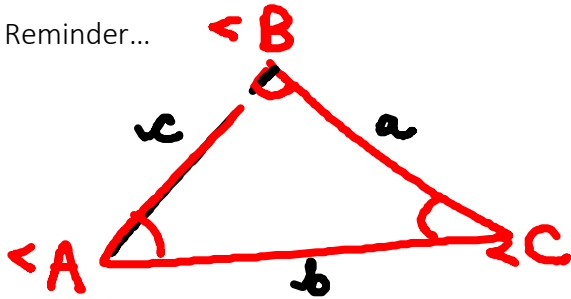


NAME: _____

U2:L3 cosine Law

Reminder...



The Law of Cosines states the relationship...

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

Proof...

$\triangle ACD$
 $\cos A = \frac{x}{b}$
 $\cos A(b) = x$

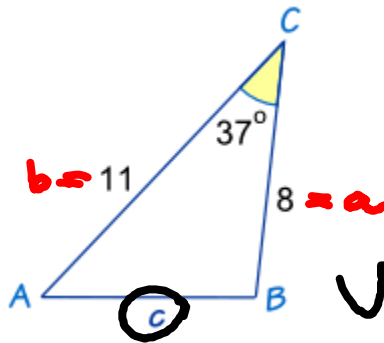
$b^2 = x^2 + h^2$

$\triangle DCB$
 $a^2 = h^2 + (c-x)^2$ PYTHAGORAS
 $a^2 = h^2 + c^2 - 2cx + x^2$ EXPAND BINOMIAL
 $a^2 = x^2 + h^2 + c^2 - 2cx$ REARRANGE
 $a^2 = b^2 + c^2 - 2c(\cos A(b))$
 $a^2 = b^2 + c^2 - 2cb \cos A$

Rearrange the equation to solve for the other variables and we get:

$$\begin{aligned} a^2 &= b^2 + c^2 - 2cb(\cos A) \\ b^2 &= a^2 + c^2 - 2ac(\cos B) \\ c^2 &= a^2 + b^2 - 2ab(\cos C) \end{aligned}$$

FINDING A SIDE...



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

$$c^2 = 8^2 + 11^2 - 2(8)(11) (\cos 37^\circ)$$

$$c^2 = 64 + 121 - 2(88) (\cos 37^\circ)$$

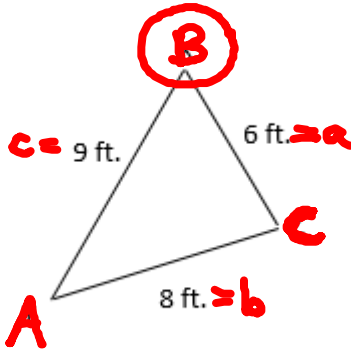
$$c^2 = 185 - 176 (\cos 37^\circ)$$

$$c^2 = 185 - 140.56$$

$$\sqrt{c^2} = 44.44$$

$$c = 6.666$$

FINDING AN ANGLE...



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

$$8^2 = 6^2 + 9^2 - 2(6 \times 9) (\cos B)$$

$$64 = 36 + 81 - 2(54) (\cos B)$$

$$64 = 117 - 108 (\cos B)$$

$$\begin{array}{r|l} -117 & -117 \\ \hline -53 & -108 \cos B \end{array}$$

$$\begin{array}{r|l} -108 & -108 \end{array}$$

$$\frac{0.49}{\cos} = \frac{\cos B}{\cos}$$

$$\boxed{\begin{array}{l} 60.6^\circ \\ 61^\circ \end{array} = B}$$

$\cos^{-1}(0.49)$