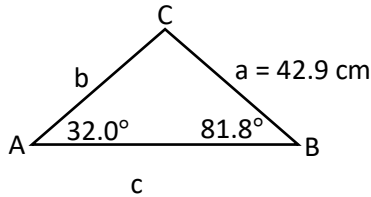# Math 3 Unit 3.1 Notes   Law of Sines

Use Law of Sines when you have: AAS or ASA

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

Use only two of the fractions at a given time.

Plug in 3 of the four variables and solve for the fourth unknown.

Example 1 given AAS:

Solve for side b:

Use $\dfrac{a}{\sin A} = \dfrac{b}{\sin B}$ since there is no c or C information.

Plug in all known information:

$$\frac{42.9}{\sin(32.0)} = \frac{b}{\sin(81.8)}$$

Solve for b:

$$(\sin(81.8))\frac{42.9}{\sin(32.0)} = \frac{b}{\cancel{\sin(81.8)}}(\cancel{\sin(81.8)})$$

b = 80.1 cm

Find angle C:

$C = 180 - 32.0 - 81.8$

$C = 66.2°$

Solve for side c:

Use $\dfrac{a}{\sin A} = \dfrac{c}{\sin C}$ since we now have angle C.

Plug in all known information:

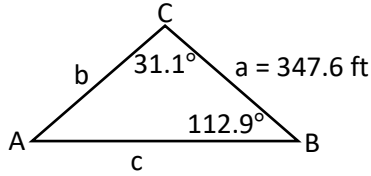$$\frac{42.9}{\sin(32.0)} = \frac{c}{\sin(66.2)}$$

Solve for c:

$$(\sin(66.2))\frac{42.9}{\sin(32.0)} = \frac{c}{\cancel{\sin(66.2)}}(\cancel{\sin(66.2)})$$

c = 74.1 cm

Example 2 given ASA:

Find angle A:

$$A = 180 - 31.1 - 112.9$$

$$A = 36.0°$$

Solve for side b:

Use $\dfrac{a}{\sin A} = \dfrac{b}{\sin B}$ since we now have angle A.

Plug in all known information:

$$\frac{347.6}{\sin(36)} = \frac{b}{\sin(112.9)}$$

Solve for b:

$$(\sin(112.9))\frac{347.6}{\sin(36)} = \frac{b}{\cancel{\sin(112.9)}}(\cancel{\sin(112.9)})$$

b = 544.8 ft

Solve for side c:

Use $\dfrac{a}{\sin A} = \dfrac{c}{\sin C}$

Plug in all known information:

$$\frac{347.6}{\sin(36)} = \frac{c}{\sin(31.1)}$$

Solve for c:

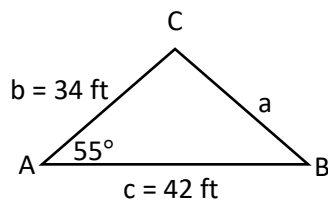$$(\sin(31.1))\frac{347.6}{\sin(36)} = \frac{c}{\cancel{\sin(31.1)}}(\cancel{\sin(31.1)})$$

c = 305.5 ft

Area of Triangle when you have: SAS

$$Area = \frac{1}{2}bc \cdot \sin A$$

Example 2 given SAS:

Find Area:

$$Area = \frac{1}{2}bc \cdot \sin A$$
$$Area = \frac{1}{2}(34)(42) \cdot \sin 55$$

$$Area = 585 \ ft^2$$