

Section 3.4 Formulas and Applications of Geometry

Section 3.4 Practice Exercises

1. $3(2y+3)-4(-y+1)=7y-10$

$$6y+9+4y-4=7y-10$$

$$10y+5=7y-10$$

$$3y=-15 \Rightarrow y=-5$$

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

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

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

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

$$-10x=0 \Rightarrow x=0$$

5. $0.5(y+2)-0.3=0.4y+0.5$

$$10[0.5(y+2)-0.3]=10(0.4y+0.5)$$

$$5y+10-3=4y+5$$

$$5y+7=4y+5$$

$$y=-2$$

7. $8b+6(7-2b)=-4(b+1)$

$$8b+42-12b=-4b-4$$

$$-4b+42=-4b-4$$

$$42=-4$$

This is a contradiction, so the solution

set is $\{ \}$.

9. $P=a+b+c$

$$P-b-c=a+b+c-b-c$$

$$a=P-b-c$$

11. $x=y-z$

$$y=x+z$$

13. $p=250+q$

$$p-250=250-250+q$$

$$q=p-250$$

15. $A=bh$

$$\frac{A}{h}=\frac{bh}{h} \Rightarrow b=\frac{A}{h}$$

17. $PV=nrt$

$$\frac{PV}{nr}=t$$

19. $x-y=5$

$$x=5+y$$

21. $3x+y=-19$

$$y=-3x-19$$

23. $2x+3y=6$

$$3y=-2x+6$$

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

25. $-2x - y = 9$

$$-2x = y + 9$$

$$x = \frac{y + 9}{-2}$$

$$= -\frac{1}{2}y - \frac{9}{2}$$

27. $4x - 3y = 12$

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

$$y = \frac{-4x + 12}{-3}$$

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

29. $ax + by = c$

$$by = -ax + c$$

$$y = \frac{-ax + c}{b} \text{ or } y = -\frac{a}{b}x + \frac{c}{b}$$

31. $A = P(1 + rt)$

$$A = P + Prt$$

$$A - P = Prt$$

$$t = \frac{A - P}{Pr} = \frac{A}{Pr} - \frac{1}{r}$$

33. $a = 2(b + c)$

$$a = 2b + 2c$$

$$a - 2b = 2c$$

$$c = \frac{a - 2b}{2}$$

$$\text{or } c = \frac{a}{2} - b$$

35. $Q = \frac{x + y}{2}$

$$2Q = x + y$$

$$y = 2Q - x$$

37. $M = \frac{a}{S}$

$$a = MS$$

39. $P = I^2R$

$$R = \frac{P}{I^2}$$

41. Let $x =$ width. Then, length equals $x + 2$.

$$P = 2w + 2l$$

$$24 = 2x + 2(x + 2)$$

$$24 = 2x + 2x + 4$$

$$4x = 20$$

$$x = 5$$

The width is 5 feet; the length is 7 feet.

43. Let $x =$ width. Then, the length is $4x$.

$$P = 2w + 2l$$

$$300 = 2x + 2(4x)$$

$$300 = 2x + 8x$$

$$10x = 300$$

$$x = 30$$

The width is 30 yd. and the length is 120 yd.

45. Let $x =$ width. Then, the length is $2x - 5$.

$$P = 2w + 2l$$

$$590 = 2x + 2(2x - 5)$$

$$590 = 2x + 4x - 10$$

$$6x = 600 \Rightarrow x = 100$$

The width is 100 m; the length is 195 m.

47. Let $x =$ length of the two sides that are the same. Then, the length of the third side is

$$x + 5.$$

$$P = a + b + c$$

$$71 = x + x + x + 5$$

$$71 = 3x + 5$$

$$3x = 71 - 5$$

$$3x = 66 \Rightarrow x = 22$$

The sides are 22 m, 22 m, and 27 m.

49. Adjacent supplementary angles form a straight angle. The words *supplementary* and *straight* both begin with the same letter.

51. Let $x =$ one angle. Then, $3x - 4^\circ$ is the other angle.

$$(\text{sum of the angles}) = 90^\circ$$

$$x + 3x - 4 = 90$$

$$4x = 94 \Rightarrow x = 23.5$$

The angles are 23.5° and 66.5° .

53. Let $x =$ one angle. Then $4x + 6$ is the other angle.

$$(\text{sum of the angles}) = 180^\circ$$

$$x + 4x + 6 = 180$$

$$5x = 174 \Rightarrow x = 34.8$$

55. Vertical angles are equal.

$$x + 17 = 2x - 3$$

$$x = 20$$

The angles are $20 + 17 = 37^\circ$ and

$$2(20) - 3 = 37^\circ.$$

57. Let $x =$ smallest angle. Then the middle angle is $2x$ and the largest angle is $3x$.

$$(\text{sum of angles of a triangle}) = 180^\circ$$

$$x + 2x + 3x = 180$$

$$6x = 180$$

$$x = \frac{180}{6} = 30^\circ$$

The angles are 30° , 60° , and 90° .

59. Let $x =$ largest angle. Then, the middle angle is $x - 30^\circ$, and the smallest angle

is $\frac{1}{2}$ of $x = \frac{1}{2}x$.

$$(\text{sum of angles of a triangle}) = 180^\circ$$

$$x + x - 30 + \frac{1}{2}x = 180$$

$$\frac{5}{2}x = 180 + 30$$

$$\frac{5}{2}x = 210$$

$$x = 210 \cdot \frac{2}{5} \\ = 84^\circ$$

The angles are 84° , $84^\circ - 30^\circ = 54^\circ$, and

$$\frac{1}{2}(84^\circ) = 42^\circ.$$

61. The sum of complementary angles is 90° .

$$(3x + 5) + (2x) = 90$$

$$5x = 85 \Rightarrow x = 17$$

The angles are $3(17) + 5 = 56^\circ$, $2(17) = 34^\circ$.

63. (a) $A = lw$

(b) $A = lw$

$$w = \frac{A}{l}$$

(c) $w = \frac{A}{l}$

$$w = \frac{1740.5}{59}$$

$$= 29.5 \text{ feet}$$

65. (a) $P = l + l + w + w$
 $= 2l + 2w$

(b) $P = 2l + 2w$

$$P - 2w = 2l$$

$$\frac{P - 2w}{2} = \frac{2l}{2}$$

$$p - 2w = 2l$$

$$l = \frac{P - 2w}{2}$$

(c) $l = \frac{P - 2w}{2}$

$$l = \frac{338 - 2(66)}{2}$$

$$= \frac{206}{2}$$

$$l = 103$$

The length is 103 m.

67. (a) $C = 2\pi r$

(b) $C = 2\pi r$

$$\frac{C}{2\pi} = \frac{2\pi r}{2\pi} \Rightarrow r = \frac{C}{2\pi}$$

$$\text{(c) } r = \frac{C}{2\pi}$$
$$r = \frac{880}{2(3.14)} = \frac{880}{6.28} \Rightarrow r \approx 140$$

The radius is approximately 140 ft.

$$\mathbf{69. (a) } A = \pi r^2$$

$$A = \pi(11.5)^2$$

$$A = 132.25\pi$$

$$A \approx 415.48 \text{ m}^2$$

$$\mathbf{(b) } V = \pi r^2 h$$

$$V = \pi(11.5)^2(25)$$

$$V = 3306.25\pi$$

$$V \approx 10,386.89 \text{ m}^3$$