THE LAW OF COSINES

WHEN TO USE THE LAW OF COSINES

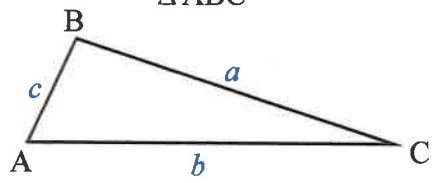
The Law of Cosines is used to find the missing sides and/or angles of an oblique triangle. Use the Law of Cosines when given:

the measures of all three sides of the triangle – SSS

the measures of two sides and the included angle -- SAS

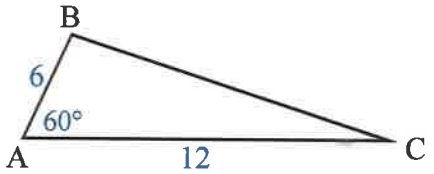
THE LAW OF COSINES

ΔABC



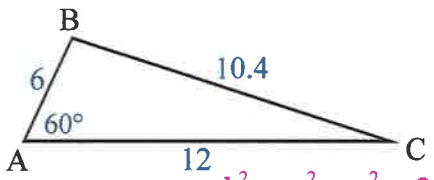
$$a^2 = b^2 + c^2 - 2bc\text{Cos}A$$
$$b^2 = a^2 + c^2 - 2ac\text{Cos}B$$
$$c^2 = a^2 + b^2 - 2ab\text{Cos}C$$

Solve ΔABC



$$a^2 = b^2 + c^2 - 2bc\text{Cos}A$$
$$a^2 = 12^2 + 6^2 - 2(12)(6)\text{Cos}60°$$
$$a^2 = 180 - (144)\text{Cos}60°$$
$$a^2 = 108$$
$$a \approx 10.4$$

Solve Δ ABC



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

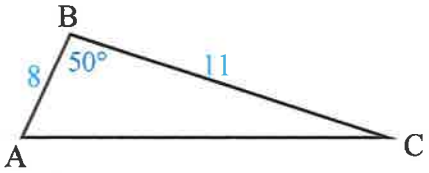
$$12^2 = 10.4^2 + 6^2 - 2(10.4)(6)\cos B$$

$$\frac{12^2 - 10.4^2 - 6^2}{-2(10.4)(6)} = \cos B$$

$$\angle B \approx 89.9°$$

$$\angle C \approx 180° - 89.9° - 60° = 30.1°$$

Solve Δ ABC



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

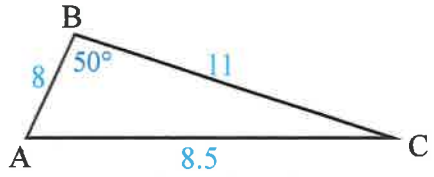
$$b^2 = 11^2 + 8^2 - 2 \cdot 11 \cdot 8 \cdot \cos 50°$$

$$b^2 = 185 - 176 \cdot \cos 50°$$

$$b^2 = 71.9$$

$$b \approx 8.5$$

Solve Δ ABC



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

$$11^2 = 8.5^2 + 8^2 - 2(8.5)(8)\cos A$$

$$\frac{11^2 - 8.5^2 - 8^2}{-2(8.5)(8)} = \cos A$$

$$\angle A \approx 83.6°$$

$$\angle C \approx 180° - 83.6° - 50° = 46.4°$$