Answers to Geometry Unit 3 Practice

LESSON 17-1

1. a. (4, 9)

b. (8, 30)

c. (−2, 15)

d. $\left(\frac{2}{9}, -\frac{3}{2}\right)$

e. (0.10, 2.25)

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

b. $A'(-4.5, 4.5)$, $B'(6, 7.5)$, $C'(9, 0)$, $D'(-6, -6)$

3. C

4. a. 2

b. enlargement

c. (1, −2)

d. $P'(-7, 10)$, $Q'(-9, -4)$, $R'(3, -6)$

5. $A'(-3, 7.5)$, $B'(3, 7.5)$, $C'(3, -1.5)$, $D'(-3, -1.5)$

LESSON 17-2

6. D

7. $(x, y) \rightarrow \left(\frac{x}{3}, \frac{y}{3}\right) \rightarrow \left(3 - \frac{x}{3}, \frac{y}{3}\right)$

8. $P'(-6, -1)$, $Q'(2, -1)$, $R'(2, 9)$

9. $D_{o,\,12}$

10. No. Sample answer. A dilation can change the size of a preimage. Since a rigid transformation does not affect the size of a figure, a dilation is not a rigid transformation.

LESSON 17-3

11. 0.5

12. $y = 7.2$, $z = 15$

13. a. no, not congruent; yes, similar

b. $A'(-5, 17)$, $B'(10, 20)$, $C'(16, -1)$

14. B

15. a. Yes. In $\triangle ABC$, $\angle C \cong \angle B$ because $AB = AC$. Dilations preserve angle measure, so $\angle C' \cong \angle B'$ and $\triangle A'B'C'$ is isosceles.

b. 2

LESSON 18-1

16. Triangle II is similar to Triangle III. Sample answer. The third angle in Triangle II is 70°, so Triangles II and III are similar by the AA Similarity Postulate.

17. a. $\frac{AB}{XY} = \frac{12}{15} = \frac{4}{5}$; $\frac{AC}{XZ} = \frac{16}{20} = \frac{4}{5}$; $\angle A \cong \angle X$. Since two sides are proportional and the angles formed by the sides are congruent, the triangles satisfy the SAS similarity criterion.

b. Use the scale factor $\frac{4}{5}$: $\frac{BC}{YZ} = \frac{4}{5}$; $\frac{18}{YZ} = \frac{4}{5}$, $YZ = \frac{(18)(5)}{4} = 22.5$.

c. There is a sequence of transformations, including a dilation, that maps $\triangle ABC$ to $\triangle XYZ$.

d. $\triangle YZX$

18. C

19. a. Sample answer. $\angle PST \cong \angle PQR$ or $\angle PTS \cong \angle PRQ$

b. $\frac{PS}{PQ} = \frac{PT}{PR}$

20. a. $m\angle D = 107°$, $m\angle E = 38°$

b. 17.8

LESSON 18-2

21. a. 25°

b. $\triangle ZSR$

c. $\frac{15}{13}$; 1.15

d. 2.67

e. $RZ = 13$, $XZ = 15$

22. 7.9

23. Sample answer. Using 8, 9, and 6 in the numerator and 8, $10\frac{2}{3}$, and 12 in the denominator, we can form the ratios $\frac{6}{8}$, $\frac{8}{10\frac{2}{3}}$, and $\frac{9}{12}$, and show that each ratio is equivalent to $\frac{3}{4}$. That means corresponding sides are proportional, so the two triangles are similar by the SSS similarity criterion.

24. a. 20 units, 16 units

b. $7\frac{1}{5}$ units, $9\frac{3}{5}$ units

c. 9 units, 15 units

d. $1\frac{4}{5}$ units, $2\frac{2}{5}$ units

25. D

LESSON 18-3

26. C

27. $\frac{a}{b} = \frac{d}{c}$ or $\frac{b}{a} = \frac{c}{d}$

28. a. $\frac{AD}{DB}$ or $\frac{ED}{CB}$

b. $AD = 40.9$, $DB = 34.1$

29. a. 7.5

b. 22.5

c. 9

d. 21.6

30. a. $5\frac{5}{7}$

b. 118°

LESSON 19-1

31. a. $\angle PMT$, $\angle SPT$

b. $\angle PTM$

c. $\angle TPM$

d. 3

32. a. $\overline{BE}$

b. $\overline{CJ}$, $\overline{GJ}$

c. $\overline{EF}$

d. $\triangle AGJ$, $\triangle AGC$

33. a. 12

b. 28.8

c. 33.8

d. 31.2

34. C

35. Sample answer. $\triangle KJL \sim \triangle MJK \sim \triangle MKL$

LESSON 19-2

36. C

37. a. 4

b. 4.2

c. 8

d. 6

38. a. 8

b. 2

c. 18.3

d. 8

39. a. 50

b. $18\sqrt{3}$

c. $3\sqrt{5}$

d. $100\sqrt{2}$

e. $\sqrt{ab}$

40. a. $f = 8$

b. area $= \frac{1}{2}bh = \frac{1}{2}(4 + 16)(8) = \frac{1}{2}(20)(8) = 80$ units^2

c. $a = 4\sqrt{5}$, $b = 8\sqrt{5}$

d. area $= \frac{1}{2}bh = \frac{1}{2}(4\sqrt{5})(8\sqrt{5}) = \frac{1}{2}(32)(5)$
$= 80$ units^2

e. Sample answer. You get the same value for the area of triangle ABC whether you use $\overline{AB}$ and $\overline{CD}$ as the base and height or whether you use $\overline{BC}$ and $\overline{CA}$ as the base and height.

LESSON 20-1

41. C

42. 24 ft

43. a. 13 ft

b. 61 ft

c. 228 ft^2

d. 25 ft

44. **a.** 14.5 units

b. 58 units

c. 7.7 units

d. 29.9 units

45. **a.** 34.1 cm

b. 26.6 cm

LESSON 20-2

46. **a.** acute

b. right

c. right

d. obtuse

e. acute

47. **a.** Yes. $15.1^2 + 18.4^2 = 23.8^2$

b. No. $11.3^2 + 13.5^2 \neq 18.5^2$

48. **a.** $1.9 < s < 8.6$ cm

b. $10.5 < l < 19.1$ cm

c. 6.0 cm

d. 13.6 cm

49. D

50. **a.** $\sqrt{5}$

b. $\sqrt{2}$

c. $\sqrt{1}$ or 1

d. $\sqrt{6}$

e. $\sqrt{3}$

LESSON 21-1

51. **a.** $12\sqrt{2}$ in.; 16.97 in.

b. $25\sqrt{2}$ cm; 35.36 cm

c. $7a\sqrt{2}$ ft; $9.90a$ ft

d. $\frac{a\sqrt{2}}{b}$ units; $\frac{1.41a}{b}$ units

52. **a.** $11\sqrt{2}$ in.; 15.56 in.

b. $9.5\sqrt{2}$ cm or $\frac{19\sqrt{2}}{2}$ cm; 13.44 cm

c. $2.5a\sqrt{2}$ ft; $3.54a$ ft

d. $\frac{c\sqrt{2}}{2d}$ units; $\frac{0.71c}{d}$ units

53. B

54. **a.** 6 units

b. 26 cm

c. $(\sqrt{6} + \sqrt{2})$ cm

d. 0.5 unit

55. **a.** leg: 7 units; hypotenuse: $7\sqrt{2}$ units

b. leg: 10 units; hypotenuse: $10\sqrt{2}$ units

c. leg: 5 units; hypotenuse: $5\sqrt{2}$ units

d. leg: $\sqrt{m}$ units; hypotenuse: $\sqrt{2m}$ units

LESSON 21-2

56. **a.** longer leg: $15\sqrt{3}$ in.; hypotenuse: 30 in.

b. longer leg: 24 cm; hypotenuse: $16\sqrt{3}$ cm

c. longer leg: $a\sqrt{3}$ ft; hypotenuse: $2a$ ft

d. longer leg: $3\sqrt{15}$ units; hypotenuse: $6\sqrt{5}$ units

57. **a.** shorter leg: 12.5 cm; longer leg: $12.5\sqrt{3}$ cm

b. shorter leg: $4\sqrt{3}$ in.; hypotenuse $8\sqrt{3}$ in.

c. shorter leg: $\frac{10\sqrt{3}}{3}$ ft; hypotenuse: $\frac{20\sqrt{3}}{3}$ ft

d. shorter leg: $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ units; longer leg: 1 unit

58. D

59. **a.** legs: 5 cm, $5\sqrt{3}$ cm; hypotenuse: 10 cm

b. legs; 6, $6\sqrt{3}$; hypotenuse: 12

c. legs: 15, $15\sqrt{3}$; hypotenuse: 30

d. legs: a, $a\sqrt{3}$; hypotenuse: $2a$

60. $a = \frac{5\sqrt{2}}{2}$, $b = \frac{5\sqrt{2}}{2}$, $c = 5\sqrt{3}$, $d = 10$

LESSON 22-1

61. a. $\overline{MT}$

b. $\overline{MT}$

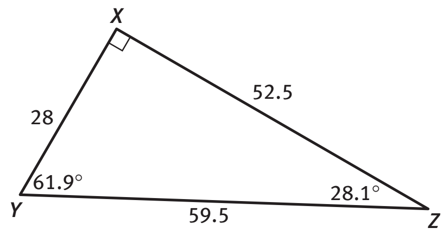
c. $\overline{NT}$

d. $\overline{NT}$

62. a. 15

b. 28.1°

c.



d. Sample answer. I used the same angle measures as in $\triangle QRS$. I multiplied each side length of $\triangle QRS$ by 3.5 to find the side lengths of $\triangle XYZ$.

63. 6.6 cm, 6.1 cm

64. C

65. Scale Factor = 0.4, $m\angle A = 28.1°$, $m\angle E = 61.9°$, $AC = 15$, $EF = 3.2$, $DE = 6.8$

LESSON 22-2

66. a. $\frac{p}{r}$

b. $\frac{q}{p}$

c. $\frac{p}{r}$

d. $\frac{q}{r}$

e. $\frac{p}{q}$

67. a. $\frac{55}{48}$ or $1\frac{7}{48}$

b. $\frac{48}{55}$

c. $\frac{48}{73}$

d. $\frac{55}{73}$

e. $\frac{55}{73}$

68. a. 0.84

b. 0.73

c. 143.24

d. 0

e. 1

69. C

70. B

LESSON 22-3

71. a. $\sin 68° = \frac{a}{150}$; $0.9272 = \frac{a}{150}$;

$a = (150)(0.9272) = 139.1$

b. $\cos 68° = \frac{b}{150}$; $0.3746 = \frac{b}{150}$;

$b = (0.3746)(150) = 56.2$

72. a. $\sin 62° = \frac{27.6}{m}$; $m = \frac{27.6}{\sin 62°} = \frac{27.6}{0.88} = 31.3$

perimeter: $7 + 31.3 + 27.6 = 65.9$ units

area: $\frac{1}{2}(7)(27.6) = 96.6$ units^2

b. $\tan 43° = \frac{17.8}{p}$; $p = \frac{17.8}{\tan 43°} = \frac{17.8}{0.93} = 19.1$

$\sin 43° = \frac{17.8}{q}$; $q = \frac{17.8}{\sin 43°} = \frac{17.8}{0.68} = 26.1$

perimeter: $17.8 + 19.1 + 26.1 = 63$ units

area: $\frac{1}{2}(17.8)(19.1) = 170.0$ units^2

73. B

74. a. $\cos 53° = \frac{AD}{BD}$, $AD = (BD)(\cos 53°)$

$= (42.3)(0.6018) = 25.5$

$\sin 53° = \frac{AB}{BD}$, $AB = (BD)(\sin 53°)$

$= (42.3)(0.7986) = 33.8$

b. The area of $ABCD$ is $(25.5)(33.8) = 861.9$, so the area of $\triangle ABD$ is $(0.5)(861.9) = 430.95$. Using AT as height and BD as base in $\triangle ABD$,

$A = \frac{1}{2}bh$; $430.95 = (42.3)(AT)$; so

$AT = \frac{(430.95)(2)}{42.3} = 20.4.$

c. $\sin 53° = \dfrac{AT}{AD}$, $AT = (AD)(\sin 53°)$
$= (25.5)(0.7986) = 20.4.$

d. Sample answer. The results are the same. I prefer the method in Part c because it is faster.

75. **a.** 1601.7 m

b. 783.2 m

c. 1988.5 m

d. 396.4 m

LESSON 22-4

76. **a.** 35°

b. 44°

c. 78.5°

d. 76°

e. 61.9°

77. **a.** 4.76°

b. 4.78°

78. $AB = 21.2$, $CB = 13.9$, $m\angle B = 49°$

79. $DF = 9.8$, $m\angle F = 66.9°$, $m\angle E = 23.1°$

80. D

LESSON 23-1

81. **a.** $\sin Q = \dfrac{h}{r}$

b. $\sin R = \dfrac{h}{q}$

c. $h = r \sin Q$, $h = q \sin R$

d. $r \sin Q = q \sin R$

e. $\dfrac{\sin Q}{q} = \dfrac{\sin R}{r}$

82. $\dfrac{\sin M}{m} = \dfrac{\sin N}{n} = \dfrac{\sin T}{t}$

83. **a.** 17.8

b. 11.3

84. D

85. C

LESSON 23-2

86. A

87. **a.** $\dfrac{\sin 38°}{12} = \dfrac{\sin Q}{15}$; $\sin Q = \dfrac{(15)(\sin 38°)}{12}$
$= \dfrac{(15)(0.6157)}{12} = 0.77$; $m\angle Q = 50.3°$

b. $\dfrac{\sin 38°}{12} = \dfrac{\sin T}{15}$; $\sin T = \dfrac{(15)(\sin 38°)}{12}$
$= \dfrac{(15)(0.6157)}{12} = 0.77$; $m\angle T = 50.3°$

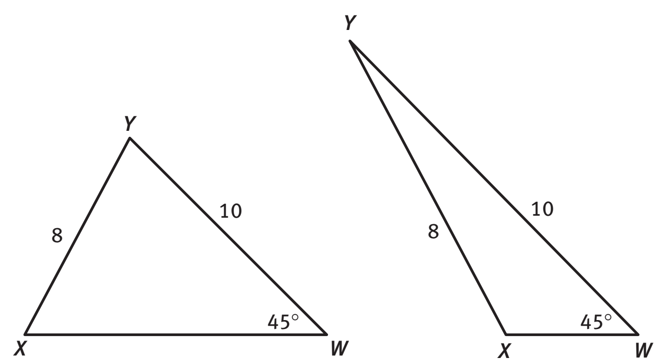
c. Sample answer. In $\triangle PQR$, $m\angle Q = 50.3°$, but in STV, $m\angle T \neq 50.3°$.

d. Sample answer. The supplement of 50.3° is 129.7°, and sin 127.9° = 0.77. The actual measure of angle T is the supplement of 50.3°.

88. **a.** 55°, 125°

b. 38, 10

89. Sample answer.



90. **a.** 73°, 17°

b. 10.8, 3.3

LESSON 23-3

91. C

92. 117.7°

93. D

94. 16.7 cm

95. **a.** 24°

b. 78°

LESSON 23-4

96. B

97. **a.** side, side, side

b. Law of Cosines

c. 70.0°

d. 63.4°

e. 46.6°

98. **a.** angle, angle, side

b. Law of Sines

c. 18.3

d. 8.6

e. 26°

99. **a.** side, angle, side

b. You can use the Law of Cosines to find *HK* and then either the Law of Sines or the Law of Cosines to find $m\angle K$ or $m\angle H$.

c. 31.1

d. 37°

e. 50°

100. $m\angle T = 180 - (25 + 29) = 180 - 54 = 126°$

$$\frac{\sin 126°}{100} = \frac{\sin 25°}{TB} = \frac{\sin 29°}{TA}$$

$$TB = \frac{100 \sin 25°}{\sin 126°} = \frac{(100)(0.4226)}{0.8090} = 52.2 \text{ m}$$

$$TA = \frac{100 \sin 29°}{\sin 126°} = \frac{(100)(0.4848)}{0.8090} = 59.9 \text{ m}$$

The surveyor at point *B* is closer to *T*, by $59.9 - 52.2 = 7.7$ m.