

7.2

Use the Converse of the Pythagorean Theorem

- Goal** • Use the Converse of the Pythagorean Theorem to determine if a triangle is a right triangle.

The converse of the Pythagorean Theorem is also true. You can use it to verify that a triangle with given side lengths is a right triangle.

THEOREM

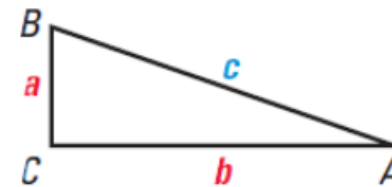
For Your Notebook

THEOREM 7.2 Converse of the Pythagorean Theorem

If the square of the length of the longest side of a triangle is equal to the sum of the squares of the lengths of the other two sides, then the triangle is a right triangle.

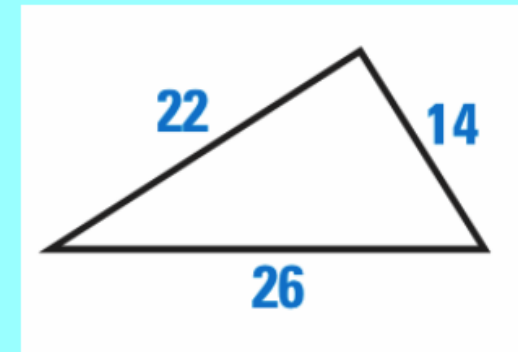
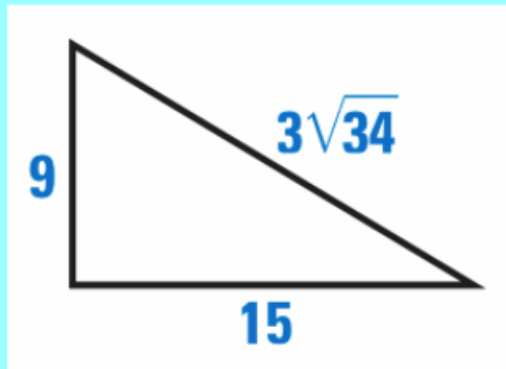
If $c^2 = a^2 + b^2$, then $\triangle ABC$ is a right triangle.

Proof: Ex. 42, p. 446



EXAMPLE 1 Verify right triangles

Tell whether the given triangle is a right triangle.



So... what if they do not create a right triangle?

$$a^2 + b^2 \neq c^2$$

What other kinds of triangles can we make?

THEOREMS

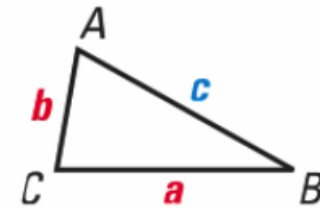
For Your Notebook

THEOREM 7.3

If the square of the length of the longest side of a triangle is less than the sum of the squares of the lengths of the other two sides, then the triangle ABC is an acute triangle.

If $c^2 < a^2 + b^2$, then the triangle ABC is acute.

Proof: Ex. 40, p. 446

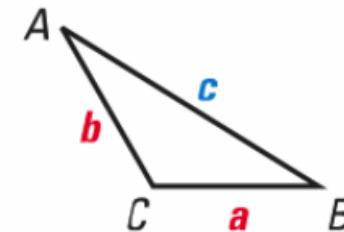


THEOREM 7.4

If the square of the length of the longest side of a triangle is greater than the sum of the squares of the lengths of the other two sides, then the triangle ABC is an obtuse triangle.

If $c^2 > a^2 + b^2$, then triangle ABC is obtuse.

Proof: Ex. 41, p. 446



EXAMPLE 2 **Classify triangles**

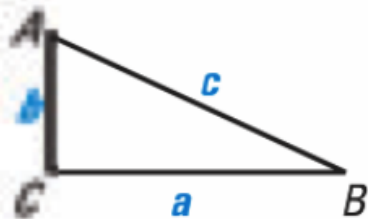
Can segments with lengths of 4.3 feet, 5.2 feet, and 6.1 feet form a triangle? If so, would the triangle be *acute*, *right*, or *obtuse*?

CONCEPT SUMMARY

For Your Notebook

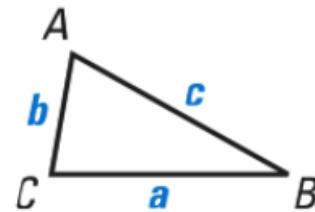
Methods for Classifying a Triangle by Angles Using its Side Lengths

Theorem 7.2



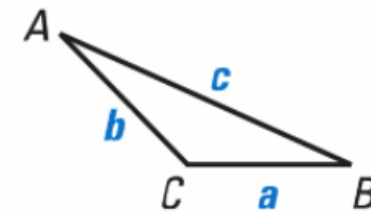
If $c^2 = a^2 + b^2$, then $m\angle C = 90^\circ$ and $\triangle ABC$ is a right triangle.

Theorem 7.3



If $c^2 < a^2 + b^2$, then $m\angle C < 90^\circ$ and $\triangle ABC$ is an acute triangle.

Theorem 7.4



If $c^2 > a^2 + b^2$, then $m\angle C > 90^\circ$ and $\triangle ABC$ is an obtuse triangle.

Assignment:

p. 445 (1-29 odd, 36, 49-52 all)