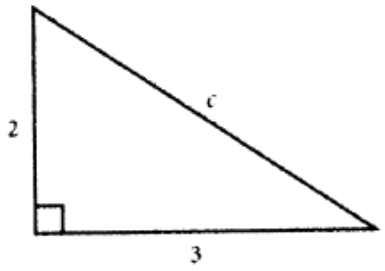
RIGHT TRIANGLES

84. PYTHAGOREAN THEOREM

For all right triangles:

$(\text{leg}_1)^2 + (\text{leg}_2)^2 = (\text{hypotenuse})^2$



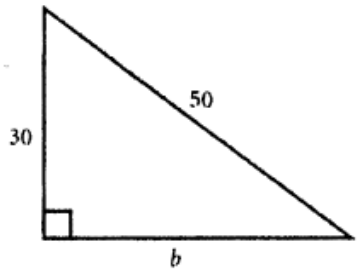
If one leg is 2 and the other leg is 3, then:

$$2^2 + 3^2 = c^2$$
$$c^2 = 4 + 9$$
$$c = \sqrt{13}$$

85. SPECIAL RIGHT TRIANGLES

- ***3-4-5***

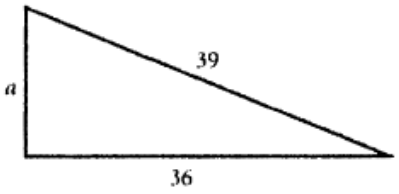
If a right triangle's leg-to-leg ratio is 3:4, or if the leg-to-hypotenuse ratio is 3:5 or 4:5, then it's a 3-4-5 triangle and you don't need to use the Pythagorean theorem to find the third side. Just figure out what multiple of 3-4-5 it is.



In the right triangle above, one leg is 30 and the hypotenuse is 50. This is 10 times 3-4-5. The other leg is 40.

- ***5-12-13***

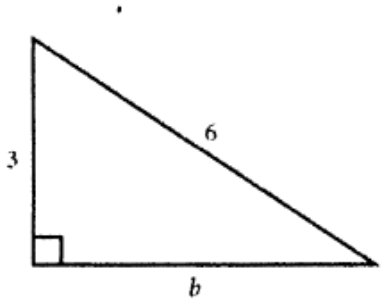
If a right triangle's leg-to-leg ratio is 5:12, or if the leg-to-hypotenuse ratio is 5:13 or 12:13, then it's a 5-12-13 triangle and you don't need to use the Pythagorean theorem to find the third side. Just figure out what multiple of 5-12-13 it is.



Here one leg is 36 and the hypotenuse is 39. This is 3 times 5-12-13. The other leg is 15.

• ***30°-60°-90°***

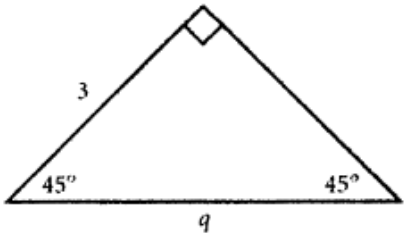
The sides of a 30°-60°-90° triangle are in a ratio of $1:\sqrt{3}:2$. You don't need to use the Pythagorean theorem.



If the hypotenuse is 6, then the shorter leg is half that, or 3; and then the longer leg is equal to the short leg times $\sqrt{3}$, or $3\sqrt{3}$.

• ***45°-45°-90°***

The sides of a 45°-45°-90° triangle are in a ratio of $1:1:\sqrt{2}$.



If one leg is 3, then the other leg is also 3, and the hypotenuse is equal to a leg times $\sqrt{2}$, or $3\sqrt{2}$.