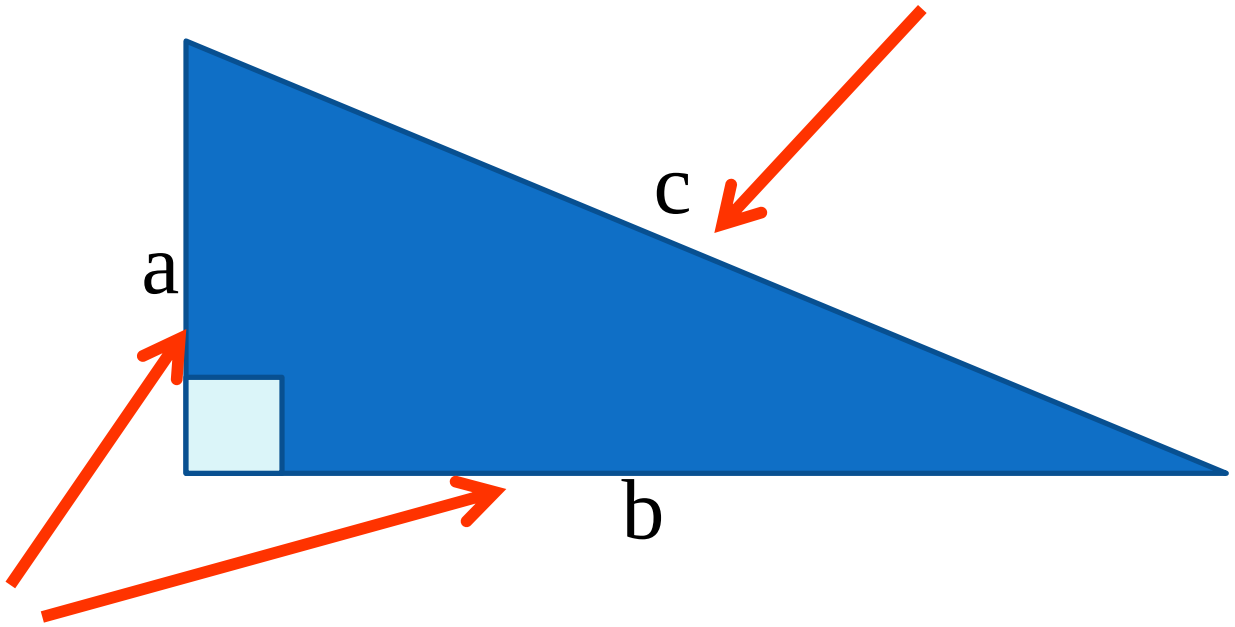
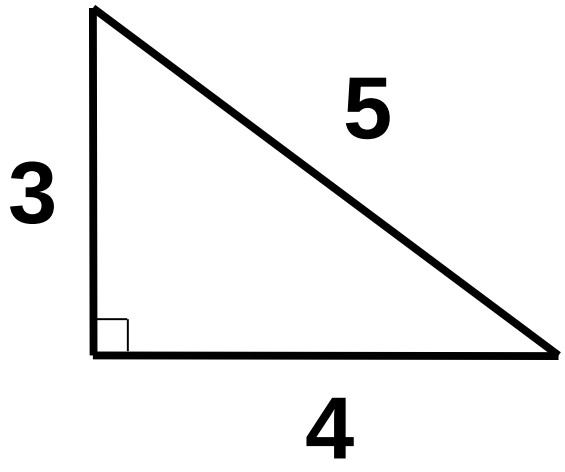
8.2 & 8.3

The Pythagorean Theorem and Its Converse

Parts of a Right Triangle



About 2,500 years ago, a Greek mathematician named Pythagorus discovered a special relationship between the sides of right triangles.

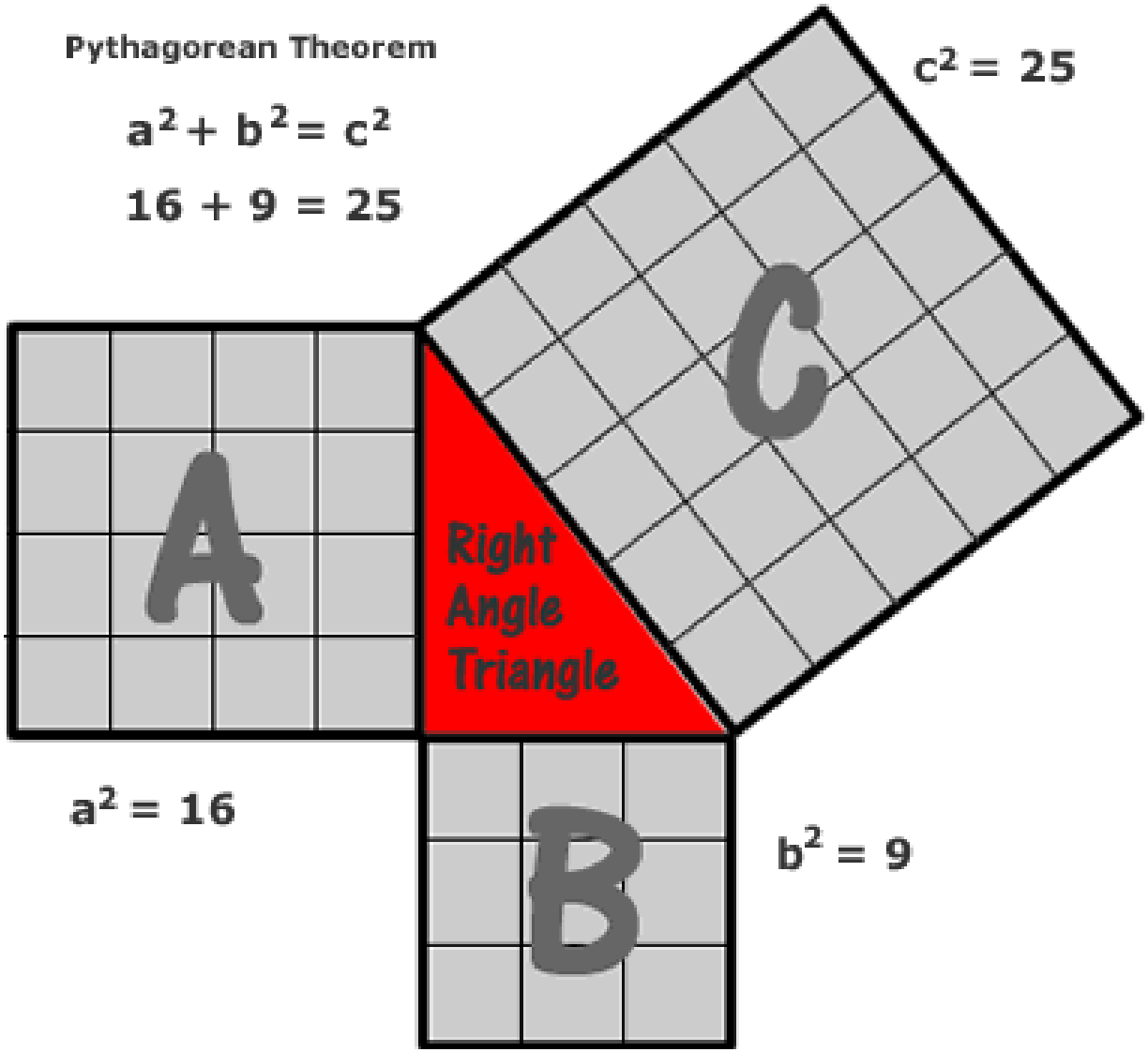


Pythagorean Theorem

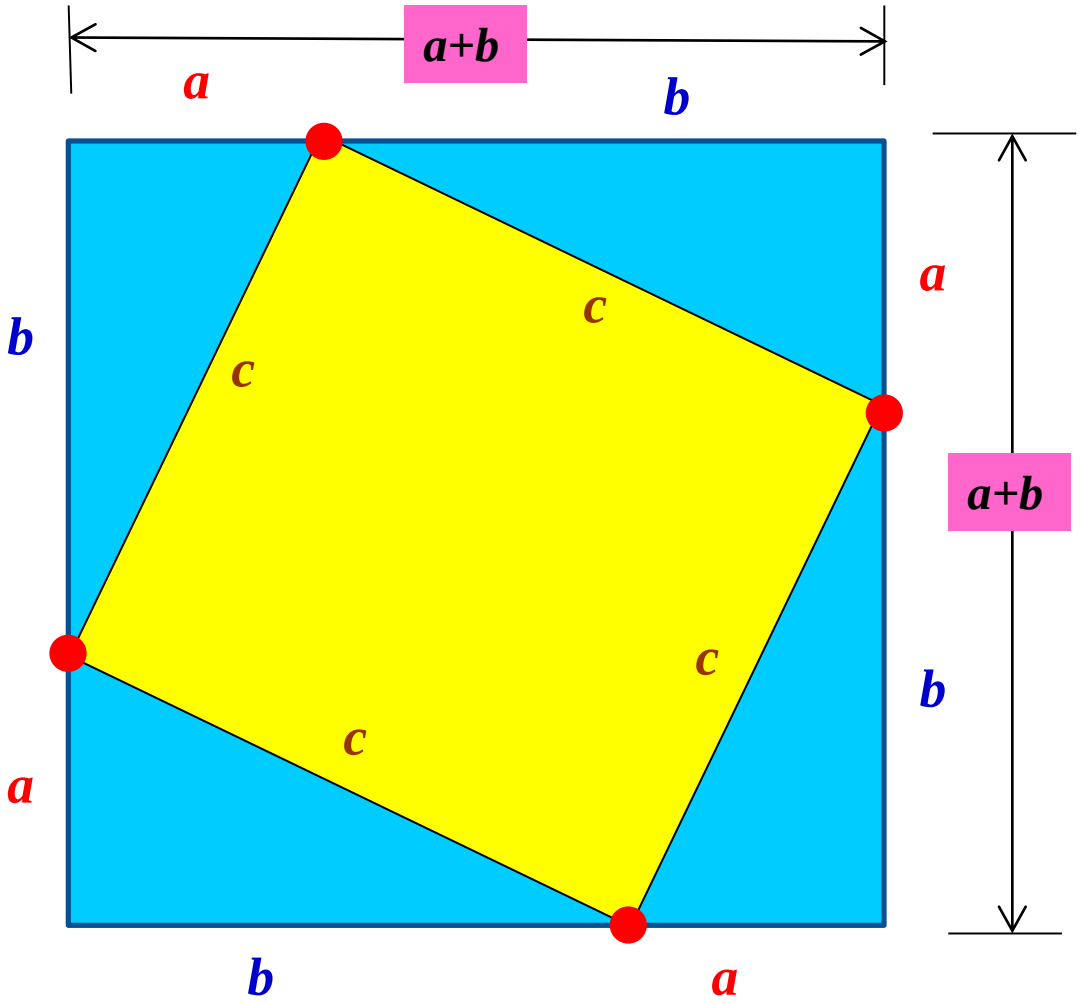
POK

If a triangle is a _____ triangle, then the sum of the squares of the sides is the equal to the square of the length of the _____.

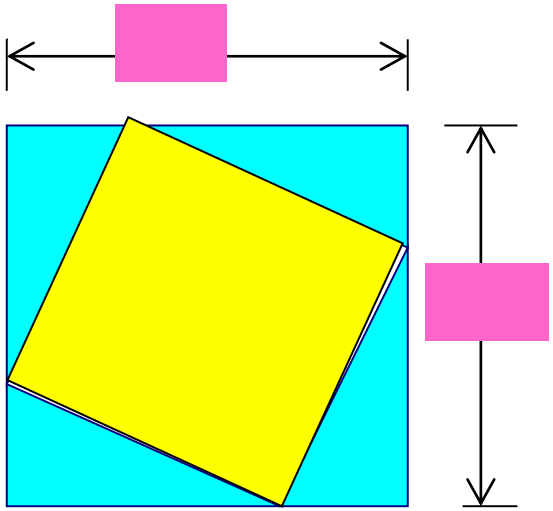
TYPICAL PYTHAGOREAN ILLUSTRATION (NOT A PROOF)

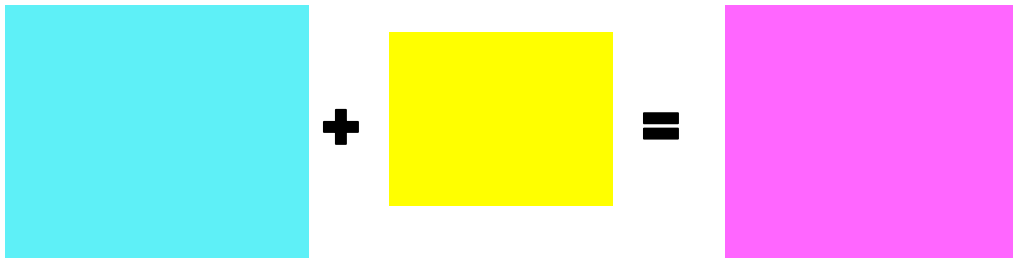


A PROOF OF THE PYTHAGOREAN THEOREM

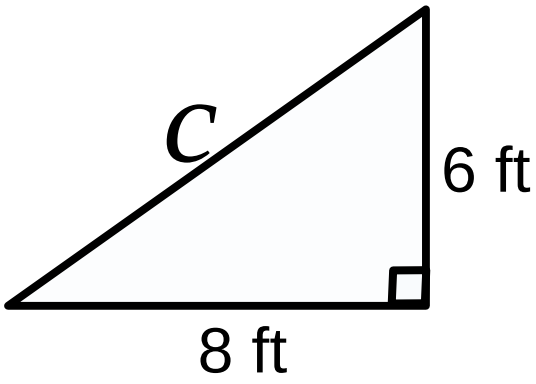


A PROOF OF THE PYTHAGOREAN THEOREM





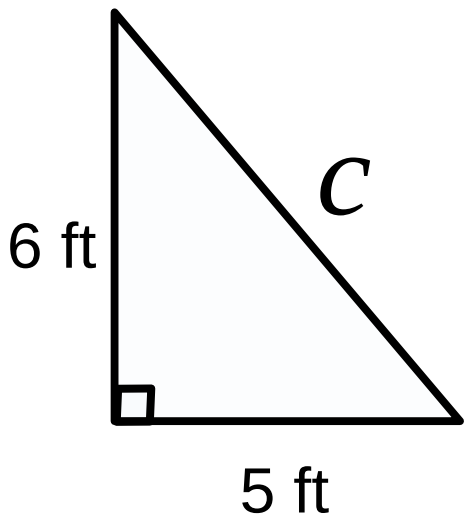
1) Find the missing length. Leave answer in simplified radical form if necessary (exact form).



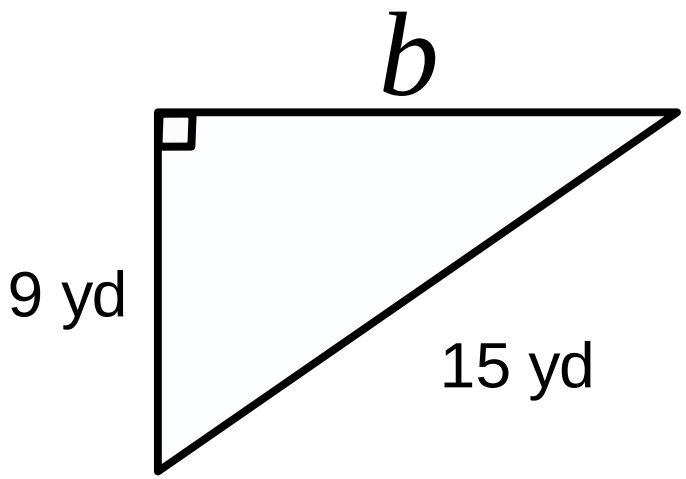
$$a^2 + b^2 = c^2$$

2) Find the missing length. Leave answer in simplified radical form if necessary (exact form).

$$a^2 + b^2 = c^2$$



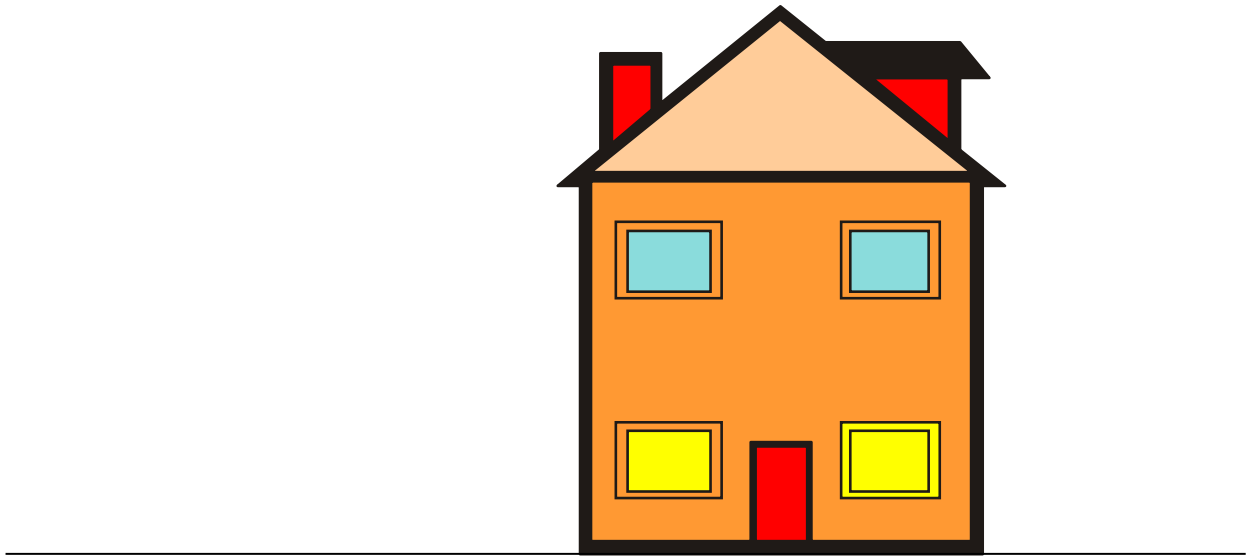
3) Find the missing length. Leave answer in simplified radical form if necessary (exact form).



$$a^2 + b^2 = c^2$$

10.3 – Applying the Pythagorean Theorem

A 12 ft ladder rests against the side of a house. The top of the ladder is 9.5 ft from the floor. How far is the base of the ladder from the house? (Round to the nearest 0.1)



Investigation 1

Open on the Sketchpad website the "8.2- & 8.3 – The Pythagorean Theorem and Its Converse" sketch.

1) **Adjust the measurements of the triangle, so they would follow the Pythagorean theorem.**

2) **What kind of triangle is it?**

Complete the following:

Converse of the Pythagorean Theorem

If the _____ of the squares of the sides of a triangle is the equal to the _____ of the length of the third side, then the triangle is a _____ _____.

Determine if the triangle with the given side lengths is a right triangle.

$a)\quad 11, 18, 21$

$b)\quad 5, 6, \sqrt{11}$

Investigation 2

Open on the Sketchpad website the "8.2- & 8.3 – The Pythagorean Theorem and Its Converse" sketch.

1) **As we did before, adjust the measurements of the triangle; so, they would follow the Pythagorean theorem.**

2) **At this point, adjust the measurement of side c^2 so it's less than $a^2 + b^2$.**

3) **What kind of triangle is it?**

4) **Now, adjust the measurement of side c^2 so it's greater than $a^2 + b^2$.**

5) **What kind of triangle is it?**

Considering all of this, complete the following if a, b, and c are the measurements of the sides of a triangle. c is the measurement of the longest side.

KIND OF TRIANGLE

$c^2 = a^2 + b^2$ _____

$c^2 < a^2 + b^2$ _____

$c^2 > a^2 + b^2$ _____

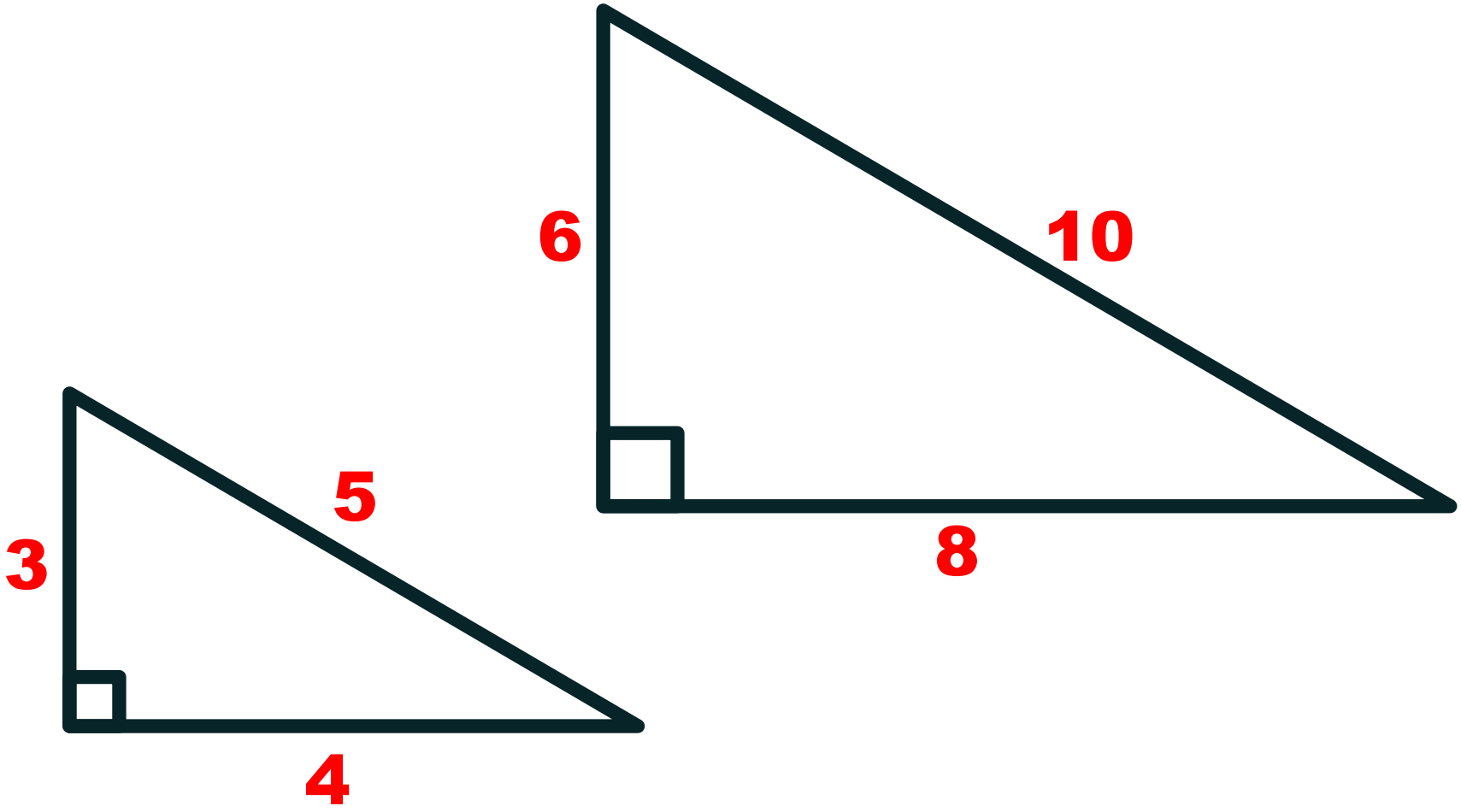
The lengths of the sides of a triangle are given. Classify each as acute, right, or obtuse.

$a)\quad 4,5,6$

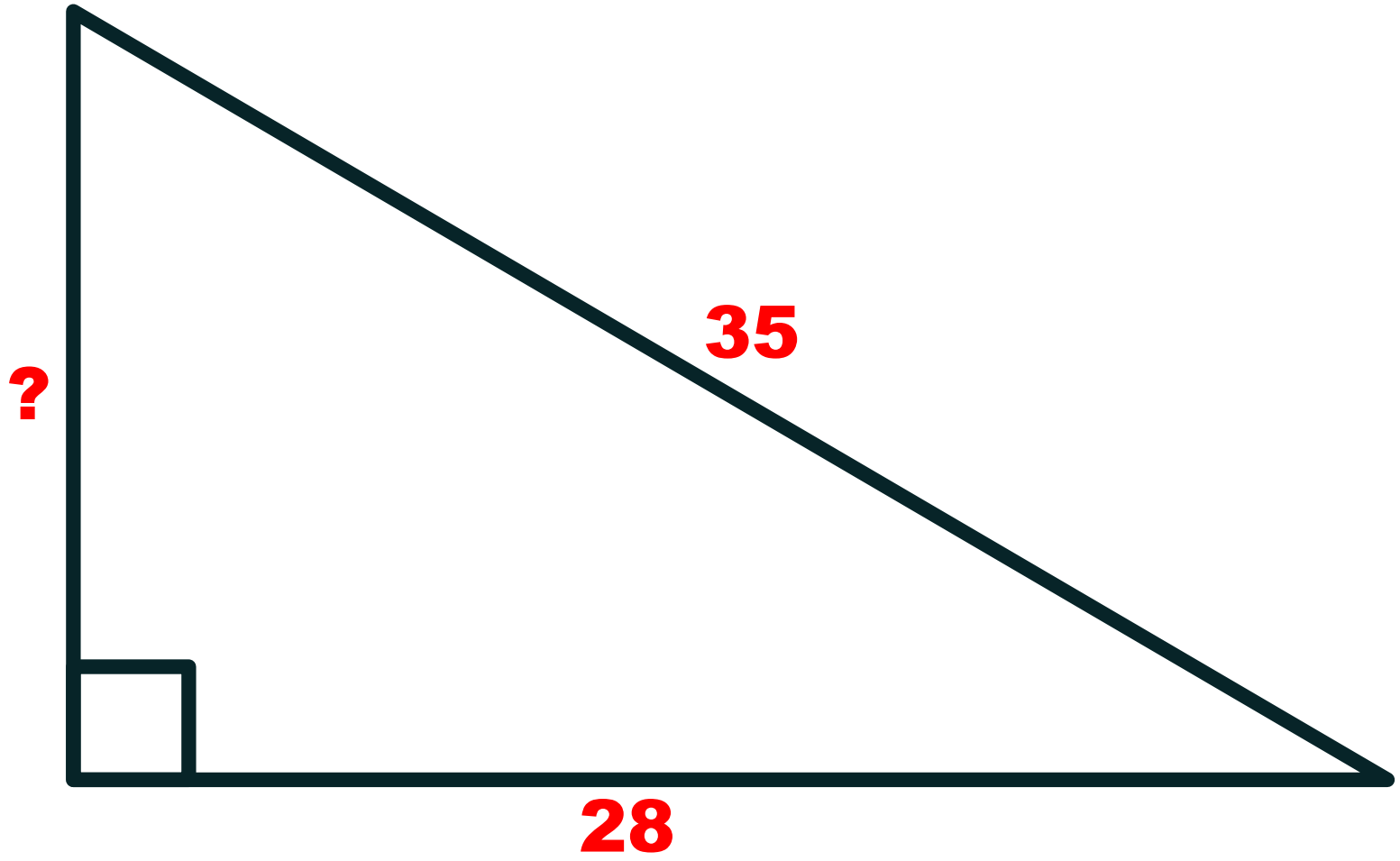
$b)\quad 11,12,15$

$c)\quad \sqrt{3},2,3$

Observations...



Observations...



Pythagorean Triples (Primitives)

3-4-5

5-12-13

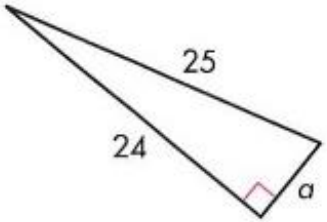
8-15-17

7-24-25

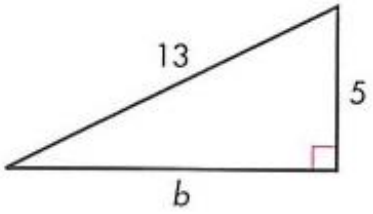
Etc.

Find the measurement of the missing side without the use of a calculator.

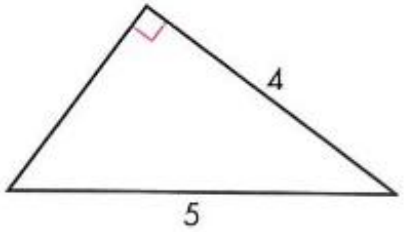
1. a = -?-



2. b = -?-

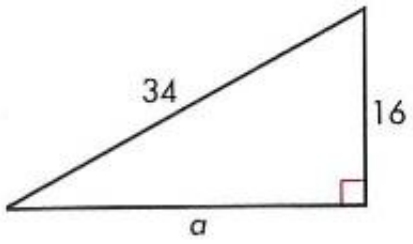


3. What is the perimeter?

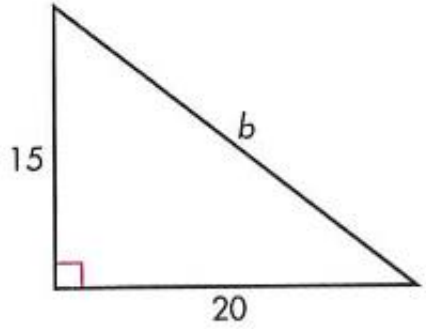


Find the measurement of the missing side without the use of a calculator.

11.* a = -?-



12. b = -?-



13. c = -?-