COSINE LAW

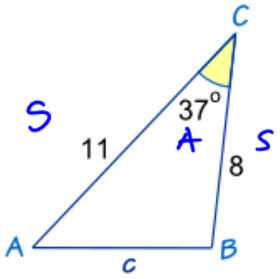
It works for any triangle:

Solving for a Side	Solving for an Angle
$\underbrace{c^2}_{\text{side to find}} = \underbrace{a^2 + b^2 - 2ab}_{\text{other 2 sides}} \underbrace{\cos C}_{\text{angle opposite side to find}}$	$\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$

When Do We Use It?

The Cosine Law is used to solve any triangle when given:

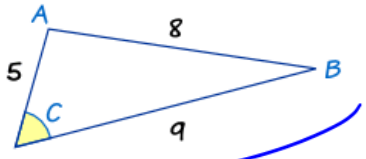
Case 1) SIDE - ANGLE - SIDE	Case 2) SIDE - SIDE - SIDE



$c^2 = 11^2 + 8^2 - 2 \cdot 11 \cdot 8 \cdot \cos 37°$

$c^2 = 44.4402$

$c \doteq 6.7$



$\cos C = \dfrac{5^2 + 9^2 - 8^2}{2 \cdot 5 \cdot 9}$

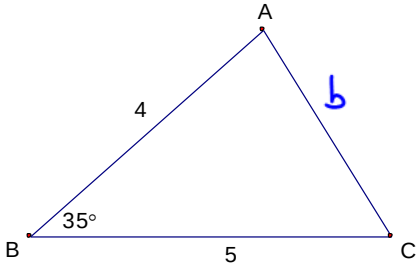
$\cos C = \dfrac{42}{90}$

$\cos C = 0.4667$

$\cos^{-1}(0.4667) = C$

$C = 62°$

1. Find the value of side b.



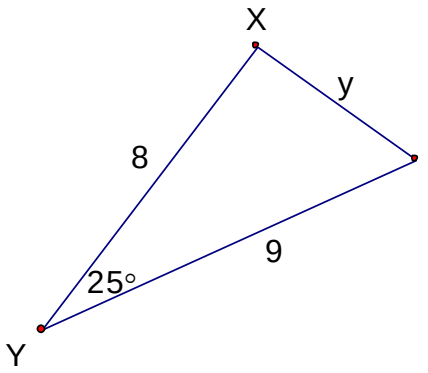
$b^2 = 4^2 + 5^2 - 2 \cdot 4 \cdot 5 \cos 35$

$b^2 = 16 + 25 - 32.7661$

$b^2 = 8.2339$

$b = 2.9$

2. **Find the value of side y.**



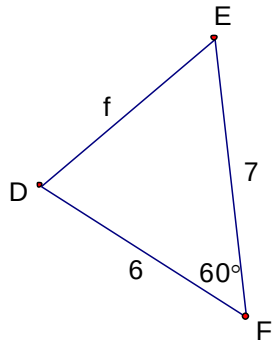
$y^2 = 8^2 + 9^2 - 2 \cdot 8 \cdot 9 \cdot \cos 25$

$y^2 = 64 + 81 - 130.5083$

$y^2 = 14.4917$

$\boxed{y = 3.8}$

3. **Solve for side f.** (ANS: 6.6)

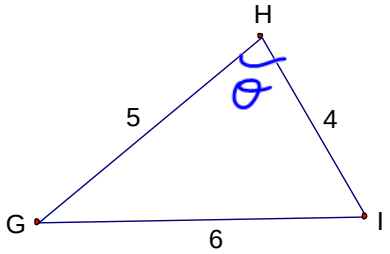


$f^2 = 6^2 + 7^2 - 2 \cdot 6 \cdot 7 \cdot \cos 60$

$f^2 = 43$

$\boxed{f \doteq 6.6}$

4. **Solve for ∠H.** (ANS: 83°)



$\cos\theta = \dfrac{5^2 + 4^2 - 6^2}{2 \cdot 5 \cdot 4}$

$\cos\theta = \dfrac{5}{40}$

$\cos\theta = 0.125$

$\cos^{-1}(0.125) = \theta$

$\boxed{\theta = 83^\circ}$