

LAW OF COSINES

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc} \quad \cos B = \frac{a^2 + c^2 - b^2}{2ac} \quad \cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

1. $A = 70^\circ$ $b = 10$ $c = 18$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a = \sqrt{b^2 + c^2 - 2bc \cos A}$$

$$a = \sqrt{10^2 + 18^2 - 2(10)(18) \cos 70^\circ}$$

$$a = 17.35$$

$$\frac{B}{\sin B} = \frac{b}{\sin A}$$
$$B = \cos^{-1} \left(\frac{a^2 + c^2 - b^2}{2ac} \right)$$

$$B = \cos^{-1} \left(\frac{17.35^2 + 18^2 - 10^2}{2(17.35)(18)} \right)$$

$$B = 32.8^\circ$$

$$\frac{C}{\sin C} = \frac{c}{\sin A}$$
$$C = 180^\circ - A - B$$
$$= 180^\circ - 70^\circ - 32.8^\circ$$

$$C = 77.2^\circ$$

2. $a = 9$ $b = 5$ $c = 10$

$$\frac{A}{\sin A} = \frac{a}{\sin A}$$
$$A = \cos^{-1} \left(\frac{b^2 + c^2 - a^2}{2bc} \right)$$

$$A = \cos^{-1} \left(\frac{5^2 + 10^2 - 9^2}{2(5)(10)} \right)$$

$$A = \cos^{-1} \left(\frac{85 + 100 - 81}{100} \right)$$

$$A = 63.9^\circ$$

$$\frac{B}{\sin B} = \frac{b}{\sin A}$$
$$B = \cos^{-1} \left(\frac{a^2 + c^2 - b^2}{2ac} \right)$$

$$B = \cos^{-1} \left(\frac{9^2 + 10^2 - 5^2}{2(9)(10)} \right)$$

$$B = \cos^{-1} \left(\frac{81 + 100 - 25}{180} \right)$$

$$B = 29.93^\circ$$

$$\frac{C}{\sin C} = \frac{c}{\sin A}$$
$$C = 180^\circ - A - B$$

$$C = 180^\circ - 63.9^\circ - 29.93^\circ$$

$$C = 86.17^\circ$$