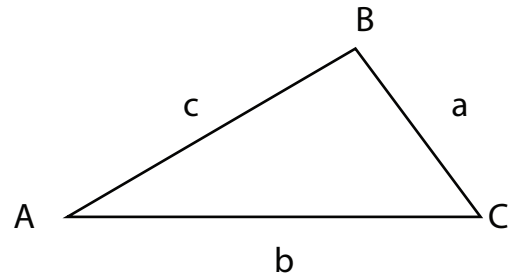


LAW OF COSINES

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

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

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

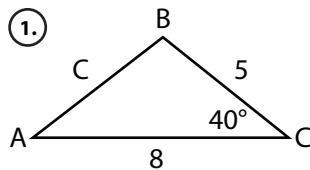


Steps for Solving Oblique Triangles:

1. Draw a triangle and label using the given data
2. Pick your formula (Law of Sines or Cosines) by determining the type of congruency in the given triangle
 - (a) ASA or AAS use Law of Sines
 - (b) SSA use Law of Sines Ambiguous case
 - (c) SAS or SSS use Law of Cosines
3. Solve for all unknown parts. Remember, the sum of interior angles in a triangle is 180°

Examples: Solve $\triangle ABC$

1. $a = 5, b = 8, c = 40^\circ$



② SAS = Law of Cosines

③ $c^2 = a^2 + b^2 - 2ab \cos C$
 $c^2 = 5^2 + 8^2 - 2(5)(8) \cos 40^\circ$
 $c^2 = 27.716$
 $c = 5.26$

$$\frac{\sin A}{5} = \frac{\sin 40^\circ}{5.26} \rightarrow \sin A = \frac{5(\sin 40^\circ)}{5.26}$$

$$\sin A = 0.611$$

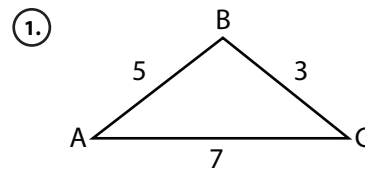
$$A = \sin^{-1}(0.611)$$

$$A = 37.66^\circ$$

$$A + B + C = 180^\circ$$

$$37.66^\circ + B + 40^\circ = 180^\circ \rightarrow B = 102.34^\circ$$

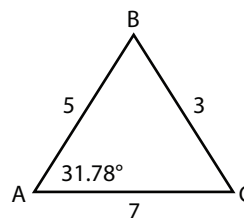
2. $a = 3, b = 7, c = 5$



② SSS = Law of Cosines

③ $a^2 = b^2 + c^2 - 2bc \cos A$
 $3^2 = 7^2 + 5^2 - 2(7)(5) \cos A$
 $9 = 74 - 70 \cos A$
 $-65 = -70 \cos A$
 $\cos A = \left(\frac{65}{70}\right) \rightarrow A = \cos^{-1}\left(\frac{65}{70}\right)$

$$A = 21.78^\circ$$



$$\frac{\sin B}{7} = \frac{\sin 21.78^\circ}{3}$$

$$\sin B = \frac{7(\sin 21.78^\circ)}{3}$$

$$B = \sin^{-1}(0.489)$$

$$B = 119.83^\circ$$

$$A + B + C = 180^\circ \rightarrow 21.78^\circ + 119.83^\circ + C = 180^\circ$$

$$C = 38.39^\circ$$