△ABC is shown below
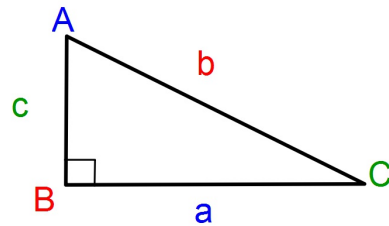
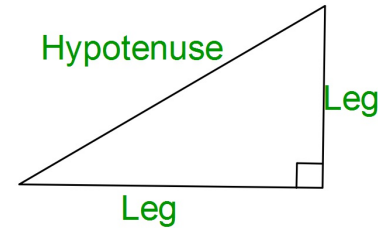Angles are labeled with Capital Letters and sides are labeled with Lower Case Letters.

Like letters are opposite each other.

In other words, Side a is opposite Angle A.

Names for the sides of a right triangle.
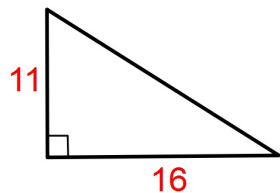
Hypotenuse
side opposite the rt. angle

Legs
- The other two sides.
- Together they form the right angle.
- They make an "L".

Find the missing side in this right triangle

11

16

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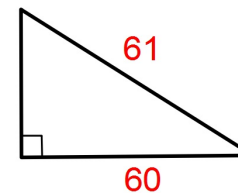
$$a^2 + b^2 = c^2$$

$$(Leg)^2 + (Leg)^2 = (Hypot)^2$$

$$11^2 + 16^2 = x^2$$
$$121 + 256 = x^2$$
$$\sqrt{377} = \sqrt{x^2}$$

$$x = 19.42$$

Find the missing side in this right triangle

61

60

$$a^2 + 60^2 = 61^2$$

$$a^2 + 3600 = 3721$$
$$-3600 \quad -3600$$
$$\sqrt{a^2} = \sqrt{121}$$

$$a = 11$$

A Pythagorean Triple is three whole numbers that form a right triangle.

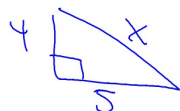In other words, three whole numbers that make the Pythagorean Theorem True.

Find the third number in this Pythagorean Triple
4, 5

4 and 5 are either both legs   or   5 is the hypotenuse and 4 is a leg

$4^2 + 5^2 = x^2$

$\sqrt{41} = \sqrt{x^2}$

Since this doesn't lead to a whole number x isn't the hypotenuse.

$5^2 = 4^2 + x^2$

$25 = 16 + x^2$

$-16 \quad -16$

$\sqrt{9} = \sqrt{x^2}$ $x = 3$

Since this leads to a whole number it leads to the correct answer that x=3
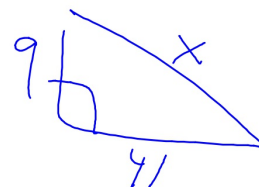

Find the third number in this Pythagorean Triple
9, 41

9 & 41 could be legs and x could be the hypotenuse   OR   9 is a leg, 41 is the hypotenuse, and x is the other leg

$x^2 = 9^2 + 41^2$

$\sqrt{x^2} = \sqrt{1762}$

$x = 41.98$

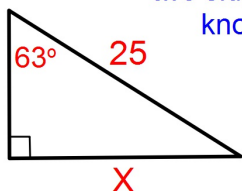this isn't the answer because we don't get a whole number

$41^2 = x^2 + 9^2$

$1681 = x^2 + 81$

$\sqrt{1600} = \sqrt{x^2}$

$x = 40$

Since this leads to a whole number then x = 40 is correct.

Could you use the Pythagorean Theorem to find the side labeled X?   No, the Pythagorean Theorem uses two sides to find the third side and we only know one of the sides.

63°   25

X

How could you find the side labeled X ?

Use Trigonometry

If you are standing at A, which of the sides are the...

C

Hypotenuse

Opposite Leg

B

Adjacent Leg

A
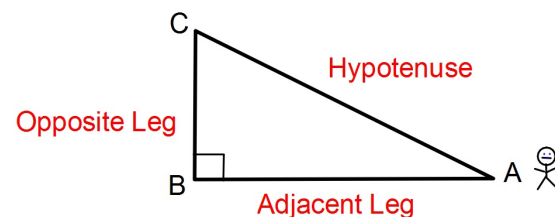
Opposite means "across from"

Adjacent means "next to"

Trigonometry

Trigonometry is the study of triangles.

(The name comes from Greek trigonon "triangle" + metron "measure") .

Trigonometric Ratios:

The ratio of sides in a right triangle

Sine, Cosine, & Tangent