BE-Geometry 11 Monday 11-7-11

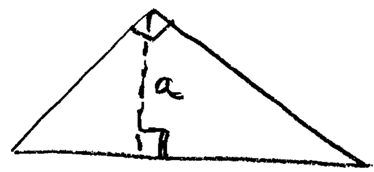
1. Solve using EBS or EBA

$$\begin{cases} y = -x + 3 \\ y = 2x - 3 \end{cases}$$

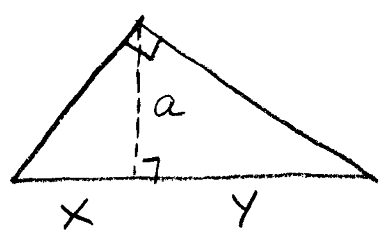
2. Graph the above 2 lines on the <u>same</u> graph. Does their intersection support your answer to 1?

Recall the 2 theorems we studied in Ch. 7-1 that applied to Right Triangles

Theorem 7.1 An altitude to the hypotenuse will form 3 similar Δ's



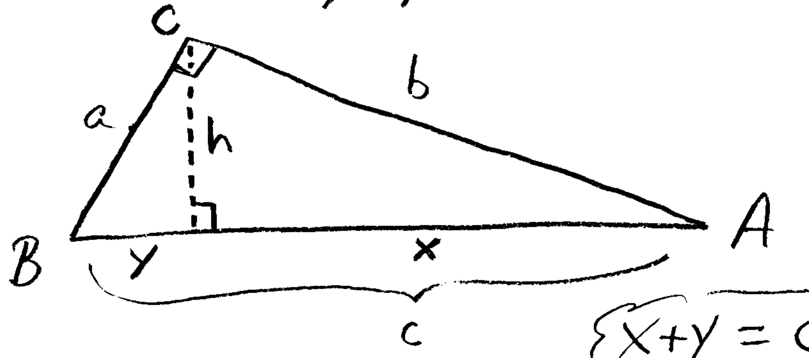
Theorem 7.2 An altitude to the hypotenuse will be the geometric mean of the 2 segments it makes on the hypotenuse.



$$\frac{x}{a} = \frac{a}{y} \quad \therefore \; a^2 = xy$$
$$a = \sqrt{xy}$$

These can be used to prove another interesting Theorem.

Lets look at a typical right $\triangle$ with an altitude that measures h.
The sides are a, b, c (hypotenuse).
The $\angle$s are A, B, C.



$x + y = c$

Since all 3 $\triangle$'s are $\sim$.

$$\frac{c}{a} = \frac{a}{y} \quad \frac{\leftarrow \text{hypotenuse}}{\leftarrow \text{short leg}} \qquad \text{Also: } \frac{c}{b} = \frac{b}{x} \quad \frac{\leftarrow \text{hypot}}{\leftarrow \text{long leg}}$$

$\therefore a^2 = cy$ AND $b^2 = cx$.

Add b^2 to left side and cx to right side

$+ b^2 \quad + cx$

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

$$a^2 + b^2 = c(\underbrace{y + x})$$

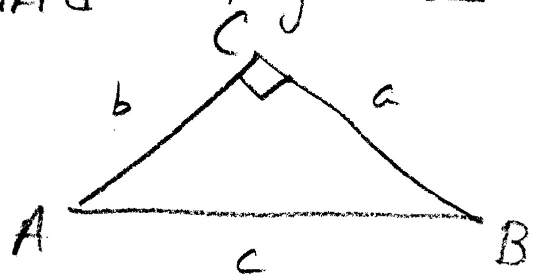
But $y + x = c$

Pg 350

$\therefore \boxed{a^2 + b^2 = c^2}$ Pythagorean Theorem (Theorem 7-5)

Many other proofs including Pythagoras, a US President!
(Which one??)

"Standard" Right $\triangle$ labels



c is Always the hypotenuse

Know $a, b \Rightarrow$ $c^2 = a^2 + b^2$

$c = \sqrt{a^2 + b^2}$

Know $a, c \Rightarrow$ $b^2 = c^2 - a^2$

$b = \sqrt{c^2 - a^2}$

Know $b, c \Rightarrow$ $a^2 = c^2 - b^2$

$a = \sqrt{c^2 - b^2}$

Converse of P.T.

If $c^2 = a^2 + b^2$ then it is a Right $\triangle$ (Theorem 7.5)

if you know one leg, c^2 is always first.

Why?

Because it is always bigger than a^2 or b^2 and length must be positive so it is always bigger − smaller

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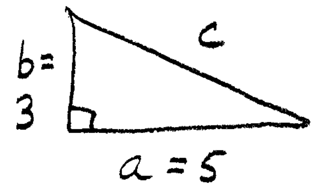
Ch 7-2 The Pythagorean Theorem and Its Converse

Ex 1 Pg 351 Find c



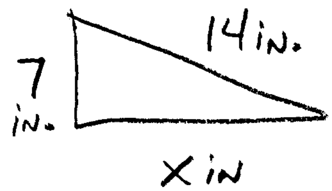
$$3^2+5^2=c^2$$

$$9+25=c^2 \quad \therefore \quad c^2=34$$

$$\boxed{c=\sqrt{34}}$$

34
2 17

Ex 2 Pg 351 Find x



DO NOT USE a, b, c !!

Use $7, x, 14$

$$7^2+x^2=14^2$$

$$x^2=14^2-7^2 \quad \therefore \quad x=\sqrt{196-49}$$

$$x=\sqrt{147}$$

147
3 49

$$\boxed{x=7\sqrt{3}\text{ in}}$$

Units!!!

Pythagorean Triple: whole numbers that satisfy $a^2+b^2=c^2$

Ex 3, 4, 5

Ex 6, 8, 10

Homework: Page 353-354 #4-6, 8-11.