Lesson 12

Glencoe Geometry Chapter 5.2 & 8.1

Right Triangles & The Pythagorean Theorem

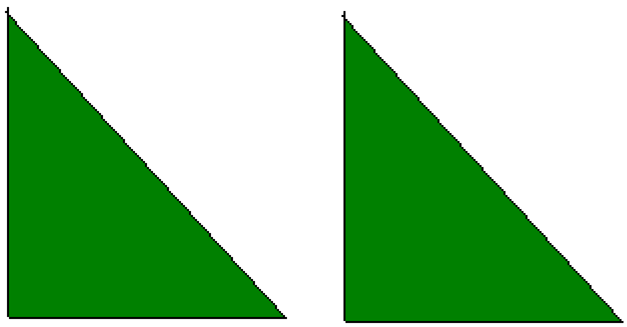
By the end of this lesson, you should be able to
1. Determine if two right triangles are congruent.
2. Use the Pythagorean Theorem to solve problems.

A few episodes ago, we looked at determining whether ANY two triangles were congruent. To review, there were several combinations of sides and angles we needed to draw a conclusion. They were (in no particular order):

SSS, SAS, AAS, ASA

Today, we are going to take a special look at the most famous of all triangles: **Right Triangles**

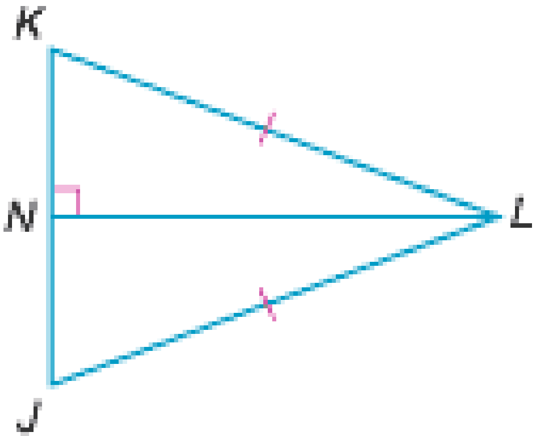
When determining if two right triangles are congruent, we are **ALWAYS** given at least one angle, the right (or 90 degree) angle. Though all of the above methods work on right triangles, there was a special case that worked **ONLY** for right triangles, HL: If the hypotenuse and leg of one right triangle are congruent to the corresponding parts of another right triangle, the right triangles are congruent.



Remember that this was the SSA or Ambiguous case for non-right triangles. Because this only works for right triangles, we give it its own special name: HL

Example:

Determine the reason that $\triangle NKL \cong \triangle NJL$. Then, find $m\angle J$ if $m\angle KLN = 20^\circ$.



Example:

Find the value of x so that the two right triangles $\triangle ABC$ and $\triangle XYZ$ are congruent by the HL postulate. Assume angle B is the right angle.

$$AC = 28, AB = 7x + 4, ZX = 9x + 1, YX = 5(x + 2)$$

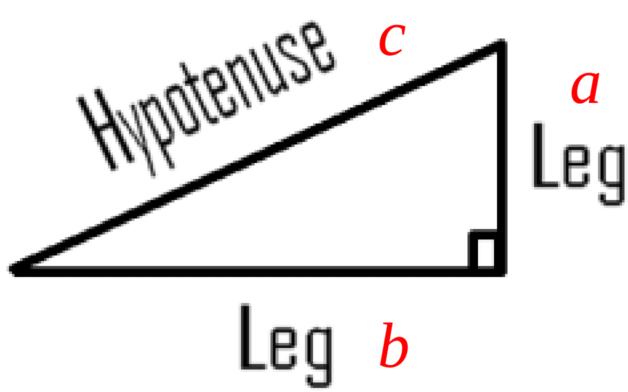
Now onto the best part about Right triangles:

THE PYTHAGOREAN THEOREM

Recall from Lesson 2:

The sum of the square of the two legs of a right triangle equals the square of the hypotenuse.

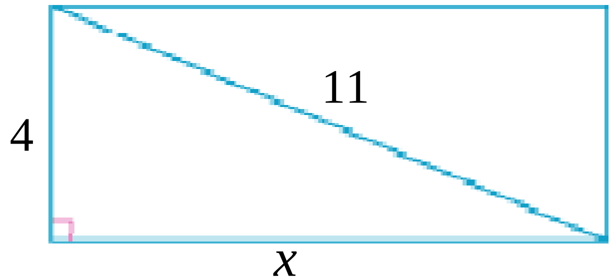
$$a^2 + b^2 = c^2$$



http://mac.ysu.edu/~jmartin/pythagorean/pythagorean1.gif

Example:

Find the value of *x*.



A. $\sqrt{137}$

B. $\sqrt{105}$

C. $\sqrt{44}$

D. 15

There are certain combinations of three whole numbers that will always satisfy the Pythagorean Theorem. These sets of numbers are called **Pythagorean Triples**. If the measures of a right triangle are whole numbers, the measures form a Pythagorean triple.

Do the measures in the above example, $4, \sqrt{105}, 11$, form a Pythagorean triple?

Example:

$3, 4, 5$ and $7, 24, 25$ (It is customary to list the numbers in increasing order, with the measure of the hypotenuse last.

Example:

Which set of numbers is a Pythagorean triple?

A. 10, 15, 18

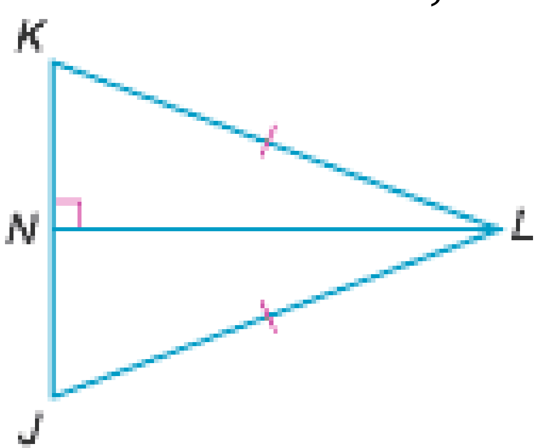
B. 10, 20, 30

C. 9, 40, 41

D. 8, 10, 12

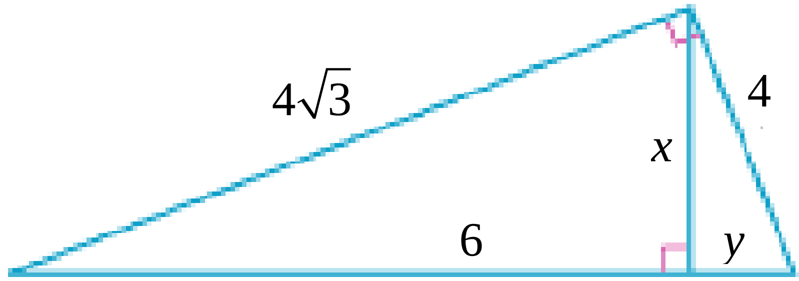
Example:

If $\triangle NKL \cong \triangle NJL$, $NL = 8\text{ft.}$ and $KL = 10\text{ft.}$, find JN.



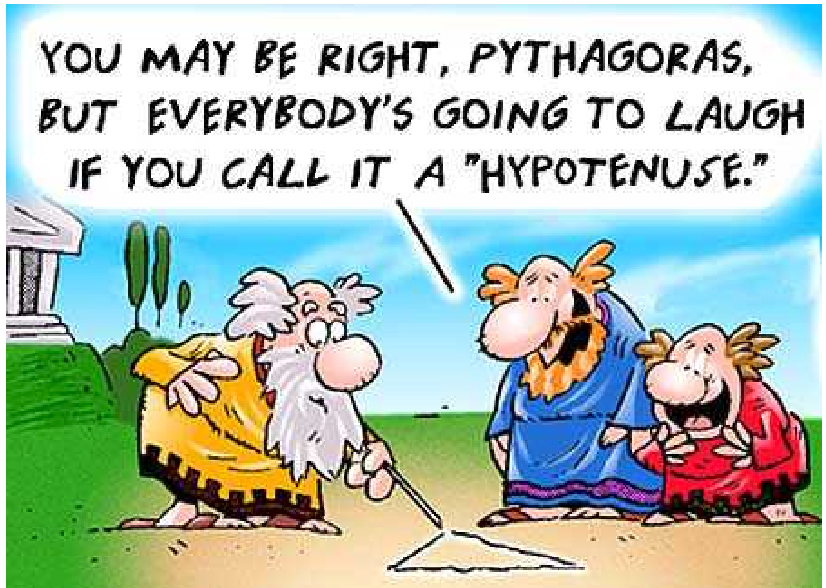
Example:

Find the value of *y*.



Say What??!!

Hypotenuse comes from the common Greek root ***hypo***(for under, as in hypodermic -under the skin) and the less common ***tein*** or ***ten***, for stretch. This last is the source of our modern word tension. The hypotenuse was the line segment "*stretched under*" the right angle.



http://sid.at/hs-strassburg/images/pythagoras.jpg and Frank and Ernest by Bob Thaves

Example: Computer Link

The actual screen of one of the newest models of flat screen computer monitors measures 19.5 inches by 12 inches. Find the measure of the diagonal of the screen. Round to the nearest tenth of an inch.