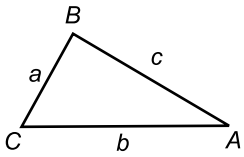
5-6

Study Guide

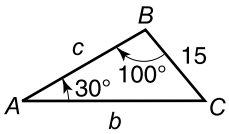
The Law of Sines

Given the measures of two angles and one side of a triangle, we can use the **Law of Sines** to find one unique solution for the triangle.



Law of Sines	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Example 1 **Solve $\triangle ABC$ if $A = 30°$, $B = 100°$, and $a = 15$.**



First find the measure of $\angle C$.
$C = 180° - (30° + 100°)$ or $50°$

Use the Law of Sines to find b and c.

$$\frac{a}{\sin A} = \frac{b}{\sin B} \qquad \frac{c}{\sin C} = \frac{a}{\sin A}$$

$$\frac{15}{\sin 30°} = \frac{b}{\sin 100°} \qquad \frac{c}{\sin 50°} = \frac{15}{\sin 30°}$$

$$\frac{15 \sin 100°}{\sin 30°} = b \qquad c = \frac{15 \sin 50°}{\sin 30°}$$

$$29.54423259 \approx b \qquad c \approx 22.98133329$$

Therefore, $C = 50°$, $b \approx 29.5$, and $c \approx 23.0$.

The area of any triangle can be expressed in terms of two sides of a triangle and the measure of the included angle.

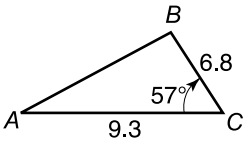
Area (K) of a Triangle	$K = \frac{1}{2}bc \sin A \quad K = \frac{1}{2}ac \sin B \quad K = \frac{1}{2}ab \sin C$

Example 2 **Find the area of $\triangle ABC$ if $a = 6.8$, $b = 9.3$, and $C = 57°$.**

$K = \frac{1}{2}ab \sin C$

$K = \frac{1}{2}(6.8)(9.3) \sin 57°$

$K \approx 26.51876336$



The area of $\triangle ABC$ is about 26.5 square units.