


7 - 6

The Law of Cosines



*****Use this when the Law of Sines
can't be used*****

Law of Cosines

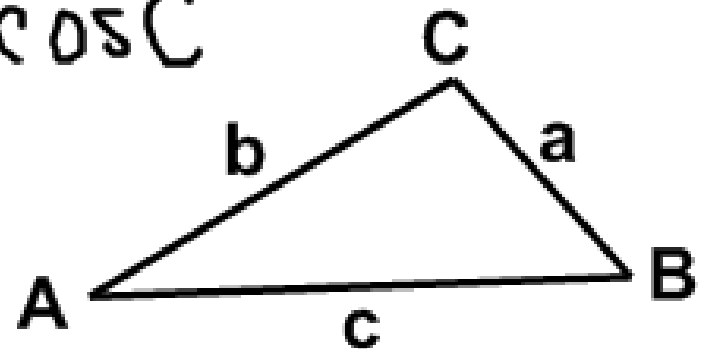
Let $\triangle ABC$ be any triangle with a , b , and c representing the measures of the sides opposite the angles with measures A , B , and C respectively.

Then the following equations are true...

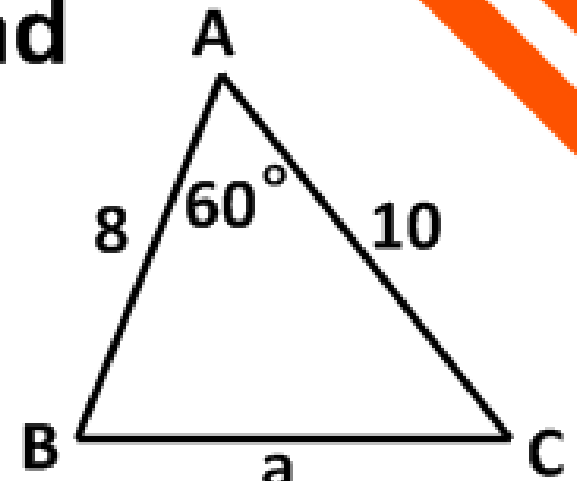
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$



Ex: Find a if $c = 8$, $b = 10$, and $m\angle A = 60^\circ$.



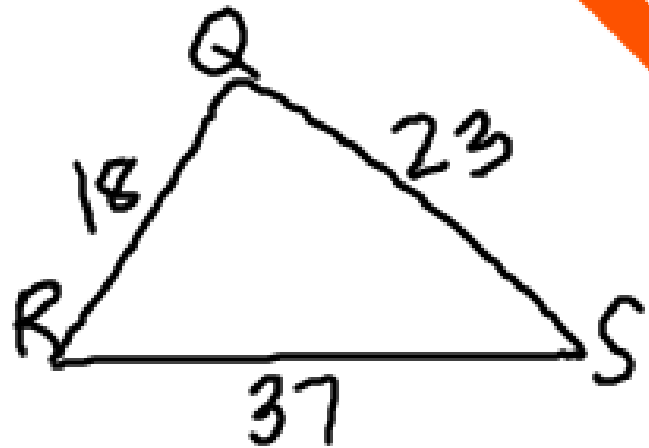
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 10^2 + 8^2 - 2(10)(8) \cos 60^\circ$$

$$\sqrt{a^2} = \sqrt{164 - 160 \cos 60^\circ}$$

$$a = 9.2$$

Ex: Find $m\angle R$.



$$r^2 = s^2 + q^2 - 2sq \cos R$$

$$23^2 = 18^2 + 37^2 - 2(18)(37) \cos R$$

$$529 = 1693 - 1332 \cos R$$

$$\begin{array}{r} + 1164 \\ \hline + 1332 \end{array} = \begin{array}{r} - 1332 \cos R \\ \hline - 1332 \end{array}$$

$$\boxed{29.1^\circ = R}$$

(29.1 cos)

Ex:

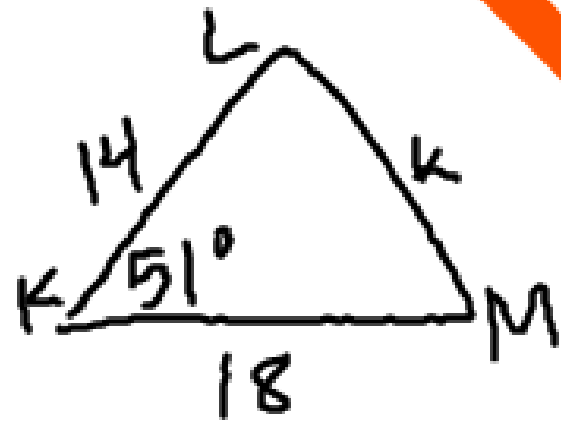
$$k^2 = l^2 + m^2 - 2lm \cos K$$

$$k^2 = 18^2 + 14^2 - 2(18)(14) \cos 51$$

$$k^2 = 520 - 504 \cos 51$$

$$k = 14.2$$

(work for $\angle L$ and $\angle M$
on next page)



Given:

$\angle K$

m

l

$$k = \underline{14.2}$$

$$m\angle M = \underline{50^\circ}$$

$$m\angle L = \underline{79^\circ}$$

$$\frac{\sin K}{k} = \frac{\sin M}{m}$$

$$\frac{\sin 51}{14.2} = \frac{\sin M}{14}$$

$$\frac{\cancel{14.2} \sin M}{\cancel{14.2}} = \frac{14 \sin 51}{14.2}$$

$$\boxed{M = 50^\circ}$$

$$\begin{array}{r} 51 \\ + 50 \\ \hline 101 \end{array}$$

$$\begin{array}{r} 180 \\ - 101 \\ \hline \end{array}$$

$$\boxed{79 = \angle L}$$



Homework:

7-7 WS (evens)