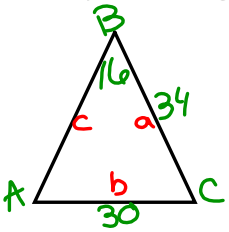
Law of Sines (Ambiguous Case) p.65

- What triangle congruence theorem do we never use? ASS or SSA
- In which quadrant(s) is sine positive? I + II
- What is the supplement of 72°? 180° − 72 = 108°

Solve each triangle below. Round to the nearest tenth.

1. $m\angle B = 16°$, $a = 34$ ft, $b = 30$ ft



a = 34 A = 18.2
b = 30 B = 16
c = C =

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

$\frac{34}{\sin A} \times \frac{30}{\sin 16}$

$\frac{30 \sin A}{30} = \frac{34 \sin 16}{30}$

calc

$A = \sin^{-1}(\text{ANS})$ 2nd (−)

★ Find the supplement of the 1st angle you get

	Option 1 1st Δ	Option 2
∠A	18.2°	180 − 18.2 161.8°
∠B	16°	16°
∠C	145.8°	2.2°

180 − 161.8 − 16

Do both options make "legal" triangles? Now find side c.

yes; bc you can find a 3rd ∠ for 2nd Δ

1st Δ

a = 34 A = 18.2
b = 30 B = 16
c = 61.2 C = 145.8

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

$\frac{34}{\sin 18.2} \times \frac{c}{\sin 145.8}$

$c = \frac{34 \sin 145.8}{\sin 18.2}$

c = 61.2

2nd Δ

a = 34 $A_2 = 161.8°$
b = 30 B = 16°
C_2 = $C_2 = 2.2°$

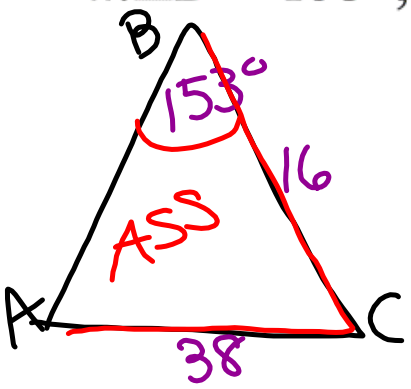
$\frac{a}{\sin A} = \frac{C_2}{\sin C_2}$

$\frac{34}{\sin 161.8} \times \frac{C_2}{\sin 2.2}$

$C = \frac{34 \sin 2.2}{\sin 161.8}$

$C_2 = 4.2$

2. $m\angle B = 153°$, $a = 16$ yd, $b = 38$ yd



$a = 16$ $A = 11°$
$b = 38$ $B = 153°$
$c = 23.1$ $C = 16°$

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

$\frac{16}{\sin A} = \frac{38}{\sin 153}$

$\frac{38 \sin A}{38} = \frac{16 \sin 153}{38}$

$A = \sin^{-1}(\text{Ans})$

$A = 11°$

$A_2 = 180 - 11$

$A_2 = 169°$

	Option 1	Option 2
$\angle A$	11°	169°
$\angle B$	153°	153°
$\angle C$	16°	-12°

$180 - 169 - 153$

Do both options make "legal" triangles? Now find side c.

No!

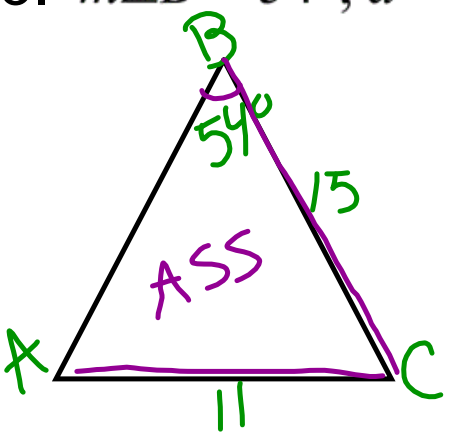
$\frac{b}{\sin B} = \frac{c}{\sin C}$

$\frac{38}{\sin 153°} = \frac{c}{\sin 16°}$

$\frac{c \sin 153}{\sin 153} = \frac{38 \sin 16}{\sin 153}$

$c = 23.1$

3. $m\angle B = 54°$, $a = 15$ in, $b = 11$ in



$a=15$ $A=$

$b=11$ $B=54°$

$c=$ $C=$

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

$\frac{15}{\sin A} = \frac{11}{\sin 54}$

$\frac{\cancel{11}\sin A}{\cancel{11}} = \frac{15\sin 54}{11}$

$A = \sin^{-1}(\text{Ans})$

"Domain Error"

no triangle

	Option 1	Option 2
$\angle A$		
$\angle B$	54°	54°
$\angle C$		

Do both options make "legal" triangles? Now find side c.

No $\triangle$ exists

HW: p. 298; # 11-23 odds