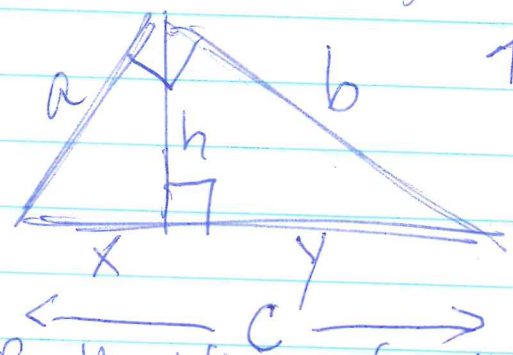
9.1 - Prove Pythagorean Theorem



The 3 right △'s are similar by AA shortcut using △ sum Th.

By the definition of similarity, we can write proportions:

$$\frac{\text{short leg}}{\text{hyp}} = \frac{\text{short leg}}{\text{hyp}} \qquad \frac{\text{long leg}}{\text{hyp}} = \frac{\text{long leg}}{\text{hyp}}$$

$$\frac{x}{a} = \frac{a}{c} \qquad \frac{y}{b} = \frac{b}{c}$$

$$a^2 = cx \quad + \quad b^2 = cy$$

$$a^2 + b^2 = cx + cy$$

$$a^2 + b^2 = c(x+y) \qquad \text{but } x+y=c$$

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

Other Notes:

Converse of Pythag: If $a^2+b^2=c^2$, then △ is a right triangle.

Ex) 8, 15, 17 $\quad c^2 = a^2+b^2$ so right △

9, 12, 16 $\quad c^2 > a^2+b^2$ not right, obtuse

9, 12, 14 $\quad c^2 < a^2+b^2$ not right, acute

Triples: 3 whole #s = right △

Memorize prime triples: 3,4,5 5,12,13 8,15,17 7,24,25

Multiples: just multiply by a common factor like 6,8,10