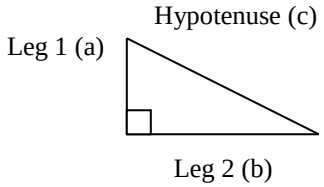
Pythagorean Theorem

Pythagorean theorem (for right triangles)
Given a right triangle of sides A and B, and hypotenuse with length c, there exists a relationship of:

$$A^2 + B^2 = C^2$$

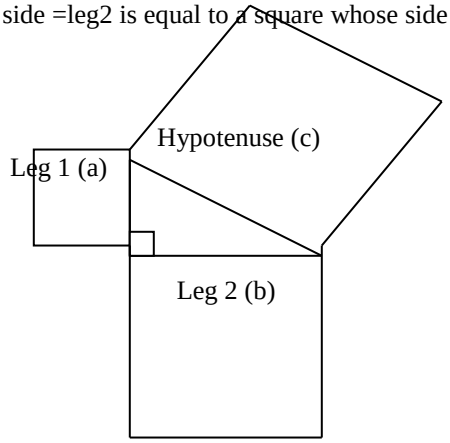


What does C^2 mean?

Pythagoras had special answers that he liked to the above equations. If the above equations can be solved using only integers (…-3, -2, -1, 0, 1, 2, 3, …), we call the numbers (for the sides of the triangles) a Pythagorean theorem. The oldest and best known Pythagorean triple is 3-4-5.

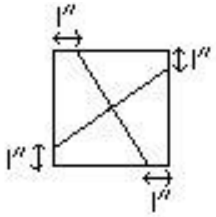
Exercise: (tedious)
Find as many Pythagorean triples as you can under the number 100.

Geometric interpretation of the Pythagorean theorem
C^2 means the square of the length of the hypotenuse. This is the same as the area of a square whose side is the length of the hypotenuse! So, the equation $A^2 + B^2 = C^2$ says that the area of a square whose side=leg1 plus the area of a square whose side =leg2 is equal to a square whose side = hypotenuse.



Don't believe it? Hmmm…

Try this…
Make three squares out of paper. One 3"x3", one 4"x4", and one 5"x5". These correspond to A^2, B^2,and C^2 respectively. Now take the 4"x4" and cut it like this:



Then rearrange the pieces of B and A and compare with square C.

Exercises: using $A^2 + B^2 = C^2$ or $x^2 + y^2 = r^2$

1.) A = 3, B = 4; C^2 = ?, C = ?
2.) A = 5, B = 12; C^2 = ?, C = ?
3.) x = 1, y = 1; r^2 = ?, r = ?
4.) x = 2, y = ?; r^2 = 13, r=?
5.) A = 12, B = ?; C^2 = 169, C=?