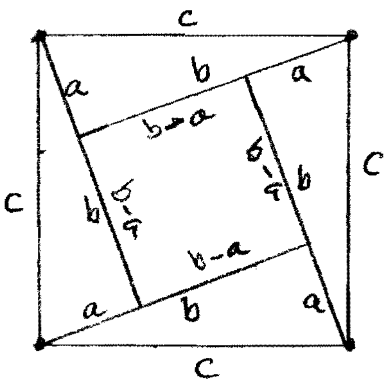
— Proving the Pythagorean Theorem —

The square of the hypotenuse of any right triangle equals the sum of the squares of the legs.

Proof I: * Start with a square of side length "c".

* From each corner draw an acute angle as shown.
* Label the interior triangle's legs "a" and "b."
* The overall squares area equals the sum of the areas of the interior triangles and inner square.
* Simplify.



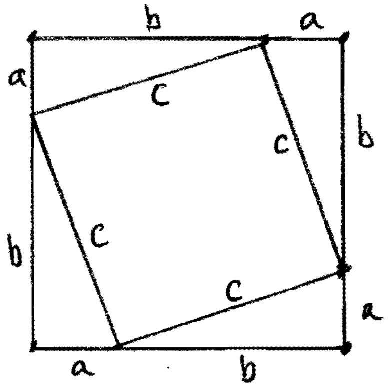
$$4\left(\tfrac{1}{2}ab\right) + (b-a)^2 = c^2$$

$$\cancel{2ab} + b^2 - \cancel{2ab} + a^2 = c^2$$

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

Proof II: * From any square construct any interior Square as shown, then label the sides.

* Relate the areas and simplify.



$$(a+b)^2 = 4\left(\tfrac{1}{2}ab\right) + c^2$$

$$a^2 + \cancel{2ab} + b^2 = \cancel{2ab} + c^2$$

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

Suggested Procedure:

1. Express complicated equation in "transform form"
2. "Back out" translations (Bring graph back to origin)
3. Remove stretch/shrinks
4. Note simple (old) form and its graph
5. Now, to sketch complicated equation begin with simple (old) sketch and move through transforms to complicated.

(New) $y = 5(x-3)^2 - 2$

$$\frac{y+2}{5} = (x-3)^2$$

(T.F.) $$\frac{y-(-2)}{5} = (x-3)^2$$

$y \to y-(-2)$ $\quad \downarrow 2$

$x \to x-3$ $\quad \rightarrow 3$

$$\frac{y}{5} = x^2$$

$y \to \frac{y}{5}$ $\quad \updownarrow 5$

(old.) $y = x^2$

MATH

To Graph