac{1}{3}x\right)+6\left(\frac{2}{3}\right) &\leq 6\left(\frac{3}{2}x\right)-6\left(\frac{5}{2}\right) \\ 2x+4 &\leq 9x-15 \\ 2x+4+15 &\leq 9x-15+15 \\ 2x+19 &\leq 9x \\ -2x+2x+19 &\leq -2x+9x \\ 19 &\leq 7x \\ \frac{19}{7} &\leq \frac{7x}{7} \\ \frac{19}{7} &\leq x \text{ or } x \geq \frac{19}{7} \end{aligned}$$



50.
$$\begin{aligned} 4(2-x)-(-5x+1) &\geq -8 \\ 8-4x+5x-1 &\geq -8 \\ x+7 &\geq -8 \\ x+7-7 &\geq -8-7 \\ x &\geq -15 \end{aligned}$$



How Am I Doing? Chapter 2 Test

1.
$$\begin{aligned} 3x+5.6 &= 11.6 \\ 3x+5.6-5.6 &= 11.6-5.6 \\ 3x &= 6 \\ \frac{3x}{3} &= \frac{6}{3} \\ x &= 2 \end{aligned}$$

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2.
$$\begin{aligned} 9x-8 &= -6x-3 \\ 9x+6x-8 &= -6x+6x-3 \\ 15x-8 &= -3 \\ 15x-8+8 &= -3+8 \\ 15x &= 5 \\ \frac{15x}{15} &= \frac{5}{15} \\ x &= \frac{1}{3} \end{aligned}$$

3.
$$\begin{aligned} 2(2y-3) &= 4(2y+2) \\ 4y-6 &= 8y+8 \\ 4y-6+6 &= 8y+8+6 \\ 4y &= 8y+14 \\ -8y+4y &= -8y+8y+14 \\ -4y &= 14 \\ \frac{-4y}{-4} &= \frac{14}{-4} \\ y &= -\frac{7}{2} \text{ or } -3\frac{1}{2} \text{ or } -3.5 \end{aligned}$$

4.
$$\begin{aligned} \frac{1}{7}y+3 &= \frac{1}{2}y \\ 14\left(\frac{1}{7}y\right)+14(3) &= 14\left(\frac{1}{2}y\right) \\ 2y+42 &= 7y \\ 2y-2y+42 &= 7y-2y \\ 42 &= 5y \\ \frac{42}{5} &= \frac{5y}{5} \\ y &= \frac{42}{5} \text{ or } y = 8\frac{2}{5} \text{ or } y = 8.4 \end{aligned}$$

5.
$$\begin{aligned} 4(7-4x) &= 3(6-2x) \\ 28-16x &= 18-6x \\ 28-16x+6x &= 18-6x+6x \\ 28-10x &= 18 \\ 28+(-28)-10x &= 18+(-28) \\ -10x &= -10 \\ \frac{-10x}{-10} &= \frac{-10}{-10} \\ x &= 1 \end{aligned}$$

6.
$$\begin{aligned} 0.8x+0.18-0.4x &= 0.3(x+0.2) \\ 0.4x+0.18 &= 0.3x+0.06 \\ 100(0.4x)+100(0.18) &= 100(0.3x)+100(0.06) \\ 40x+18 &= 30x+6 \\ 40x+18-18 &= 30x+6-18 \\ 40x &= 30x-12 \\ -30x+40x &= -30x+30x-12 \\ 10x &= -12 \\ \frac{10x}{10} &= \frac{-12}{10} \\ x &= -\frac{6}{5} \text{ or } -1.2 \end{aligned}$$

7.
$$\begin{aligned} \frac{2y}{3}+\frac{1}{5}-\frac{3y}{5}+\frac{1}{3} &= 1 \\ 15\left(\frac{2y}{3}\right)+15\left(\frac{1}{5}\right)-15\left(\frac{3y}{5}\right)+15\left(\frac{1}{3}\right) &= 15(1) \\ 10y+3-9y+5 &= 15 \\ y+8 &= 15 \\ y+8-8 &= 15-8 \\ y &= 7 \end{aligned}$$

8.
$$\begin{aligned} 3-2y &= 2(3y-2)-5y \\ 3-2y &= 6y-4-5y \\ 3-2y &= y-4 \\ 3-2y+2y &= y+2y-4 \\ 3 &= 3y-4 \\ 3+4 &= 3y-4+4 \\ 7 &= 3y \\ \frac{7}{3} &= \frac{3y}{3} \\ \frac{7}{3} &= y \text{ or } y = 2\frac{1}{3} \end{aligned}$$

9.
$$\begin{aligned} 5(20-x)+10x &= 165 \\ 100-5x+10x &= 165 \\ 100+5x &= 165 \\ -100+100+5x &= -100+165 \\ 5x &= 65 \\ \frac{5x}{5} &= \frac{65}{5} \\ x &= 13 \end{aligned}$$

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10.
$$\begin{aligned}5(x+40)-6x&=9x\\5x+200-6x&=9x\\200-x&=9x\\200-x+x&=9x+x\\200&=10x\\\frac{200}{10}&=\frac{10x}{10}\\20&=x\end{aligned}$$

11.
$$\begin{aligned}-2(2-3x)&=76-2x\\-4+6x&=76-2x\\-76-4+6x&=-76+76-2x\\-80+6x&=-2x\\-80+6x-6x&=-2x-6x\\-80&=-8x\\\frac{-80}{-8}&=\frac{-8x}{-8}\\10&=x\end{aligned}$$

12.
$$\begin{aligned}20-(2x+6)&=5(2-x)+2x\\20-2x-6&=10-5x+2x\\-2x+14&=-3x+10\\3x-2x+14&=3x-3x+10\\x+14&=10\\x+14-14&=10-14\\x&=-4\end{aligned}$$

13.
$$\begin{aligned}2x-3&=12-6x+3(2x+3)\\2x-3&=12-6x+6x+9\\2x-3&=21\\2x-3+3&=21+3\\2x&=24\\\frac{2x}{2}&=\frac{24}{2}\\x&=12\end{aligned}$$

14.
$$\begin{aligned}\frac{1}{3}x-\frac{3}{4}x&=\frac{1}{12}\\12\left(\frac{1}{3}x\right)-12\left(\frac{3}{4}x\right)&=12\left(\frac{1}{12}\right)\\4x-9x&=1\\-5x&=1\\\frac{-5x}{-5}&=\frac{1}{-5}\\x&=-\frac{1}{5}\text{ or }-0.2\end{aligned}$$

15.
$$\begin{aligned}\frac{3}{5}x+\frac{7}{10}&=\frac{1}{3}x+\frac{3}{2}\\30\left(\frac{3}{5}x\right)+30\left(\frac{7}{10}\right)&=30\left(\frac{1}{3}x\right)+30\left(\frac{3}{2}\right)\\18x+21&=10x+45\\18x+21-21&=10x+45-21\\18x&=10x+24\\-10x+18x&=-10x+10x+24\\8x&=24\\\frac{8x}{8}&=\frac{24}{8}\\x&=3\end{aligned}$$

16.
$$\begin{aligned}\frac{15x-2}{28}&=\frac{5x-3}{7}\\28\left(\frac{15x-2}{28}\right)&=28\left(\frac{5x-3}{7}\right)\\15x-2&=4(5x-3)\\15x-2&=20x-12\\15x-2+12&=20x-12+12\\15x+10&=20x\\-15x+15x+10&=-15x+20x\\10&=5x\\\frac{10}{5}&=\frac{5x}{5}\\2&=x\end{aligned}$$

17.
$$\begin{aligned}\frac{2}{3}(x+8)+\frac{3}{5}&=\frac{1}{5}(11-6x)\\\frac{2}{3}x+\frac{16}{3}+\frac{3}{5}&=\frac{11}{5}-\frac{6}{5}x\\\frac{2}{3}x+\frac{89}{15}&=\frac{11}{5}-\frac{6}{5}x\\15\left(\frac{2}{3}x\right)+15\left(\frac{89}{15}\right)&=15\left(\frac{11}{5}\right)-15\left(\frac{6}{5}x\right)\\10x+89&=33-18x\\10x+18x+89&=33-18x+18x\\28x+89&=33\\28x+89+(-89)&=33+(-89)\\28x&=-56\\\frac{28x}{28}&=\frac{-56}{28}\\x&=-2\end{aligned}$$

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18.
$$A = 3w + 2P$$
$$A - 2P = 3w + 2P - 2P$$
$$A - 2P = 3w$$
$$\frac{A-2P}{3} = \frac{3w}{3}$$
$$\frac{A-2P}{3} = w$$
$$w = \frac{A-2P}{3}$$

19.
$$\frac{2w}{3} = 4 - \frac{1}{2}(x+6)$$
$$\frac{2w}{3} = 4 - \frac{1}{2}x - 3$$
$$\frac{2w}{3} = 1 - \frac{1}{2}x$$
$$6\left(\frac{2w}{3}\right) = 6(1) - 6\left(\frac{1}{2}x\right)$$
$$4w = 6 - 3x$$
$$\frac{4w}{4} = \frac{6-3x}{4}$$
$$w = \frac{6-3x}{4}$$

20.
$$A = \frac{1}{2}h(a+b)$$
$$A = \frac{1}{2}ha + \frac{1}{2}hb$$
$$2(A) = 2\left(\frac{1}{2}ha\right) + 2\left(\frac{1}{2}hb\right)$$
$$2A = ha + hb$$
$$2A - hb = ha$$
$$\frac{2A-hb}{h} = \frac{ha}{h}$$
$$\frac{2A-hb}{h} = a$$
$$a = \frac{2A-hb}{h}$$

21.
$$5ax(2-y) = 3axy + 5$$
$$10ax - 5axy = 3axy + 5$$
$$10ax - 5axy + 5axy = 3axy + 5 + 5axy$$
$$10ax - 5 = 8axy$$
$$\frac{10ax-5}{8ax} = \frac{8axy}{8ax}$$
$$\frac{10ax-5}{8ax} = y$$
$$y = \frac{10ax-5}{8ax}$$

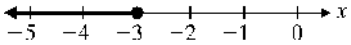
22.
$$V = \frac{1}{3}Bh$$
$$3V = 3\left(\frac{1}{3}Bh\right)$$
$$3V = Bh$$
$$\frac{3V}{h} = \frac{Bh}{h}$$
$$\frac{3V}{h} = B$$
$$B = \frac{3V}{h}$$

23. $B = \frac{3V}{h}$, $V = 140$, $h = 14$

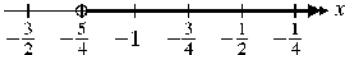
$$B = \frac{3(140)}{14} = 30$$

The base is 30 square inches.

24.
$$3(x-2) \geq 5x$$
$$3x - 6 \geq 5x$$
$$3x + (-5x) - 6 \geq 5x + (-5x)$$
$$-2x - 6 \geq 0$$
$$-2x - 6 + 6 \geq 0 + 6$$
$$-2x \geq 6$$
$$\frac{-2x}{-2} \leq \frac{6}{-2}$$
$$x \leq -3$$



25.
$$2 - 7(x+1) - 5(x+2) < 0$$
$$2 - 7x - 7 - 5x - 10 < 0$$
$$-12x - 15 < 0$$
$$-12x - 15 + 15 < 0 + 15$$
$$-12x < 15$$
$$\frac{-12x}{-12} > \frac{15}{-12}$$
$$x > -\frac{5}{4}$$



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26. $5+8x-4<2x+13$

$8x+1<2x+13$

$8x+1-1<2x+13-1$

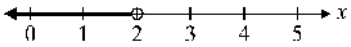
$8x<2x+12$

$-2x+8x<-2x+2x+12$

$6x<12$

$\frac{6x}{6}=\frac{12}{6}$

$x<2$



27. $\frac{1}{4}x+\frac{1}{16}\le\frac{1}{8}(7x-2)$

$\frac{1}{4}x+\frac{1}{16}\le\frac{7}{8}x-\frac{1}{4}$

$16\left(\frac{1}{4}x\right)+16\left(\frac{1}{16}\right)\le16\left(\frac{7}{8}x\right)-16\left(\frac{1}{4}\right)$

$4x+1\le14x-4$

$4x+1+4\le14x-4+4$

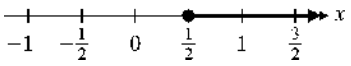
$4x+5\le14x$

$-4x+4x+5\le-4x+14x$

$5\le10x$

$\frac{5}{10}\le\frac{10x}{10}$

$\frac{1}{2}\le x$



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