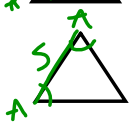
Law of Sines p.63

The law of sines can be used to solve triangles that aren't right triangles & you know:

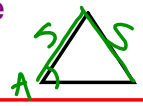
- AAS - 2 angles & 1 non-included side

- ASA - 2 angles & 1 included side

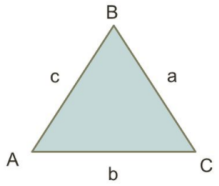


- ASS* - 2 sides & 1 non-included angle

  *This is the ambiguous case



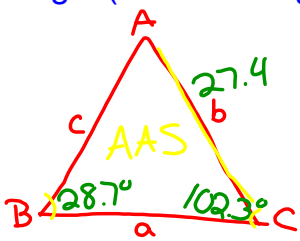
Law of Sines



$$\frac{a}{SinA} = \frac{b}{SinB} = \frac{c}{SinC}$$

* you only use 2 at a time

1. Given C= 102.3°, B= 28.7°, & b=27.4 ft, solve the triangle (find all 3 angles & 3 sides)



A= 49° a=43.1 ft
B=28.7° b=27.4 ft
C=102.3° c=55.7 ft

① Law of Sines

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

$$\frac{27.4}{\sin 28.7} = \frac{c}{\sin 102.3}$$

$$\frac{c \cdot \sin 28.7}{\sin 28.7} = \frac{27.4 \sin 102.3}{\sin 28.7}$$

c = 55.7 ft

② Sum of angles in Δ = 180°

A = 180° - 28.7° - 102.3°

A = 49°

③ Law of Sines

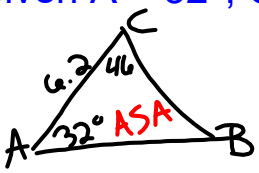
$$\frac{b}{\sin B} = \frac{a}{\sin A}$$

$$\frac{27.4}{\sin 28.7} = \frac{a}{\sin 49}$$

$$\frac{a \sin 28.7}{\sin 28.7} = \frac{27.4 \sin 49}{\sin 28.7}$$

a = 43.1 ft

2. Given A = 32°, C = 46°, & b=6.2, solve the triangle.



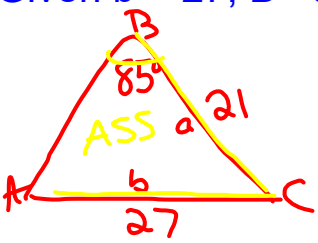
$A = 32°$ $a = 3.4$
$B = 102°$ $b = 6.2$
$C = 46°$ $c = 4.6$

① $B = 180° - 32° - 46°$
$B = 102°$

② Law of sines
$\frac{a}{\sin A} = \frac{b}{\sin B}$
$\frac{a}{\sin 32} = \frac{6.2}{\sin 102°}$
$\frac{a \sin 102}{\sin 102} = \frac{6.2 \sin 32}{\sin 102}$
$a = 3.4$

③ LOS
$\frac{b}{\sin B} = \frac{c}{\sin C}$
$\frac{6.2}{\sin 102} = \frac{c}{\sin 46}$
$c = 4.6$

3. Given b = 27, B= 85°, & a=21 ft, solve the triangle.



$A = 50.8°$ $a = 21$ ft
$B = 85°$ $b = 27$ ft
$C = 44.2°$ $c = 18.9$ ft

① LOS
$\frac{a}{\sin A} = \frac{b}{\sin B}$
$\frac{21}{\sin A} = \frac{27}{\sin 85}$
$\frac{27 \cdot \sin A}{27} = \frac{21 \sin 85}{27}$
$\sin A = \frac{21 \sin 85}{27}$
$A = \sin^{-1}(\text{Ans})$
$\boxed{2nd}$ $\boxed{\sin}$ $\boxed{2nd}$ $\boxed{(-)}$
$A = 50.8°$

② $C = 180 - 50.8 - 85$
$C = 44.2°$

③ $\frac{b}{\sin B} = \frac{c}{\sin C}$
$\frac{27}{\sin 85°} = \frac{c}{\sin 44.2°}$
$c = 18.9$ ft