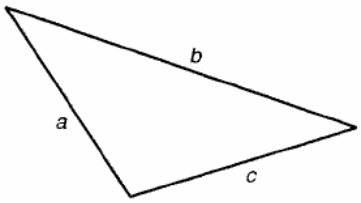
Geometry H Name: _____

7.2: Converse of Pythagorean Theorem Date: _____ Period: _____

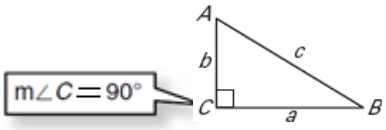
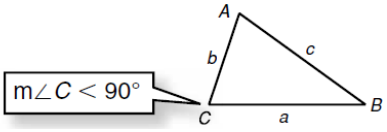
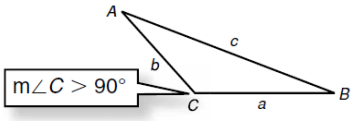
- I can determine if side lengths form a triangle.
- I can find possible side lengths of a triangle
- I can classify a triangle as acute, obtuse, or right given side lengths.

Theorem	**Example**
Triangle Inequality Theorem The sum of any two sides of a triangle is greater than the third side length.	 $a + b > c$ $b + c > a$ $c + a > b$

Example 1: *Find possible side lengths.*

The lengths of two sides of a triangle are given. Describe the possible lengths of the third side.

a) 14 and 10 b) 23 and 17

Converse of Pythagorean Theorem		
Given three sides of a triangle, *a, b,* and *c*, where *c* is the longest side, if $c^2 = a^2 + b^2$, then the triangle is a right triangle. 	Given three sides of a triangle, *a, b,* and *c*, where *c* is the longest side, if $c^2 < a^2 + b^2$, then the triangle is an acute triangle. 	Given three sides of a triangle, *a, b,* and *c*, where *c* is the longest side, if $c^2 > a^2 + b^2$, then the triangle is an obtuse triangle. 

Example 2: *Classify triangles, if possible.*

Determine if the given side lengths can form a triangle. If so, would the triangle be acute, right, or obtuse?

a) 4, 7, 9 b) 10, 13, 16 c) 5, 14, 20 d) $3, 5, \sqrt{34}$

Example 3: Creating triangles

An obtuse triangle has side lengths x, x-3, and 33, where 33 is the length of the longest side. What value(s) of x make the triangle obtuse?

Geometry H

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7.2 Homework: Converse of Pythagorean Theorem

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Describe the possible lengths of the third side of the triangle given the lengths of the other two sides.

1. 6 in., 9 in.

2. 4 ft, 12 ft

3. 21 yd, 16 yd

4. Two airplanes leave the same airport heading in different directions. After 2 hours, one airplane has traveled 710 miles and the other has traveled 640 miles. Describe the range of distances that represents how far apart the two airplanes can be at this time.

Decide whether the numbers can represent the side lengths of a triangle. If they can, classify the triangle as *right, acute,* or *obtuse*.

5. 5, 12, 13

6. $\sqrt{8}$,4,6

7. 20, 21, 28

8. 9, 6, 19

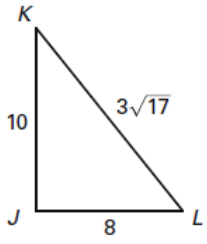
9. $\sqrt{13}$,10,12

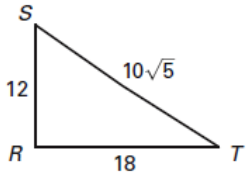
10. 14, 48, 50

In exercises 11 and 12, complete the statement with <, >, or =, if possible. If it is not possible, explain why.

11. $m\angle J$ _____ $m\angle R$

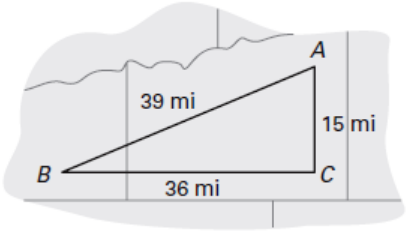
12. $m\angle K + m\angle L$ _____ $m\angle S + m\angle T$





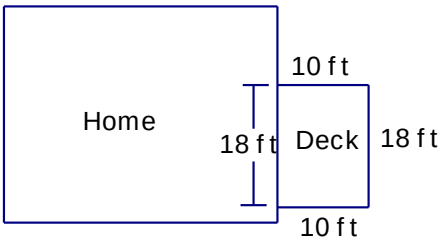
13. The distances between three towns are given in the diagram.

a) Is the triangle (ΔABC) formed by the three towns a right triangle?



b) Town *B* is directly west of town *C*. Is town *A* directly north of town *C*?

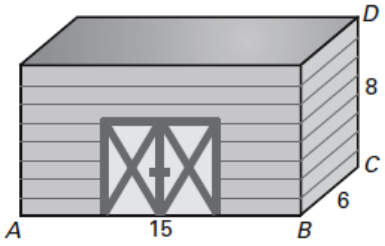
14. You are contractor building a deck adjacent to a home as shown. How can you be sure that the deck is square (the corners are right angles) when you lost your T-square and only have a tape measure? Explain.



The sides and classification of a triangle are given below. The length of the longest side is the integer given. What value(s) of *x* make the triangle?

15. x, x, 10; obtuse **16.** x, x, 15; acute **17.** x, x-5, 24; right

18. The figure represents a rectangular storage shed and its dimensions are given in feet. Can you fit an 18 foot 6 inch pipe in the shed?



Answer Key:

1. $3\ in. < x < 15\ in.$ **2.** $8\ ft < x < 16\ ft$ **3.** $5\ yd < x < 37\ yd$

4. The two airplanes are between 70 miles and 1350 miles apart.

5. yes; right **6.** Yes; obtuse **7.** Yes, acute

8. Not a triangle **9.** Yes, obtuse **10.** Yes, right

11. < **12.** > **13. a)** yes **b)** yes

14. Measure the length of the diagonal. If the square of the length of the diagonal is equal to $10^2 + 18^2$, then the deck is square.

15. $5 < x < 5\sqrt{2}$ **16.** $x > \frac{15\sqrt{2}}{2}$ **17.** $x = \frac{5+7\sqrt{23}}{2}$ **18.** no