Section 4.2: cont'd

Wednesday, November 05, 2014
9:38 AM

Test #2 moved to

Thursday, Nov 13

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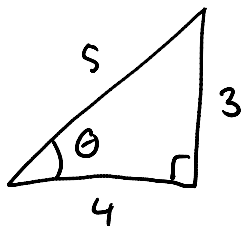
so, use the inverse trig functions:

$\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$

to calculate the angles in a right triangle when given the sides



so, now that we've found that $\theta \approx 37°$, how do we find the remaining angle?

recall: all angles sum to 180°

(or the two acute angles sum to 90°)

so remaining angle is approx 53°

to completely solve a triangle

$\Rightarrow$ find all remaining sides and angles

note: to completely solve <u>any</u> triangle, you need <u>three</u> pieces of info

$\Rightarrow$ <u>one</u> of which must be a side

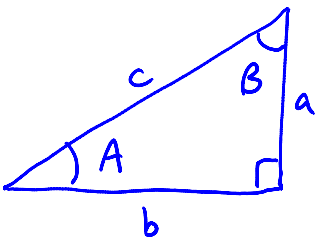
- for <u>right</u> triangles, you already have one angle

so need <u>two</u> more pieces of info, <u>one</u> of which must be a side

example: completely solve the right triangle with

$A = 17°$
$b = 42$

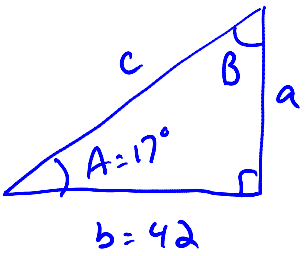
naming convention:



lower case { c - hypotenuse
a, b - other two sides in any order

upper case { A, B are the angles
A is opposite a
(C is 90°)

original question with $A = 17°$ and $b = 42$



$B = 90° - A$
$= 73°$

$\cos A = \frac{b}{c}$

$c = \frac{b}{\cos A}$

$= \frac{42}{\cos 17°}$

$= 43.9191$

$= 44$ or 43.9

now calculate side a:

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

$a^2 = c^2 - b^2$

$= (43.9191)^2 - 42^2$

$a = 12.8407$

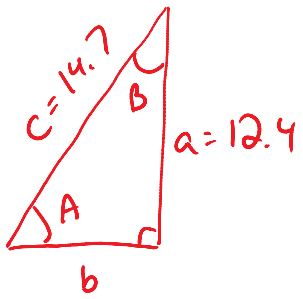
$= 13$ or 12.8

$\tan A = \frac{a}{b}$

$b \tan A = a$

answer: $a = 13,\ c = 44,\ B = 73°$

example: solve the right triangle with $a = 12.4$ and $c = 14.7$
Gives angles to one decimal place.



side b:

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

$b^2 = c^2 - a^2$

$= (14.7)^2 - (12.4)^2$

$b = 7.89494$

$= 7.9$ or 7.89

$$\sin A = \frac{\text{opp}}{\text{hyp}} = \frac{a}{c} = \frac{12.4}{14.7}$$

$$A = \sin^{-1}\left(\frac{12.4}{14.7}\right)$$

$$= 57.5156^\circ$$

$$= 57.5^\circ$$

$$B = 90^\circ - A = 32.5^\circ$$

$A = 57.5^\circ, B = 32.5^\circ, b = 7.9$