

Alg. 2 - BE THURSDAY 1-12-12

SOLVE USING THE QUADRATIC FORMULA:

① $x^2 - 21.8x + 96 = 0$

(NEED A CALCULATOR)

$a = 1$

$b^2 - 4ac$

$b = -21.8$

$(-21.8)^2 - 4(1)(96)$

$c = 96$

$475.24 - 384$

$d = 91.2$

$x = \frac{-b \pm \sqrt{d}}{2a} = \frac{+21.8 \pm \sqrt{91.2}}{2(1)}$

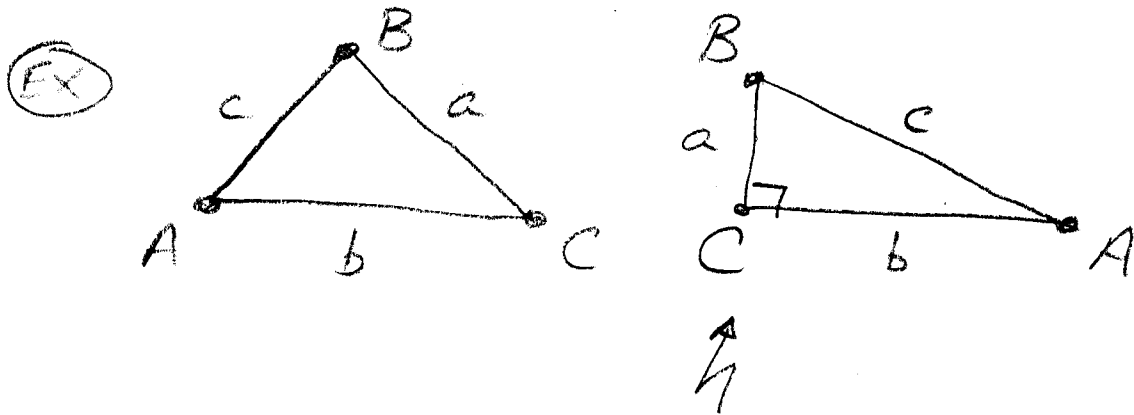
$= \frac{21.8 \pm 9.5}{2}$

$x = \{15.7, 6.2\}$

CK $(15.7)^2 - 21.8(15.7) + 96 \stackrel{?}{=} 0$ $\left\{ \begin{array}{l} (6.2)^2 - 21.8(6.2) + 96 \stackrel{?}{=} 0 \\ 0.23 \approx 0 \checkmark \end{array} \right.$ $\left. \begin{array}{l} -0.72 \approx 0 \checkmark \end{array} \right.$

15.7

RECALL: the vocabulary for naming the sides (lower case a, b, c) and angles (upper case A, B, C)



IN A right Δ Angle C is always the 90° angle, side c is Always the hypotenuse.

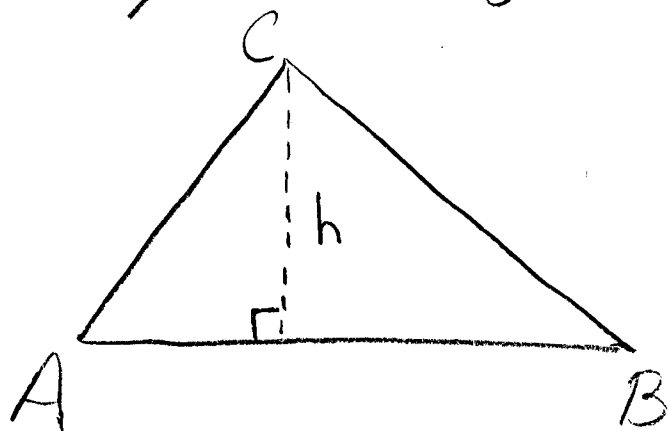
Recall: what is the formula for the Area of any Δ ?

$$A_{\Delta} = \frac{1}{2}bh \text{ or } \frac{1}{2}(\text{base})(\text{height})$$



Lets extend $A = \frac{1}{2}bh$ - by using a little trig!

Take any Δ , say ΔABC :



$$A = \frac{1}{2}(\overline{AB})(h)$$

BUT, $\sin A = \frac{h}{\overline{AC}}$ solve for h

$$\overline{AC} \cdot \sin A = \frac{h}{\overline{AC}} \cdot \overline{AC}$$

$$\overline{AC} \sin A = h \quad \text{Since } A = \frac{1}{2} b \overline{h}$$

SUBSTITUTE \rightarrow

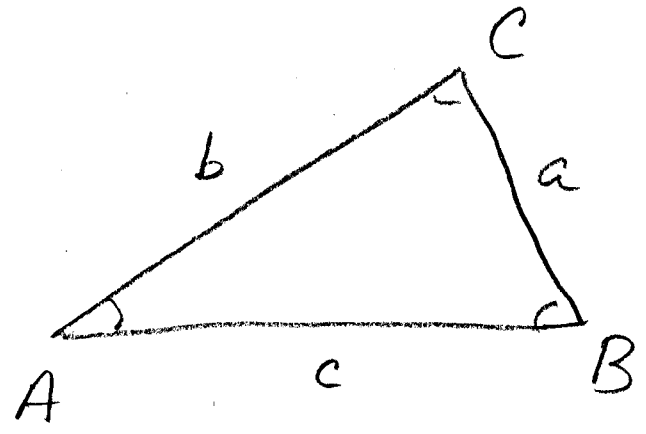
$$A = \frac{1}{2}(\overline{AB})(\overline{AC}) \sin A$$

*for any triangle!

$A_{\Delta} = \frac{1}{2}$ the product of the length of two sides times the sine of their included angle.

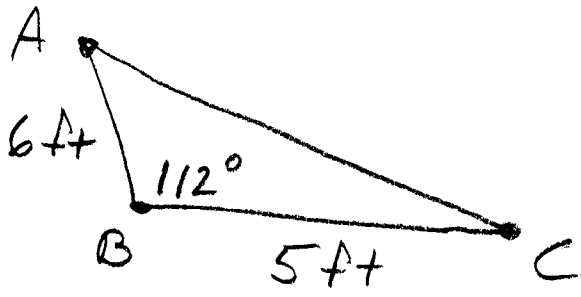
In terms of a, b, c, A, B, C:

$$\begin{aligned}
 A_{\Delta} &= \frac{1}{2}bc \sin A \\
 &= \frac{1}{2}ac \sin B \\
 &= \frac{1}{2}ab \sin C
 \end{aligned}$$

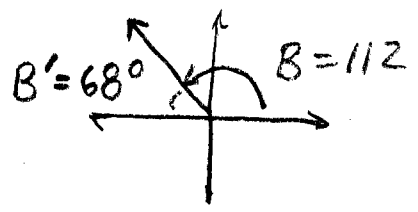


Did I mention this works for ANY Δ , not just right triangles.

EX1
pg 725 Find the Area of ΔABC



$$\begin{aligned}
 A_{\Delta} &= \left(\frac{1}{2}\right)(6)(5) \sin 112^{\circ} \\
 &= (15)(.9272) \\
 &= 13.908 = \boxed{13.9 \text{ ft}^2}
 \end{aligned}$$



*MUST HAVE UNITS!!

Let's use the 3 different forms of the area of a Δ :

$$\frac{\frac{1}{2}bc\sin A}{\frac{1}{2}abc} = \frac{\frac{1}{2}ac\sin B}{\frac{1}{2}abc} = \frac{\frac{1}{2}ab\sin C}{\frac{1}{2}abc}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

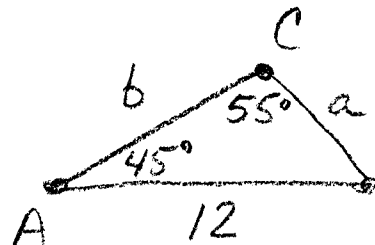
OR

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

LAW OF SINES \Rightarrow Ch. 13-4

* Use any two fractions in a "3 out of 4" problem.

EX 2 Find a
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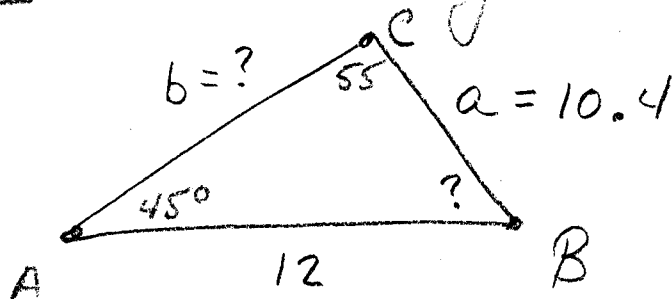


$$\frac{\sin 55^\circ}{12} = \frac{\sin 45^\circ}{a}$$

"3 of 4" ARE KNOWN: ASA

$$a = \left(\sin 45^\circ \right) \left(\frac{12}{\sin 55^\circ} \right) = (.7071) \left(\frac{12}{.8192} \right) \approx 10.4 \text{ UNITS}$$

Ex 1 (Cont) How would you find B and b?



$$B = 180 - (55 + 45)$$

$$= 180 - 100 = \boxed{80^\circ = B}$$

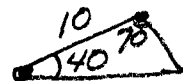
$$b \Rightarrow \frac{\sin 55^\circ}{12} = \frac{\sin 80^\circ}{b} \quad \text{"3 of 4"}$$

$$\therefore b = (\sin 80^\circ) \left(\frac{12}{\sin 55^\circ} \right)$$

$$b = (.9848) \left(\frac{12}{.8192} \right) \approx \boxed{14.4 \text{ units}}$$

If you know 2 angles \Rightarrow ASA or AAS
use THE LOS

(EX)



(EX)



If you know 2 sides \Rightarrow SSS, SAS, SSA
use THE LOC (later) SPECIAL

Homework: Pg. 730 # 4-7.