Answers for 4.7

For use with pages 267–270

4.7 Skill Practice

1. The angle formed by the legs is the vertex angle.

2. They are congruent.

3. A, D; Base Angles Theorem

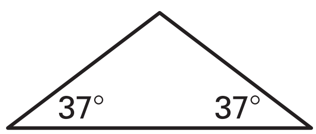
4. A, BEA; Base Angles Theorem

5. $\overline{CD}$, $\overline{CE}$; Converse of Base Angles Theorem

6. $\overline{EB}$, $\overline{EC}$; Converse of Base Angles Theorem

7. 12 **8.** 16 **9.** 60°

10. 106°



11. 20 **12.** 6 **13.** 8

14. $\overline{AC}$ is not congruent to $\overline{BC}$, $\overline{AB} \cong \overline{BC}$, which makes $BC = 5$.

15. 39, 39 **16.** 48, 70 **17.** 45, 5

18. No; an isosceles triangle can have an obtuse or a right vertex angle, which would make it an obtuse or a right triangle.

19. B

20. 50, $\frac{1}{2}$; first find y by using the Triangle Sum Theorem followed by the Base Angles Theorem. Next find x by using the Definition of linear pair followed by the Base Angles Theorem.

21. There is not enough information to find x or y. We need to know the measure of one of the vertex angles.

22. ± 4, 4; since $y + 12 = 3x^2 - 32$ and $3x^2 - 32 = 5y - 4$, use the Transitive Property of Equality and set $y + 12 = 5y - 4$ to solve for y and use the value of y to solve for x.

23. 16 ft **24.** 17 in. **25.** 39 in.

26. Not possible; the isosceles triangle with legs of length 7 cannot contain two 90° angles.

27. possible

28. Not possible; $x = y$ forms parallel segments which cannot be two sides of a triangle.

29. possible

30. Isosceles; two of the angles have the same measure, so two of the sides have the same length by the Converse of the Base Angles Theorem.

31. $\triangle ABD \cong \triangle CBD$ by SAS making $\overline{BA} \cong \overline{BC}$ because corresponding parts of congruent triangles are congruent.

32. 150; one triangle is equiangular and the other two triangles are congruent making $x°$ the measure of the third angle in the center. $x + x + 60 = 360$.

33. 60, 120; solve the system $x + y = 180$ and $180 + 2x - y = 180$.

34. 90, about 8.66; one triangle is equiangular, one is isosceles, and the third one is a right triangle. Use the equiangular and isosceles triangles to establish the right triangle and then use the Pythagorean Theorem.

35. 50°, 50°, 80°, 65°, 65°, 50°; there are two distinct exterior angles. If the angle is supplementary to the base angle, the base angles measure 50°. If the angle is supplementary to the vertex angle, then the base angles measure 65°.

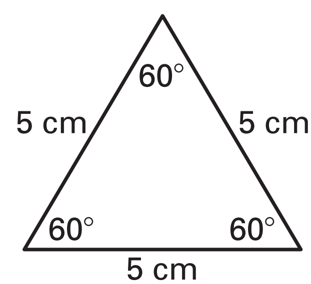
36. Since $\angle A$ is the vertex angle of isosceles $\triangle ABC$, $\angle B$ must be congruent to $\angle C$. Since 2 times any angle measure will always be an even number, an even number will be subtracted from 180 to find $m\angle A$. 180 minus an even number will always be an even number, therefore $m\angle A$ must be even.

37. $180 - x$, $180 - x$, $2x - 180$; $\frac{x}{2}$, $\frac{x}{2}$, $180 - x$, $0 < x < 180$

4.7 Problem Solving

38. 79, 22

39.



40. 10°

41. **a.** $\angle A$, $\angle ACB$, $\angle CBD$, and $\angle CDB$ are congruent and $\overline{BC} \cong \overline{CB}$ making $\triangle ABC \cong \triangle BCD$ by AAS.

b. $\triangle ABC$, $\triangle BCD$, $\triangle CDE$, $\triangle DEF$, $\triangle EFG$

c. $\angle BCD$, $\angle CDE$, $\angle DEF$, $\angle EFG$

42. a. The sides of each new triangle are the sum of the same number of congruent segments.

b. 1 square unit, 4 square units, 9 square units, 16 square units

c. $1^2, 2^2, 3^2 \ldots$; 49 square units; the numbers representing the areas are the sequence of perfect squares.

43. 90°, 45°, 45°

44. If a triangle is equilateral it is also isosceles, using these two facts it can be shown that the triangle is equiangular.

45. Statements (Reasons)

1. $\triangle ABC$ with $\angle B \cong \angle C$ (Given)
2. Draw altitude $\overline{AD}$. (Two points determine a line.)
3. $m\angle ADC = m\angle ADB = 90°$ (Definition of altitude)
4. $\angle ADC \cong \angle ADB$ (All right angles are congruent.)
5. $\overline{AD} \cong \overline{AD}$ (Reflexive Property of Congruence)
6. $\triangle ADB \cong \triangle ADC$ (AAS)
7. $\overline{AB} \cong \overline{AC}$ (Corr. parts of $\cong$ △s are $\cong$.)

46. a. Statements (Reasons)

1. $\overline{AB} \cong \overline{CD}, \overline{AE} \cong \overline{DE}$, $\angle BAE \cong \angle CDB$ (Given)
2. $\triangle ABE \cong \triangle DCE$ (SAS)

b. $\triangle AED$, $\triangle BEC$

c. $\angle EDA$, $\angle EBC$, $\angle ECB$

d. No; $\triangle AED$ and $\triangle BEC$ remain isosceles triangles with $\angle BEC \cong \angle AED$.

47. No; $m\angle 1 = 50°$, so $m\angle 2 = 50°$. $\angle 2$ corresponds to the angle measuring 45°, therefore p is not parallel to q.

48. Yes; $m\angle ABC = 50°$ and $m\angle BAC = 50°$. The Converse of Base Angles Theorem guarantees that $\overline{AC} \cong \overline{BC}$ making $\triangle ABC$ isosceles.

49. Statements (Reasons)

1. $\triangle ABC$ is equilateral, $\angle CAD \cong \angle ABE \cong \angle BCF$. (Given)
2. $m\angle CAD = m\angle ABE = m\angle BCF$ (Definition of angle congruence)

49. (cont.)

Statements (Reasons)

3. $m\angle CAD + m\angle DAB = m\angle CAB$, $m\angle ABE + m\angle EBC = m\angle ABC$, $m\angle BCF + m\angle FCA = m\angle BCA$ (Angle Addition Postulate)

4. $m\angle CAB = m\angle ABC = m\angle BCA$ (Base Angles Theorem)

5. $m\angle CAD + m\angle DAB = m\angle ABE + m\angle EBC = m\angle BCF + m\angle FCA$ (Transitive Property of Equality)

6. $m\angle CAD + m\angle DAB = m\angle CAD + m\angle EBC = m\angle CAD + m\angle FCA$ (Substitution Property of Equality)

7. $m\angle DAB = m\angle EBC = m\angle FCA$ (Subtraction Property of Equality)

8. $\angle DAB \cong \angle EBC \cong \angle FCA$ (Definition of angle congruence)

9. $\triangle ACF \cong \triangle CBE \cong \triangle BAD$ (ASA)

10. $\angle BEC \cong \angle ADB \cong \angle CFA$ (Corr. parts of $\cong$ ⚠s are $\cong$.)

11. $m\angle BEC = m\angle ADB = m\angle CFA$ (Definition of angle congruence)

12. $\angle BEC$ and $\angle DEF$, $\angle ADB$ and $\angle EDF$, $\angle CFA$ and $\angle DFE$ are linear pairs and are supplementary. (Definition of linear pair)

13. $\angle DEF \cong \angle EDF \cong \angle DFE$ (Congruent Supplements Theorem)

14. $\triangle DEF$ is equiangular. (Definition of equiangular triangle)

15. $\triangle DEF$ is equilateral. (Converse of Base Angles Theorem)

50. *Sample answer:* Choose point $p(x, y) \neq (2, 2)$ and set $PT = PU$. Solve the equation

$$\sqrt{x^2 + (y-4)^2} = \sqrt{(x-4)^2 + y^2}$$

and get $y = x$. The point (2, 2) is excluded because it is a point on $\overrightarrow{TU}$.

51. 6, 8, 10; set $3t = 5t - 12$, $3t = t + 20$, $5t - 12 = t + 20$ and solve for t.

4.7 Mixed Review

52. III

53. II

54. IV

55. $-11, -4, 1$

56. $x, y = 3x$

57. congruent

58. congruent

59. not congruent

60. congruent