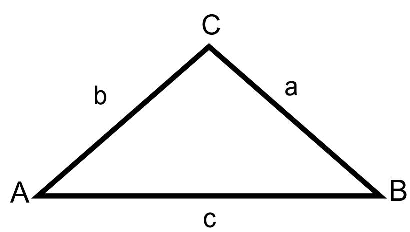
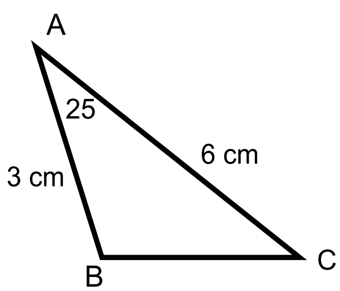
13-4 Law of Sines
Day 1

Objective: Solve problems by using the law of sines.
Determine whether a triangle has one, two, or no solutions.

Area of a Triangle: *
A = .5bc sin A
A = .5ac sin B
A = .5ab sin C



Ex 1) Find the area of triangle ABC to the nearest tenth.



$A = \text{Area} = .5(3)(6)\sin(25)$

$= \boxed{3.8 \text{ cm}^2}$

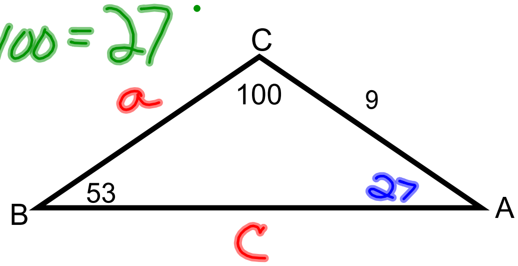
Law of Sines—does not require a right triangle…works for any triangle.

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

$$\frac{1\ \Delta \text{ formed}}{SSS, SAS, ASA, AAS}$$

Ex 2) Solve Triangle ABC.

$A = 180 - 53 - 100 = 27°$



$$\boxed{\begin{array}{l} A = 27° \\ a = 5.1 \\ c = 11.1 \end{array}}$$

$$\cancel{\frac{\sin 100}{c} = \frac{\sin 53}{9}}$$

$9 \sin 100 = c \sin 53°$

$$\frac{9 \sin 100}{\sin 53} = c$$

$11.1 = c$

$$\cancel{\frac{\sin 27}{a} = \frac{\sin 53}{9}}$$

$a \sin 53 = 9 \sin 27$

$$a = \frac{9 \sin 27}{\sin 53}$$

$a = 5.1$

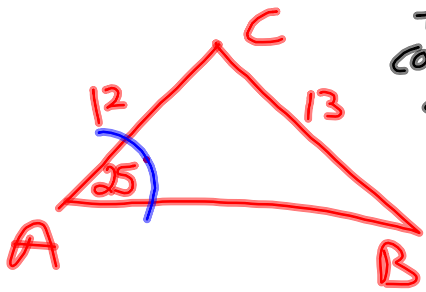
Ex 3) Solve triangle ABC.

A = 25
a = 13
b = 12

SSA

means there could be 2 Δ's

Rule: If the side opposite the angle given is larger than the other side given, then there is one triangle. If not, then there are 2 or 0 triangles formed.



$$\boxed{\begin{array}{l} c = 22.9 \\ C = 132^\circ \\ B = 23^\circ \end{array}}$$

$$C: \begin{array}{r} 180 \\ -23 \\ -25 \\ \hline 132^\circ \end{array}$$

13 > 12
1Δ exists

$$\cancel{\frac{\sin 25}{13} = \frac{\sin B}{12}}$$

$$13\sin B = 12\sin 25$$

$$\sin B = \frac{12\sin 25}{13}$$

$$\sin^{-1}\left(\frac{12\sin 25}{13}\right) = B = 23^\circ$$

$$\cancel{\frac{\sin 25}{13} = \frac{\sin 132}{c}}$$

$$c\sin 25 = 13\sin 132$$

$$c = \frac{13\sin 132}{\sin 25}$$

$$c = 22.9$$