

12-2 Law of Sines - Ambiguous Case

For oblique Δ s:

1) SSS, SAS, & all letters different, use L.o.C.

2) AAS, ASA, & 2 letters in common, use L.o.S. (Always when given 2 L's)

SSA - 2 letters in common, only 1 is an L, use L.o.S.

We will check for a 2nd Δ using the 1st L we calculate.

✓ For a 2nd Δ - yes or no?

1) $a=4, b=5, C=51^\circ$

No - L.o.C.

2) $a=2, b=3, c=4$

No - L.o.C.

3) $B=39^\circ, a=4, b=3$

Yes - Bb in common, only 1 L

4) $A=52^\circ, B=31^\circ, a=8$

No - L.o.S. (Aa's but 2 L's given)

5) $A=15^\circ, a=10, b=8$

Yes - Aa in common, only 1 L

Ex 1: Solve the Δ - $A=42^\circ, a=22, b=12$

$A=42^\circ$ $a=22$
 $B=21.41^\circ$ $b=12$
 $C=116.59^\circ$ $c=29.40$

$A=42^\circ$ $a=22$
 $B=158.59^\circ$ $b=12$
 $C=-20.41^\circ$

b) $\frac{\sin A}{a} = \frac{\sin B}{b}$
 $\frac{\sin 42}{22} = \frac{\sin B}{12}$

$22 \sin B = 12 \sin 42$

$\sin B = \frac{12 \sin 42}{22}$

$B = \sin^{-1}\left(\frac{12 \sin 42}{22}\right)$

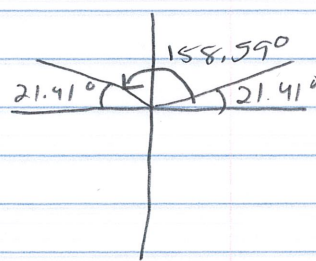
$B = 21.41^\circ$

c) $\frac{\sin A}{a} = \frac{\sin C}{c}$
 $\frac{\sin 42}{22} = \frac{\sin 116.59}{c}$

$c \sin 42 = 22 \sin 116.59$

$c = \frac{22 \sin 116.59}{\sin 42}$

$c = 29.40$



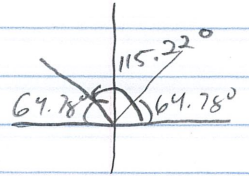
Now go Find the Ambiguous Case before you continue!

(cont)

Ex 2: Solve the Δ - $A = 20.5^\circ$, $a = 12$, $b = 31$

$$\begin{aligned} A &= 20.5^\circ & a &= 12 \\ B &= \underline{64.78^\circ} & b &= 31 \\ C &= \underline{94.72^\circ} & c &= \underline{34.15} \end{aligned}$$

$$\begin{aligned} A &= 20.5^\circ & a &= 12 \\ B &= \underline{115.22^\circ} & b &= 31 \\ C &= \underline{44.28^\circ} & c &= \underline{23.92} \end{aligned}$$



$$\begin{aligned} B) \quad \frac{\sin 20.5}{12} &= \frac{\sin B}{31} \\ 12 \sin B &= 31 \sin 20.5 \\ \sin B &= \frac{31 \sin 20.5}{12} \end{aligned}$$

$$\begin{aligned} C) \quad \frac{\sin 20.5}{12} &= \frac{\sin 44.28}{c} \\ c \sin 20.5 &= 12 \sin 44.28 \\ c &= \frac{12 \sin 44.28}{\sin 20.5} \\ c &= 23.92 \end{aligned}$$

Now go find the Ambiguous Case $\rightarrow B = 64.78^\circ$ before you continue

$$\begin{aligned} B &= \sin^{-1}\left(\frac{31 \sin 20.5}{12}\right) \\ C) \quad \frac{\sin 20.5}{12} &= \frac{\sin 94.72}{c} \\ c \sin 20.5 &= 12 \sin 94.72 \\ c &= \frac{12 \sin 94.72}{\sin 20.5} \\ c &= 34.15 \end{aligned}$$

CW/HW - wksh