Answers for 5.5

For use with pages 331–334

5.5 Skill Practice

1. $\angle A, \overline{BC}; \angle B, \overline{CA}; \angle C, \overline{AB}$

2. It is opposite the largest angle; it is opposite the smallest angle.

3. *Sample answer:* The longest side is opposite the largest angle. The shortest side is opposite the smallest angle.

4. *Sample answer:* The side and angle whose measures are between the smallest and largest side and angle respectively lie between the smallest and largest angle and smallest and largest side respectively.

5. *Sample answer:* The largest side is opposite the obtuse angle and two angles with the same measure are opposite the sides with the same measure.

6. $\overline{AB}, \overline{BC}, \overline{CA}; \angle C, \angle A, \angle B$

7. $\overline{XY}, \overline{YZ}, \overline{ZX}; \angle Z, \angle X, \angle Y$

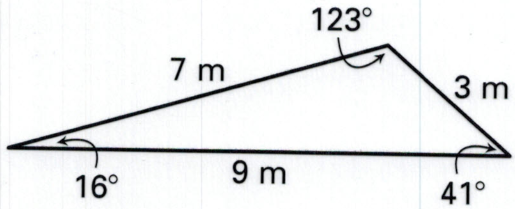
8. $\overline{RT}, \overline{ST}, \overline{RS}; \angle S, \angle R, \angle T$

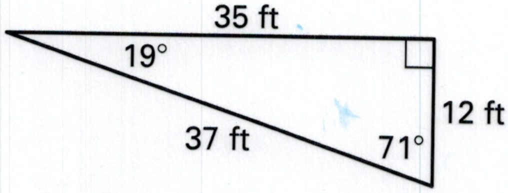
9. $\overline{KL}, \overline{JL}, \overline{JK}; \angle J, \angle K, \angle L$

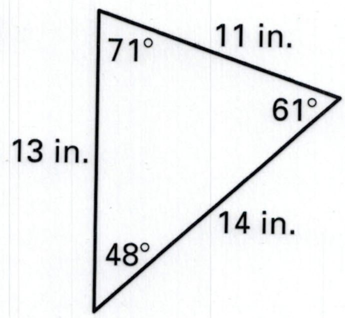
10. $\overline{NP}, \overline{MN}, \overline{PM}; \angle M, \angle P, \angle N$

11. $\overline{DF}, \overline{FG}, \overline{GD}; \angle G, \angle D, \angle F$

12. C

13. 

14. 

15. 

16. yes

17. No; 3 + 6 is not greater than 9.

18. yes

19. yes

20. B

21. 7 in. $< x <$ 17 in.

22. 1 m $< x <$ 7 m

23. 6 ft $< x <$ 30 ft

24. 13 yd $< x <$ 33 yd

25. 16 in. $< x <$ 64 in.

26. 0 m $< x <$ 50 m

27. $\angle A$ and $\angle B$ are the nonadjacent interior angles to $\angle 1$ thus by the Exterior Angle Inequality Theorem $m\angle 1 = m\angle A + m\angle B$, which guarantees $m\angle 1 > m\angle A$ and $m\angle 1 > m\angle B$.

28. The diagram indicates that an exterior angle of the triangle has the same measure as one of the nonadjacent interior angles, which cannot be.

29. The longest side is not opposite the largest angle.

30. The hypotenuse is opposite the $90°$ angle in a right triangle which is the largest angle in the triangle.

31. yes; $\angle Q$, $\angle P$, $\angle R$

32. no

33. $2 < x < 15$

34. $\frac{15}{7} < x < 13$

35. $\angle WXY$, $\angle Z$, $\angle ZXY$, $\angle WYX$ and $\angle ZYX$, $\angle W$; $\angle ZYX$ is the largest angle in $\triangle ZYX$ and $\angle WYX$ is the middle sized angle in $\triangle WXY$ making $\angle W$ the largest angle. $m\angle WXY + m\angle W = m\angle Z + m\angle ZXY$ making $\angle WXY$ the smallest.

36. $4 < P < 24$; $2 < FG < 8$, $1 < GH < 7$, and $1 < HF < 9$

5.5 Problem Solving

37. $m\angle P < m\angle Q$, $m\angle P < m\angle R$; $m\angle Q = m\angle R$

38. 35 yd $< AB <$ 50 yd. *Sample answer:* Extend $\overrightarrow{BA}$ through E such that $m\angle ACE = 40°$, then measure $\overline{AE}$.

39. a. The sum of the other two side lengths is less than 1080 km.

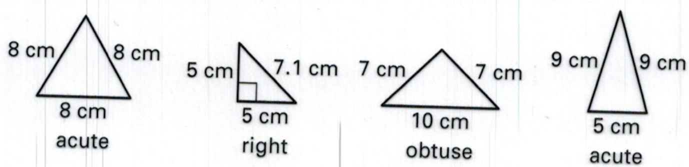
b. No; the sum of the distance from Granite Peak to Fort Peck Lake and Granite Peak to Glacier National Park must be more than 565 km.

c. $d > 76$ km, $d < 1054$ km

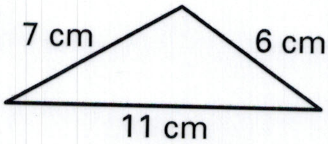
d. The distance is less than 489 kilometers.

40. Yes; pick the two shortest sides and see if their sum is greater than the third side.

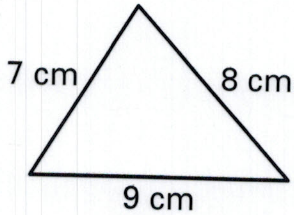
41. *Sample:*



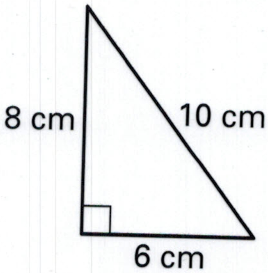
42.



scalene obtuse



scalene acute



scalene right

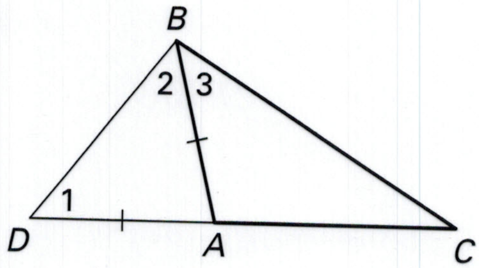
43. *Sample answer:* 3, 4, 17; 2, 5, 17; 4, 4, 16

44. $350 \text{ yd} < d < 1068 \text{ yd}$

45. $1\frac{1}{4}$ mi $\leq d \leq 2\frac{3}{4}$ mi; if the locations are collinear then the distance could be $1\frac{1}{4}$ miles or $2\frac{3}{4}$ miles. If the locations are not collinear then the distance must be between $1\frac{1}{4}$ miles and $2\frac{3}{4}$ miles because of the Triangle Inequality Theorem.

46. vertex angle: $60° < x < 180°$; vertex angle: $0° < x < 60°$

47.



One side, say $\overline{BC}$, is longer than or at least as long as each of the other sides. Then (1) and (2) are true. the proof for (3) follows.

<u>Statements (Reasons)</u>

1. $\triangle ABC$ (Given)
2. Extend $\overline{AC}$ to D so that $\overline{AB} \cong \overline{AD}$. (Ruler Postulate)
3. $AB = AD$ (Definition of segment congruence)
4. $AD + AC = DC$ (Segment Addition Postulate)
5. $\angle 1 \cong \angle 2$ (Base Angles Theorem)
6. $m\angle 1 = m\angle 2$ (Definition of segment congruence)
7. $m\angle DBC > m\angle 2$ (Protractor Postulate)
8. $m\angle DBC > m\angle 1$ (Substitution Property of Equality)

47. (cont.)

9. $DC > BC$ (If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side side opposite the smaller angle.)

10. $AD + AC > BC$ (Substitution Property of Equality)

11. $AB + AC > BC$ (Substitution Property of Equality)

48. a. Statements (Reasons)

1. $\triangle ABC$ and median $\overline{AM}$ (Given)

2. Extend $\overline{AM}$ to point D such that $\overline{AM} \cong \overline{DM}$, create $\triangle CDB$. (Construction)

3. $\overline{MB} \cong \overline{MC}$ (Definition of median)

4. $\angle AMB \cong \angle DMC$ (Vertical Angles Congruence Theorem)

5. $\triangle AMB \cong \triangle DMC$ (SAS)

6. $\overline{AB} \cong \overline{DC}$ (Corr. parts of $\cong$ ⚠ are $\cong$.)

7. $AB = DC$, $AM = DM$ (Definition of segment congruence)

8. $AM + MD = AD$ (Segment Addition Postulate)

9. $AM + AM = AD$ (Substitution Property of Equality)

10. $2AM = AD$ (Simplify.)

11. $AD < AC + CD$ (Triangle Inequality Theorem)

12. $AD < AC + AB$ (Substitution Property of Equality)

13. $2AM < AC + AB$ (Simplify.)

14. $AM < \frac{1}{2}(AC + AB)$ (Multiplication Property of Equality)

15. $\frac{1}{2}(AB + AC) < \frac{1}{2}(AB + AC + BC)$ (Property of Real Numbers)

16. $AM < \frac{1}{2}(AB + AC + BC)$ (Transitive Property)

b. In $\triangle ABC$, let $\overline{AX}$, $\overline{BY}$, and $\overline{CZ}$ be medians. By the concurrence of Medians of Triangle Theorem,

$\frac{2}{3}AX + \frac{2}{3}BY > AB$,

$\frac{2}{3}AX + \frac{2}{3}CZ > AC$, and

$\frac{2}{3}BY + \frac{2}{3}CZ > BC$.

48. b. (cont.)

Adding the left sides and right sides of the three inequalities you get $\frac{4}{3}(AX + BY + CZ) > AB + AC + BC$.

Multiplying both sides by $\frac{3}{4}$ you get $AX + BY + CZ > \frac{3}{4}(AB + AC + BC)$.

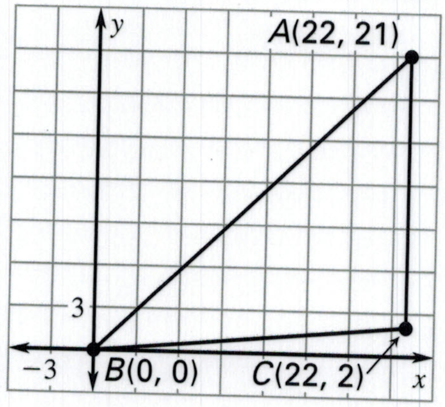
Therefore $AX + BY + CZ > \frac{1}{2}(AB + AC + BC)$.

5.5 Mixed Review

49. If a tree is a redwood, then it is a large tree; if a tree is large, then it is a redwood; if a tree is not a redwood, then it is not large; if a tree is not large, then it is not a redwood.

50. If $5x - 2 = 18$, then $x = 4$; if $x = 4$, then $5x - 2 = 18$; if $5x - 2 \neq 18$, then $x \neq 4$; if $x \neq 4$, then $5x - 2 \neq 18$.

51. Scalene; not a right triangle.



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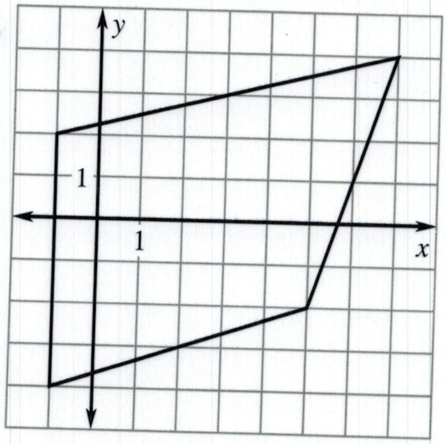

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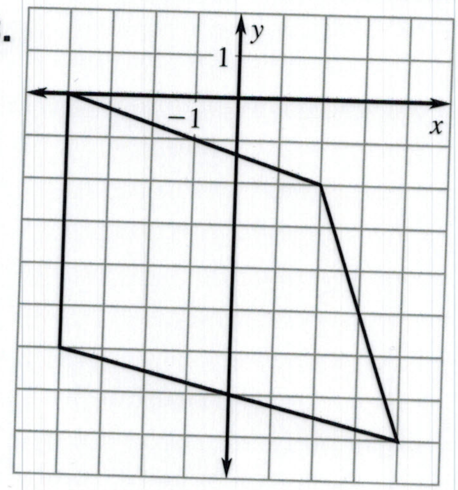

54.