

7 - 6

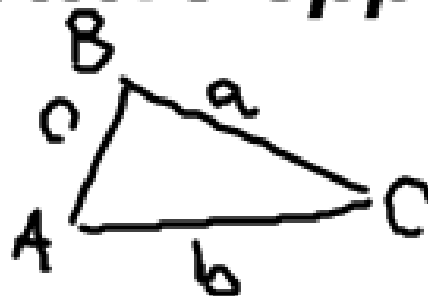
Law of Sines

****Special Note****

Capital letters are used for angles .

Lowercase letters are used for sides .

(same letters opposite each other)





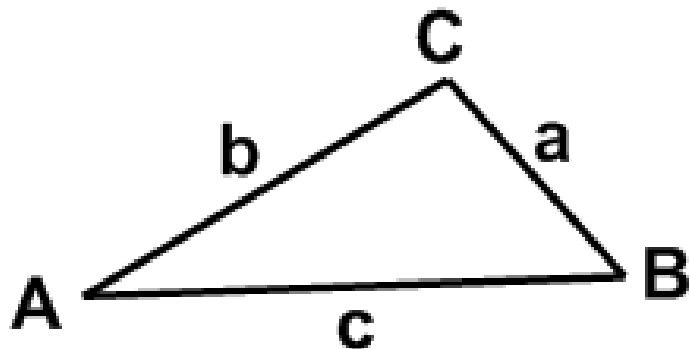
We can use the Law of Sines to find missing parts of triangles of ALL triangles, not just right triangles!

Using sin, cos, and tan (what we've done so far) only works for right triangles.

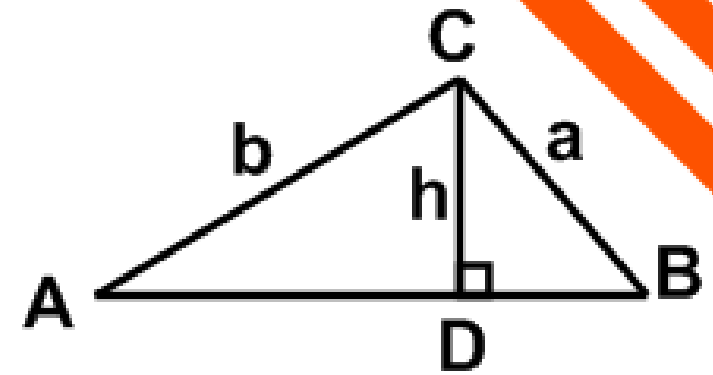
Law of Sines

Let $\triangle ABC$ be any triangle with a , b , and c representing the measures of the sides opposite the angles with measures A , B , and C respectively.

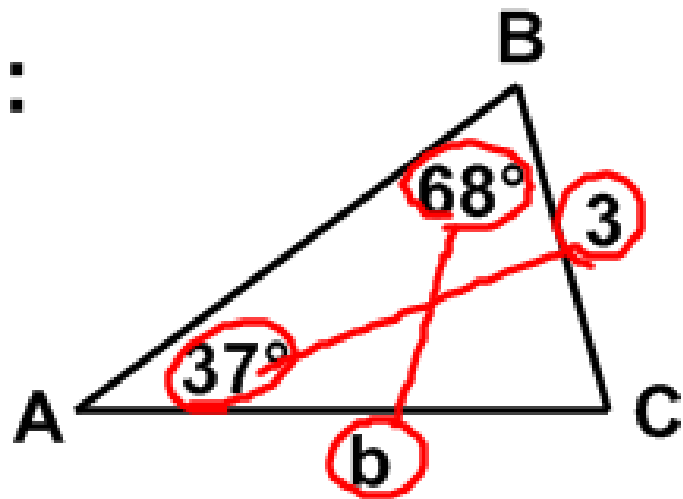
Then...
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



Proof that it works:



Ex:



Find b.

$$3 \cdot \sin(68) / \sin(37)$$

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

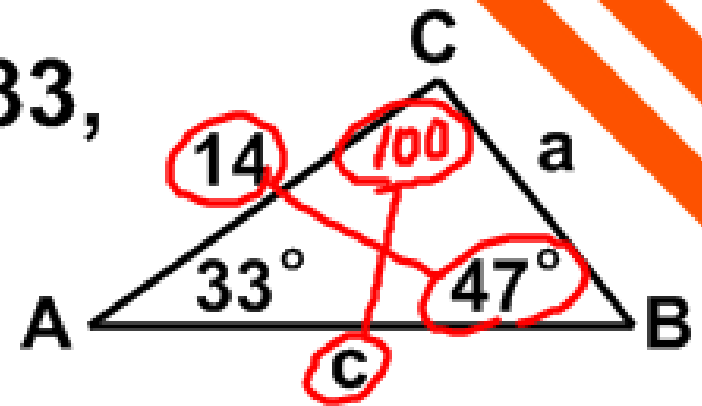
$$\frac{\sin 37}{3} = \frac{\sin 68}{b}$$

$$\frac{b \cdot \sin 37}{\sin 37} = \frac{3 \cdot \sin 68}{\sin 37}$$
$$b = 4.6$$



solving a triangle:

Ex: Solve $\triangle ABC$ if $m\angle A = 33$,
 $m\angle B = 47$, and $b = 14$.



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

$$\frac{\sin 33}{a} = \frac{\sin 47}{14}$$

$$a \frac{\sin 47}{\sin 47} = \frac{14 \sin(33)}{\sin 47}$$

$$a = 10.4$$

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

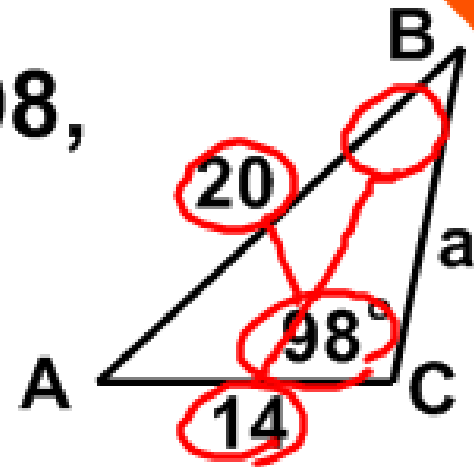
$$\frac{\sin 47}{14} = \frac{\sin 100}{c}$$

$$c \frac{\sin 47}{\sin 47} = \frac{14 \sin(100)}{\sin 47}$$

$$c = 18.9$$

$$m\angle C = \underline{100^\circ}, a = \underline{10.4}, c = \underline{18.9}$$

Ex: Solve $\triangle ABC$ if $m\angle C = 98$,
 $b = 14$, and $c = 20$.



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

$$\frac{\sin 98}{20} = \frac{\sin B}{14}$$

$$\frac{14 \sin(98)}{20} = \frac{20 \sin B}{20}$$

$$44 = B$$

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

$$\frac{\sin 38}{a} = \frac{\sin 98}{20}$$

$$\frac{20 \sin 38}{\sin 98} = \frac{a \sin 98}{\cancel{\sin 98}}$$

$$12.4 = a$$

$m\angle A = \underline{38^\circ}$, $m\angle B = \underline{44^\circ}$, $a = \underline{12.4}$



Homework:

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