Beginning and Intermediate Algebra 5th edition Tobey Solutions Manual

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

$3\frac{3}{4} + \left(-3\frac{3}{4}\right) + x = 9 + \left(-3\frac{3}{4}\right)$

$x = \frac{36}{4} + \left(-\frac{15}{4}\right)$

$x = \frac{21}{4}$ 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. $1.1y+0.3=-1.3+0.3y$
$1.1y+0.3-0.3y=-1.3+0.3y-0.3y$
$0.8y+0.3=-1.3$
$0.8y+0.3-0.3=-1.3-0.3$
$0.8y=-1.6$
$\frac{0.8y}{0.8}=\frac{-1.6}{0.8}$
$y=-2$

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

36. $7y+21-5y=5y-7+y$
Left
$2y+21=6y-7$
$2y+(-6y)+21=6y+(-6y)-7$
$-4y+21=-7$
$-4y+21+(-21)=-7+(-21)$
$-4y=-28$
$\frac{-4y}{-4}=\frac{-28}{-4}$
$y=7$

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

Neither approach is better.

38. $7(x+3)=28$
$7x+21=28$
$7x+21-21=28-21$
$7x=7$
$\frac{7x}{7}=\frac{7}{7}$
$x=1$
Check: $7(1+3)\stackrel{?}{=}28$
$7(4)\stackrel{?}{=}28$
$28=28$ ✓

40. $4(2x+1)-7=6-5$
$8x+4-7=6-5$
$8x-3=1$
$8x-3+3=1+3$
$8x=4$
$\frac{8x}{8}=\frac{4}{8}$
$x=\frac{1}{2}$
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. $8x-2(4-x)=14$
$8x-8+2x=14$
$10x-8=14$
$10x-8+8=14+8$
$10x=22$
$\frac{10x}{10}=\frac{22}{10}$
$x=\frac{11}{5}$
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. $0.4x-0.2(3-x)=1.8$
$0.4x-0.6+0.2x=1.8$
$0.6x-0.6=1.8$
$0.6x-0.6+0.6=1.8+0.6$
$0.6x=2.4$
$\frac{0.6x}{0.6}=\frac{2.4}{0.6}$
$x=4$
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. $x+3x-2+3x=-11+7(x+2)$

$7x-2=-11+7x+14$

$7x-2=7x+3$

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

$-2=3$, 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. $5(-3+4x)=4(2x+4)+12x$

$-15+20x=8x+16+12x$

$-15+20x=20x+16$

$-15+20x-20x=20x+16-20x$

$-15=16$, no solution

Cumulative Review

49. $\left(-3\frac{1}{4}\right)\left(5\frac{1}{3}\right)=\left(-\frac{13}{4}\right)\left(\frac{16}{3}\right)$

$=-\frac{13\cdot\cancel{4}\cdot 4}{\cancel{4}\cdot 3}$

$=-\frac{52}{3}$ or $-17\frac{1}{3}$

50. $5\frac{1}{2}\div 1\frac{1}{4}=\frac{11}{2}\div\frac{5}{4}$

$=\frac{11}{2}\cdot\frac{4}{5}$

$=\frac{11\cdot\cancel{2}\cdot 2}{\cancel{2}\cdot 5}$

$=\frac{22}{5}$ 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. the sum of a number and 5: $x + 5$

4. seven subtracted from a number: $x - 7$

6. one-sixth of a quantity: $\frac{1}{6}x$ or $\frac{x}{6}$

8. triple a number: $3x$

10. five more than one-third of a number: $\frac{1}{3}x+5$

12. ten times a number increased by 1: $10x + 1$

14. one-fourth of the sum of a number and 5: $\frac{1}{4}(x+5)$

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16. one-fifth of a number reduced by double the same number: $\frac{1}{5}x - 2x$

18. four less than seven times a number: $7x - 4$

20. Since the value of Twitter stock is being compared to the value of the Target stock, we let the variable represent the value of the Target stock.
x = value of a share of Target stock
The value of a share of Twitter stock is \$47.49 less than the value of a share of Target stock.
$x - 47.49$ = value of a share of Twitter stock.

22. Since the length of the rectangle is being compared to the width, we let the variable represent the width of a rectangle.
w = width of a rectangle
The length is 3 meters more than triple the width.
$3w + 3$ = length of rectangle

24. Since the rainfall in Savannah and Phoenix are being compared to the rainfall in Burlington, we let the variable represent the average rainfall in Burlington.
x = average rainfall in Burlington
The average rainfall in Savannah is 13 inches more than the average rainfall in Burlington.
$x + 13$ = average rainfall in Savannah
The average rainfall in Phoenix is 28 inches less than the average rainfall in Burlington.
$x - 28$ = average rainfall in Phoenix

26. Since the measures of the second and third angles are being compared to the measure of the first angle, we let the variable represent the measure of the first angle.
a = measure of the 1st angle
The measure of the second angle is double the measure of the first angle.
$2a$ = measure of the 2nd angle
The measure of the third angle is 30 degrees more than the measure of the first angle.
$a + 30$ = measure of the 3rd angle

28. Since the number of text messages received by Marisol is being compared to the number of text messages received by her brother, we let the variable represent the number of text messages received by her brother.
t = number of text messages received by Marisol's brother
The number of text messages Marisol received was three times the number received by her brother.
$3t$ = number of text messages received by Marisol

30. Since the attendance last year is being compared to the attendance this year, we let the variable represent the attendance this year.
x = attendance this year
The attendance last year was one-third the attendance at the convention this year.
$\frac{1}{3}x$ = attenadance last year

32. y = number of women aged 25 to 34
Since $258 - 125 = 133$, 133 fewer women aged 16 to 24 rented kayaks than women aged 25 to 34.
$y - 133$ = number of women aged 16 to 24
Since $258 - 241 = 17$, 17 fewer women aged 35 to 44 rented kayaks than women aged 25 to 34.
$y - 17$ = number of women aged 35 to 44
Since $258 - 148 = 110$, 110 fewer women aged 45+ rented kayaks than women aged 25 to 34.
$y - 110$ = number of women aged 45+

Cumulative Review

33.
$$x + \frac{1}{2}(x-3) = 9$$
$$x + \frac{1}{2}x - \frac{3}{2} = 9$$
$$\frac{3}{2}x - \frac{3}{2} = 9$$
$$2\left(\frac{3}{2}x\right) - 2\left(\frac{3}{2}\right) = 2(9)$$
$$3x - 3 = 18$$
$$3x - 3 + 3 = 18 + 3$$
$$3x = 21$$
$$\frac{3x}{3} = \frac{21}{3}$$
$$x = 7$$

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34. $\frac{3}{5}x-3(x-1)=9$

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

$-\frac{12}{5}x+3=9$

$5\left(-\frac{12}{5}x\right)+5(3)=5(9)$

$-12x+15=45$

$-12x+15-15=45-15$

$-12x=30$

$\frac{-12x}{-12}=\frac{30}{-12}$

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

Classroom Quiz 2.5

1. Seven less than a number: $x-7$

2. Eight more than triple a number: $8+3x$ or $3x+8$

3. Since the measures of the first and third angles are being compared to the measure of the second angle, we let the variable represent the measure of the second angle.
x = measure of the second angle
The measure of the first angle is 20 degrees more than the measure of the second angle.
$x+20$ = measure of the first angle
The third angle is double the measure of the second angle.
$2x$ = measure of the third angle

2.6 Exercises

2. x = the number

$x+74=265$

$x+74-74=265-74$

$x=191$

The number is 191.
Check:
Does 191 added to 74 give 265?

$191+74\stackrel{?}{=}265$

$265=265$ ✓

4. x = the number

$\frac{x}{9}=189$

$9\left(\frac{x}{9}\right)=9(189)$

$x=1701$

The number is 1701.
Check:
Is 1701 divided by 9 equal to 189?

$\frac{1701}{9}\stackrel{?}{=}189$

$189=189$ ✓

6. x = the number

$3x=1$

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

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

The number is $\frac{1}{3}$.
Check:
Is 3 times $\frac{1}{3}$ equal to 1?

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

$1=1$ ✓

8. x = the number

$8x-32=120$

$8x=152$

$x=19$

The number is 19.
Check:
Is 8 times 19 decreased by 32 equal to 120?

$8\times19-32\stackrel{?}{=}120$

$152-32\stackrel{?}{=}120$

$120=120$ ✓

10. x = the number

$2x+\frac{1}{3}x=42$

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

$6x+x=126$

$7x=126$

$x=18$

The number is 18.
Check:
Is twice 18 increased by one-third of 18 equal to 42?

$2(18)+\frac{1}{3}(18)\stackrel{?}{=}42$

$36+6\stackrel{?}{=}42$

$42=42$ ✓

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12. x = the number

$2x - 10 = 7x$

$-10 = 5x$

$-2 = x$

The number is –2.

Check:

Is 10 less than double –2 the same as 7 times –2?

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

$-4 - 10 \stackrel{?}{=} -14$

$-14 = -14$ ✓

14. x = the number

$$x + 2x + \frac{1}{3}x = 20$$

$$3x + 3(2x) + 3\left(\frac{1}{3}x\right) = 3(20)$$

$$3x + 6x + x = 60$$

$$10x = 60$$

$$x = 6$$

The number is 6.

Check:

When 6, twice 6, and one-third of 6 are added, is the result 20?

$$6 + 2(6) + \frac{1}{3}(6) \stackrel{?}{=} 20$$

$$6 + 12 + 2 \stackrel{?}{=} 20$$

$20 = 20$ ✓

16. x = number of sweatshirts

$4x$ = number of T-shirts

$4x = 164$

$\frac{4x}{4} = \frac{164}{4}$

$x = 41$

There are 41 sweatshirts in the store.

18. x = measure of equal angles

$2x + 146 = 180$

$2x = 34$

$x = 17$

Each angle measures 17°.

20. x = measure of 2nd angle

$3x$ = measure of 1st angle

$2(3x) - 30$ = measure of 3rd angle

$x + 3x + 6x - 30 = 180$

$10x - 30 = 180$

$10x = 210$

$x = 21$

$3x = 63$

$6x - 30 = 96$

1st angle measure 63°.

2nd angle measures 21°.

3rd angle measures 96°.

22. x = number of credit card applications

$11(30) + 2.50x = 377.50$

$330 + 2.50x = 377.50$

$2.50x = 47.50$

$x = 19$

Samuel obtained 19 credit card applications.

24. x = score on fifth exam

$$\frac{94 + 89 + 92 + 88 + x}{5} = 90$$

$$\frac{363 + x}{5} = 90$$

$$363 + x = 450$$

$$x = 87$$

Leo must earn at least an 87 on the fifth exam.

26. $d = rt$

55(3.5) = distance traveled by Tiana

45(3.5) = distance traveled by Allan

x = miles apart after 3.5 hours

$x = 55(3.5) - 45(3.5) = 192.5 - 157.5 = 35$

They will be 35 miles apart.

28. $d = rt$; $t = \frac{d}{r}$

Ester: $d = 420$, $r = 60$; $t_E = \frac{420}{60} = 7$; it took Ester 7 hours.

MaryAnn: $d = 420$, $r = 50$; $t_M = \frac{420}{50} = 8.4$; it took MaryAnn 8.4 hours.

8.4 – 7 = 1.4

It took MaryAnn 1.4 hours longer to drive to the beach house.

30. Let x = the life expectancy for Spain and Sweden.

$$\frac{82.6 + 82.2 + 81.8 + 81.7 + 81.2 + x + x}{7} = 81.6$$

$$\frac{409.5 + 2x}{7} = 81.6$$

$$409.5 + 2x = 571.2$$

$$2x = 161.7$$

$$\frac{2x}{2} = \frac{161.7}{2}$$

$$x = 80.85$$

The life expectancy for both Spain and Sweden was about 80.9 years.

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Cumulative Review

32. $5x(2x^2-6x-3) = 5x(2x^2)-5x(6x)-5x(3)$
$= 10x^3-30x^2-15x$

33. $-2a(ab-3b+5a)$
$= -2a(ab)-2a(-3b)-2a(5a)$
$= -2a^2b+6ab-10a^2$

34. $7x-3y-12x-8y+5y = (7-12)x+(-3-8+5)y$
$= -5x-6y$

35. $5x^2y-7xy^2-8xy-9x^2y$
$= (5-9)x^2y-7xy^2-8xy$
$= -4x^2y-7xy^2-8xy$

Classroom Quiz 2.6

1. x = the number
$2x+19 = 55$
$2x+19-19 = 55-19$
$2x = 36$
$\frac{2x}{2} = \frac{36}{2}$
$x = 18$
The number is 18.

2. Let x = measure of the equal angles.
$2x+30 = 180$
$2x = 150$
$x = 75$
The equal angles each measure 75°.

3. x = score on next test
$\frac{85+89+76+83+x}{5} = 85$
$\frac{333+x}{5} = 85$
$333+x = 425$
$x = 92$
James needs a 92.

2.7 Exercises

2. x = number of tables
$8.75(12)+8x = 385$
$105+8x = 385$
$8x = 280$
$x = 35$
She needs to serve 35 tables a week.

4. x = overtime hours
$20(40)+30x = 980$
$800+30x = 980$
$20x = 180$
$x = 6$
Anna needs 6 hours of overtime per week.

6. x = number of people
$50+85+23.5x = 558$
$135+23.5x = 558$
$23.5x = 423$
$x = 18$
18 people came to the party.

8. x = number of women working full-time last year
$0.12x = 216$
$x = 1800$
1800 women worked full-time last year.

10. x = cost of stocks
$0.07x$ = profit
$x+0.07x = 5136$
$1.07x = 5136$
$x = 4800$
The stocks cost $4800.

12. x = amount of the original investment
$0.08x$ = interest
$x+0.08x = 7560$
$1.08x = 7560$
$x = 7000$
The original investment was $7000.

14. x = amount earning 8%
$8000-x$ = amount earning 6%
$0.08x+0.06(8000-x) = 580$
$0.08x+480-0.06x = 580$
$0.02x+480 = 580$
$0.02x = 100$
$x = 5000$
$8000-x = 3000$
They invested $5000 at 8% and $3000 at 6%.

16. x = amount invested at 11% (international fund)
$600{,}000-x$ = amount invested at 7% (high-tech fund)
$0.11x+0.07(600{,}000-x) = 50{,}000$
$0.11x+42{,}000-0.07x = 50{,}000$
$0.04x+42{,}000 = 50{,}000$
$0.04x = 8{,}000$
$x = 200{,}000$
$600{,}000-x = 400{,}000$
They invested $200,000 in the international fund and $400,000 in the high-tech fund.

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18. x = amount invested

$\frac{x}{2}$ = amount invested at 4%

$\frac{x}{3}$ = amount invested at 4.5%

$$x-\frac{x}{2}-\frac{x}{3}=\frac{6x-3x-2x}{6}$$
$$=\frac{x}{6}$$
$$=\text{amount invest at } 3\%$$

$$0.04\left(\frac{x}{2}\right)+0.045\left(\frac{x}{3}\right)+0.03\left(\frac{x}{6}\right)=2400$$
$$0.02x+0.015x+0.005x=2400$$
$$0.04x=2400$$
$$x=60{,}000$$

She invested \$60,000.

20. x = number of dimes
$x + 6$ = number of quarters

$$0.10x+0.25(x+6)=5.35$$
$$10x+25(x+6)=535$$
$$10x+25x+150=535$$
$$35x=385$$
$$x=11$$

$x + 6 = 17$
He had 11 dimes and 17 quarters.

22. x = number of dimes
$x + 4$ = number of quarters
$3x$ = number of nickels

$$0.10x+0.25(x+4)+0.05(3x)=4.50$$
$$10x+25(x+4)+5(3x)=450$$
$$10x+25x+100+15x=450$$
$$50x+100=450$$
$$50x=350$$
$$x=7$$

$x + 4 = 11$
$3x = 21$
He had 7 dimes, 11 quarters, and 21 nickels.

24. x = number of adults' tickets
$3x$ = number of children's tickets

$$8.75x+5.50(3x)=176.75$$
$$8.75x+16.5x=176.75$$
$$25.25x=176.75$$
$$x=7$$

$3x = 21$
There were 7 adults and 21 children who got to attend the show for free.

26. x = number of \$10 bills
$x - 4$ = number of \$20 bills
$3x$ = number of \$5 bills

$$10x+20(x-4)+5(3x)=325$$
$$10x+20x-80+15x=325$$
$$45x=405$$
$$x=9$$

$x - 4 = 5$
$3x = 27$
She had nine \$10 bills, five \$20 bills, and twenty-seven \$5 bills.

28. x = number of dogs taken in
$2x$ = number of cats taken in

$$0.6x+0.8(2x)=286$$
$$0.6x+1.6x=286$$
$$2.2x=286$$
$$x=130$$

$2x = 260$
They took in 130 dogs and 260 cats.

Cumulative Review

29. $5(3) + 6 \div (-2) = 15 + (-3) = 12$

30.
$$5(-3)-2(12-15)^2\div 9=5(-3)-2(-3)^2\div 9$$
$$=5(-3)-2(9)\div 9$$
$$=-15-18\div 9$$
$$=-15-2$$
$$=-17$$

31. If $a = -1$ and $b = 4$, then

$$a^2-2ab+b^2=(-1)^2-2(-1)(4)+(4)^2$$
$$=1+8+16$$
$$=25$$

32. If $a = -1$ and $b = 4$, then

$$a^3+ab^2-b-5=(-1)^3+(-1)(4)^2-4-5$$
$$=-1+(-1)(16)-4-5$$
$$=-1-16-4-5$$
$$=-26$$

Classroom Quiz 2.7

1. x = number of months

$$2500+245x=6910$$
$$245x=4410$$
$$x=18$$

She will be able to lease the car for 18 months.

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2. x = last year's cost
$x + 0.06x = 12,932$
$1.06x = 12,932$
$x = 12,200$
Last year's cost was \$12,200.

3. x = amount invested at 4%
$6000 - x$ = amount invested at 6%
$0.04x + 0.06(6000 - x) = 314$
$0.04x + 360 - 0.06x = 314$
$360 - 0.02x = 314$
$-0.02x = -46$
$x = 2300$
$6000 - x = 6000 - 2300 = 3700$
They invested \$2300 at 4% and \$3700 at 6%.

2.8 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.
$\frac{9}{11} > \frac{41}{53}$

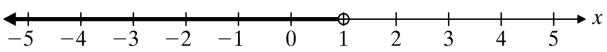
18. $-4.2 \; ? \; -7.3$
Use >, since -4.2 is to the right of -7.3 on a number line.
$-4.2 > -7.3$

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.

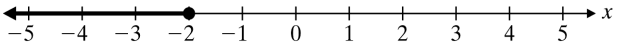


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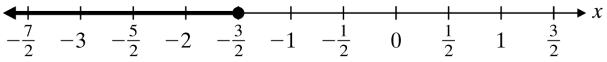
28. $x \le -2$

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.



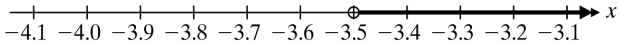
30. $x \le -\frac{3}{2}$

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 $-\frac{3}{2}$.



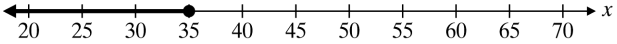
32. $x > -3.5$

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.

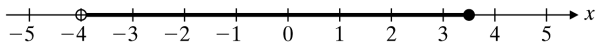
x is greater than -4.

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

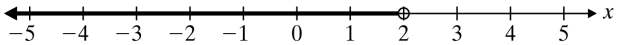
x is greater than or equal to $-\frac{9}{2}$.

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.

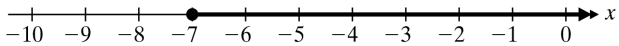
$-4 < x \le \frac{7}{2}$



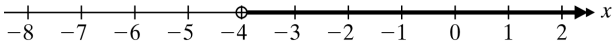
48.
$$x - 5 < -3$$
$$x - 5 + 5 < -3 + 5$$
$$x < 2$$



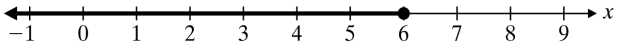
50.
$$6x \ge -42$$
$$\frac{6x}{6} \ge \frac{-42}{6}$$
$$x \ge -7$$



52.
$$-7x < 28$$
$$\frac{-7x}{-7} > \frac{28}{-7}$$
$$x > -4$$



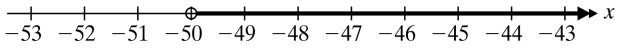
54.
$$\frac{1}{3}x \le 2$$
$$3\left(\frac{1}{3}x\right) \le 3(2)$$
$$x \le 6$$



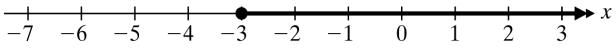
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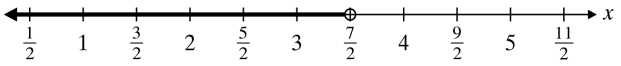
56.
$$-\frac{1}{5}x < 10$$
$$-5\left(-\frac{1}{5}x\right) > -5(10)$$
$$x > -50$$



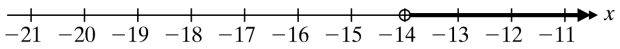
58.
$$9 - 4x \le 21$$
$$9 - 4x - 9 \le 21 - 9$$
$$-4x \le 12$$
$$\frac{-4x}{-4} \ge \frac{12}{-4}$$
$$x \ge -3$$



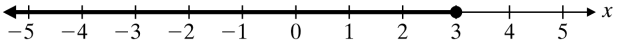
60.
$$-6 - 4x < 1 - 6x$$
$$-6 - 4x + 6x < 1 - 6x + 6x$$
$$-6 + 2x < 1$$
$$-6 + 2x + 6 < 1 + 6$$
$$2x < 7$$
$$\frac{2x}{2} < \frac{7}{2}$$
$$x < \frac{7}{2}$$



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



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



66.
$$-21 > -29$$
$$\frac{-21}{-3} < \frac{-29}{-3}$$
$$7 < \frac{29}{3}$$

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

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

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

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

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

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

Cumulative Review

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

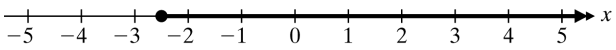
82. 18 is what percent of 120?
$\frac{18}{120}=\frac{3}{20}=0.15=15\%$

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

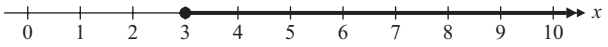
84. $\frac{3}{8}=0.375=37.5\%$

Classroom Quiz 2.8

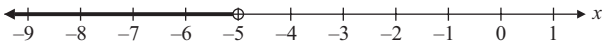
1. $x\ge -2.5$
x is greater than or equal to –2.5. All of the points to the right of –2.5 are shaded. The closed circle indicates that we do include the point for –2.5.



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



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

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Solve for H.

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

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

$$190 = 106 + 6(x - 60)$$
$$190 = 106 + 6x - 360$$
$$190 = 6x - 254$$
$$444 = 6x$$
$$74 = x$$

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)

$$= 100 + 5(5)$$
$$= 100 + 25$$
$$= 125$$

Her ideal weight is 125 pounds.

You Try It

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

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

3. x = larger number

The smaller number is one-fifth the larger.

$\frac{1}{5}x$ = smaller number

The sum of the numbers is 60.

$$x + \frac{1}{5}x = 60$$
$$5(x) + 5\left(\frac{1}{5}x\right) = 5(60)$$
$$5x + x = 300$$
$$6x = 300$$
$$x = 50$$
$$\frac{1}{5}x = \frac{1}{5}(50) = 10$$

The numbers are 10 and 50.

4. Let x = the amount invested at 2%. Then

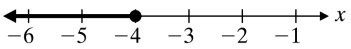
$3600 - x$ = the amount invested at 4%.

$$0.02x + 0.04(3600 - x) = 132$$
$$0.02x + 144 - 0.04x = 132$$
$$-0.02x + 144 = 132$$
$$-0.02x = -12$$
$$\frac{-0.02x}{-0.02} = \frac{-12}{-0.02}$$
$$x = 600$$

$3600 - x = 3600 - 600 = 3000$

He invested \$600 at 2% and \$3000 at 4%.

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



Chapter 2 Review Problems

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

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2. $x-19=-29+7$
$x-19=-22$
$x-19+19=-22+19$
$x=-3$

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

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

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

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

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

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

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

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

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

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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. 19 more than a number: $x + 19$

26. two-thirds of a number: $\frac{2}{3}x$

27. half a number: $\frac{1}{2}x$ or $\frac{x}{2}$

28. 18 less than a number: $x - 18$

29. triple the sum of a number and 4: $3(x + 4)$

30. twice a number decreased by 3: $2x - 3$

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31. Since the numbers of working people and unemployed people are being compared to the number of retired people, we let the variable represent the number of retired people.
r = number of retired people
The number of working people is four times the number of retired people.
$4r$ = number of working people
The number of unemployed people is one-half the number of retired people.
$\frac{1}{2}r = 0.5r$ = number of unemployed people

32. Since the length of the rectangle is being compared to the width, we let the variable represent the width of the rectangle.
w = width of the rectangle
The length is 5 meters more than triple the width.
$3w + 5$ = length of the rectangle

33. Since the number of degrees in angles A and C are being compared to the number of degrees in angle B, we let the variable represent the number of degrees in angle B.
b = the number of degrees in angle B
The number of degrees in angle A is double the number of degrees in angle B.
$2b$ = number of degrees in angle A
The number of degrees in angle C is 17 less than the number of degrees in angle B.
$b - 17$ = number of degrees in angle C

34. Since the numbers of students in biology and geology are being compared to the number of students in algebra, we let the variable represent the number of students in algebra.
a = number of students in algebra
There are 29 more students in biology than in algebra.
$a + 29$ = number of students in biology
There are one-half as many students in geology as in algebra.
$\frac{1}{2}a = 0.5a$ = number of students in geology

35. x = the number
$$\begin{aligned} 3x - 14 &= -5 \\ 3x - 14 + 14 &= -5 + 14 \\ 3x &= 9 \\ \frac{3x}{3} &= \frac{9}{3} \\ x &= 3 \end{aligned}$$
The number is 3.

36. x = the number
$$\begin{aligned} 2x - 7 &= -21 \\ 2x - 7 + 7 &= -21 + 7 \\ 2x &= -14 \\ \frac{2x}{2} &= \frac{-14}{2} \\ x &= -7 \end{aligned}$$
The number is -7.

37. x = David's age
$2x$ = Jon's age
$$\begin{aligned} 2x &= 32 \\ \frac{2x}{2} &= \frac{32}{2} \\ x &= 16 \end{aligned}$$
David is 16 years old.

38. x = score on last test
$$\begin{aligned} \frac{83 + 86 + 91 + 77 + x}{5} &= 85 \\ \frac{337 + x}{5} &= 85 \\ 337 + x &= 425 \\ x &= 88 \end{aligned}$$
Zach needs a grade of 88.

39. t_1 = time for first car
t_2 = time for other car
$$\begin{aligned} 800 &= 60t_1 \\ \frac{800}{60} &= \frac{60t_1}{60} \\ 13.3 &\approx t_1 \\ 800 &= 65t_2 \\ \frac{800}{65} &= \frac{65t_2}{65} \\ 12.3 &\approx t_2 \end{aligned}$$
The first car took 13.3 hours. The other car took 12.3 hours.

40. measure of 1st angle: x
measure of 2nd angle: $3x$
measure of 3rd angle: $2x - 12$
$$\begin{aligned} x + 3x + 2x - 12 &= 180 \\ 6x - 12 &= 180 \\ 6x &= 192 \\ x &= 32 \end{aligned}$$
$3x = 3(32) = 96$
$2x - 12 = 2(32) - 12 = 52$
The angles measure 32°, 96°, and 52°.

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41. x = number of kilowatt-hours

$$25+0.15x=71.50$$
$$0.15x=46.50$$
$$x=310$$

310 kilowatt-hours were used.

42. x = number of miles driven

$$0.25x+39(3)=187$$
$$0.25x+117=187$$
$$0.25x=70$$
$$x=280$$

He drove 280 miles.

43. x = amount withdrawn

$$0.055(7400-x)=242$$
$$407-0.055x=242$$
$$-0.055x=-165$$
$$x=3000$$

They withdrew \$3000.

44. x = original price

$$0.18x=36$$
$$x=200$$

The original price was \$200.

45. x = amount invested at 12%

$9000-x$ = amount at 8%

$$0.12x+0.08(9000-x)=1000$$
$$12x+8(9000-x)=100,000$$
$$12x+72,000-8x=100,000$$
$$4x=28,000$$
$$x=7000$$

$9000-x=2000$

They invested \$7000 at 12% and \$2000 at 8%.

46. x = amount at 4.5%

$5000-x$ = amount at 6%

$$0.045x+0.06(5000-x)=270$$
$$45x+60(5000-x)=270,000$$
$$45x+300,000-60x=270,000$$
$$-15x=-30,000$$
$$x=2000$$

$5000-x=5000-2000=3000$

He invested \$2000 at 4.5% and \$3000 at 6%.

47. x = number of dimes

$x+3$ = number of quarters

$2(x+3)=2x+6$ = number of nickels

$$0.05(2x+6)+0.10x+0.25(x+3)=3.75$$
$$5(2x+6)+10x+25(x+3)=375$$
$$10x+30+10x+25x+75=375$$
$$45x=270$$
$$x=6$$

$x+3=6+3=9$

$2x+6=2(6)+6=18$

She has 18 nickels, 6 dimes, and 9 quarters.

48. n = number of nickels

$n+2$ = number of quarters

$n-3$ = number of dimes

$$0.05n+0.25(n+2)+0.10(n-3)=9.80$$
$$0.05n+0.25n+0.50+0.10n-0.30=9.80$$
$$0.4n+0.20=9.80$$
$$0.4n=9.60$$
$$n=24$$

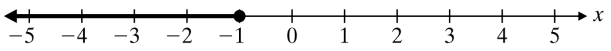
$n+2=24+2=26$

$n-3=24-3=21$

There were 24 nickels, 21 dimes, and 26 quarters.

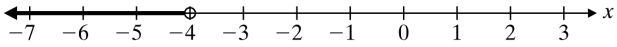
49.

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



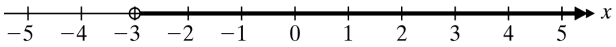
50.

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



51.

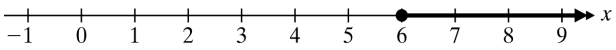
$$-x+4<3x+16$$
$$-x+4-4<3x+16-4$$
$$-x<3x+12$$
$$-3x-x<-3x+3x+12$$
$$-4x<12$$
$$\frac{-4x}{-4}>\frac{12}{-4}$$
$$x>-3$$



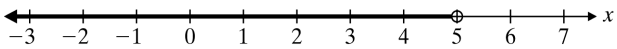
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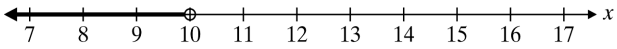
52.
$$8-\frac{1}{3}x \le x$$
$$3(8)-3\left(\frac{1}{3}x\right) \le 3x$$
$$24-x \le 3x$$
$$24-x+(-3x) \le 3x+(-3x)$$
$$24-4x \le 0$$
$$24+(-24)-4x \le 0+(-24)$$
$$-4x \le -24$$
$$\frac{-4x}{-4} \ge \frac{-24}{-4}$$
$$x \ge 6$$



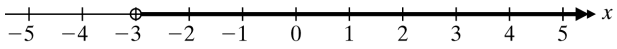
53.
$$7-\frac{3}{5}x > 4$$
$$5(7)-5\left(\frac{3}{5}x\right) > 5(4)$$
$$35-3x > 20$$
$$35+(-35)-3x > 20+(-35)$$
$$-3x > -15$$
$$\frac{-3x}{-3} < \frac{-15}{-3}$$
$$x < 5$$



54.
$$-4x-14 < 4-2(3x-1)$$
$$-4x-14 < 4-6x+2$$
$$-4x-14 < 6-6x$$
$$-4x-14+6x < 6-6x+6x$$
$$2x-14 < 6$$
$$2x-14+14 < 6+14$$
$$2x < 20$$
$$\frac{2x}{2} < \frac{20}{2}$$
$$x < 10$$



55.
$$3(x-2)+8 < 7x+14$$
$$3x-6+8 < 7x+14$$
$$3x+2 < 7x+14$$
$$3x-2+2 < 7x+14-2$$
$$3x < 7x+12$$
$$-7x+3x < -7x+7x+12$$
$$-4x < 12$$
$$\frac{-4x}{-4} > \frac{12}{-4}$$
$$x > -3$$



56.
$$15h \le 480$$
$$\frac{15h}{15} \le \frac{480}{15}$$
$$h \le 32$$

Julian can work a maximum of 32 hours.

57.
$$110n \le 2420$$
$$\frac{110n}{110} \le \frac{2420}{110}$$
$$n \le 22$$

A substitute teacher can be hired a maximum of 22 times.

58.
$$10(2x+4)-13 = 8(x+7)-3$$
$$20x+40-13 = 8x+56-3$$
$$20x+27 = 8x+53$$
$$20x+27-8x = 8x+53-8x$$
$$12x+27 = 53$$
$$12x+27-27 = 53-27$$
$$12x = 26$$
$$\frac{12x}{12} = \frac{26}{12}$$
$$x = \frac{13}{6}$$

59.
$$-9x+15-2x = 4-3x$$
$$-11x+15 = 4-3x$$
$$-11x+15+3x = 4-3x+3x$$
$$-8x+15 = 4$$
$$-8x+15-15 = 4-15$$
$$-8x = -11$$
$$\frac{-8x}{-8} = \frac{-11}{-8}$$
$$x = \frac{11}{8}$$

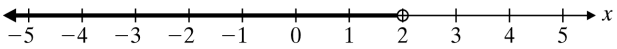
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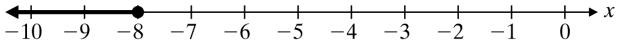
60. $-2(x-3) = -4x + 3(3x+2)$
$-2x + 6 = -4x + 9x + 6$
$-2x + 6 = 5x + 6$
$-2x + 6 - 6 = 5x + 6 - 6$
$-2x = 5x$
$2x - 2x = 2x + 5x$
$0 = 7x$
$\frac{0}{7} = \frac{7x}{7}$
$0 = x$

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

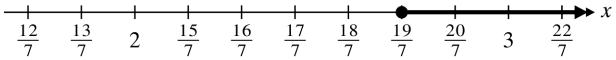
62. $5 - \frac{1}{2}x > 4$
$2(5) - 2\left(\frac{1}{2}x\right) > 2(4)$
$10 - x > 8$
$-10 + 10 - x > -10 + 8$
$-x > -2$
$\frac{-x}{-1} < \frac{-2}{-1}$
$x < 2$



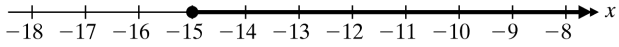
63. $2(x-1) \geq 3(2+x)$
$2x - 2 \geq 6 + 3x$
$2x - 2 - 3x > 6 + 3x - 3x$
$-x - 2 \geq 6$
$-x - 2 + 2 \geq 6 + 2$
$-x \geq 8$
$x \leq -8$



64. $\frac{1}{3}(x+2) \leq \frac{1}{2}(3x-5)$
$\frac{1}{3}x + \frac{2}{3} \leq \frac{3}{2}x - \frac{5}{2}$
$6\left(\frac{1}{3}x\right) + 6\left(\frac{2}{3}\right) \leq 6\left(\frac{3}{2}x\right) - 6\left(\frac{5}{2}\right)$
$2x + 4 \leq 9x - 15$
$2x + 4 + 15 \leq 9x - 15 + 15$
$2x + 19 \leq 9x$
$-2x + 2x + 19 \leq -2x + 9x$
$19 \leq 7x$
$\frac{19}{7} \leq \frac{7x}{7}$
$\frac{19}{7} \leq x$ or $x \geq \frac{19}{7}$



65. $4(2-x) - (-5x+1) \geq -8$
$8 - 4x + 5x - 1 \geq -8$
$x + 7 \geq -8$
$x + 7 - 7 \geq -8 - 7$
$x \geq -15$



How Am I Doing? Chapter 2 Test

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

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

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

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

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

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

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

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

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

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

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

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12. $20-(2x+6)=5(2-x)+2x$
$20-2x-6=10-5x+2x$
$-2x+14=-3x+10$
$3x-2x+14=3x-3x+10$
$x+14=10$
$x+14-14=10-14$
$x=-4$

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

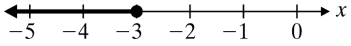
14. $\frac{1}{3}x-\frac{3}{4}x=\frac{1}{12}$
$12\left(\frac{1}{3}x\right)-12\left(\frac{3}{4}x\right)=12\left(\frac{1}{12}\right)$
$4x-9x=1$
$-5x=1$
$\frac{-5x}{-5}=\frac{1}{-5}$
$x=-\frac{1}{5}$ or -0.2

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

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

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

18. $3(x-2)\geq 5x$
$3x-6\geq 5x$
$3x+(-5x)-6\geq 5x+(-5x)$
$-2x-6\geq 0$
$-2x-6+6\geq 0+6$
$-2x\geq 6$
$\frac{-2x}{-2}\leq\frac{6}{-2}$
$x\leq -3$

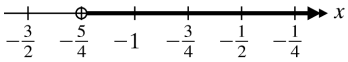


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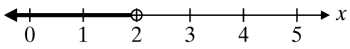
19. $2-7(x+1)-5(x+2)<0$

$$2-7x-7-5x-10<0$$
$$-12x-15<0$$
$$-12x-15+15<0+15$$
$$-12x<15$$
$$\frac{-12x}{-12}>\frac{15}{-12}$$
$$x>-\frac{5}{4}$$



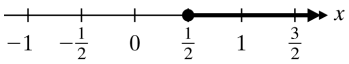
20. $5+8x-4<2x+13$

$$8x+1<2x+13$$
$$8x+1-1<2x+13-1$$
$$8x<2x+12$$
$$-2x+8x<-2x+2x+12$$
$$6x<12$$
$$\frac{6x}{6}=\frac{12}{6}$$
$$x<2$$



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

$$\frac{1}{4}x+\frac{1}{16}\le\frac{7}{8}x-\frac{1}{4}$$
$$16\left(\frac{1}{4}x\right)+16\left(\frac{1}{16}\right)\le16\left(\frac{7}{8}x\right)-16\left(\frac{1}{4}\right)$$
$$4x+1\le14x-4$$
$$4x+1+4\le14x-4+4$$
$$4x+5\le14x$$
$$-4x+4x+5\le-4x+14x$$
$$5\le10x$$
$$\frac{5}{10}\le\frac{10x}{10}$$
$$\frac{1}{2}\le x$$



22. x = number

$$2x-11=59$$
$$2x=70$$
$$x=35$$

The number is 35.

23. x = number

$$\frac{1}{2}x+\frac{1}{9}x+\frac{1}{12}x=25$$
$$36\left(\frac{1}{2}x+\frac{1}{9}x+\frac{1}{12}x\right)=36(25)$$
$$18x+4x+3x=900$$
$$25x=900$$
$$x=36$$

The number is 36.

24. x = second number

The first number is six less than three times the second number.

$3x-6$ = first number

The sum of the numbers is twenty-two.

$$x+(3x-6)=22$$
$$4x-6=22$$
$$4x-6+6=22+6$$
$$4x=28$$
$$\frac{4x}{4}=\frac{28}{4}$$
$$x=7$$

$3x-6=3(7)-6=15$

The numbers are 7 and 15.

25. $t=\frac{d}{r}$

Jerome's time: $t=\frac{300}{50}=6$ hours

Steven's time: $t=\frac{300}{60}=5$ hours

$6-5=1$

Steven arrived 1 hour before Jerome.

26. x = second angle

$3x$ = first angle

$x+10$ = third angle

$$3x+x+(x+10)=180$$
$$5x+10=180$$
$$5x=170$$
$$x=34$$

$3x=3(34)=102$

$x+10=34+10=44$

First angle = 102°

Second angle = 34°

Third angle = 44°

27. x = number of months

$$116x+200=1940$$
$$116x=1740$$
$$x=15$$

Raymond will be able to rent the computer for 15 months.

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28. x = last year's tuition

$$x + 0.08x = 34,560$$
$$1.08x = 34,560$$
$$x = 32,000$$

Last year's tuition was $32,000.

29. x = amount at 14%

$4000 - x$ = amount at 11%

$$0.14x + 0.11(4000 - x) = 482$$
$$100[0.14x + 0.11(4000 - x)] = 100(482)$$
$$14x + 11(4000 - x) = 48,200$$
$$14x + 44,000 - 11x = 48,200$$
$$3x + 44,000 = 48,200$$
$$3x = 4200$$
$$x = 1400$$

$4000 - x = 4000 - 1400 = 2600$

He invested $1400 at 14% and $2600 at 11%.

30. $2x$ = number of nickels

$x - 1$ = number of dimes

x = number of quarters

$$0.05(2x) + 0.10(x - 1) + 0.25(x) = 3.50$$
$$5(2x) + 10(x - 1) + 25x = 350$$
$$10x + 10x - 10 + 25x = 350$$
$$45x - 10 = 350$$
$$45x = 360$$
$$x = 8$$

$2x = 2(8) = 16$

$x - 1 = 8 - 1 = 7$

She has: 16 nickels; 7 dimes; 8 quarters.

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