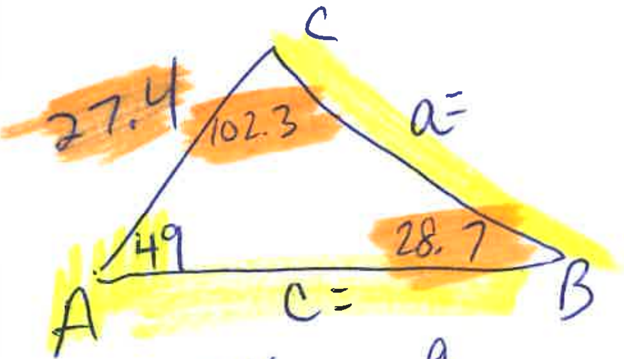
Name: Hansen 1/29/2020

HansenMath Pre-calc: 6.1 Law of Sines, DAY TWO

Warm it up, class

1.) Solve the triangle

C = 102.3° B = 28.7° b = 27.4 feet



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

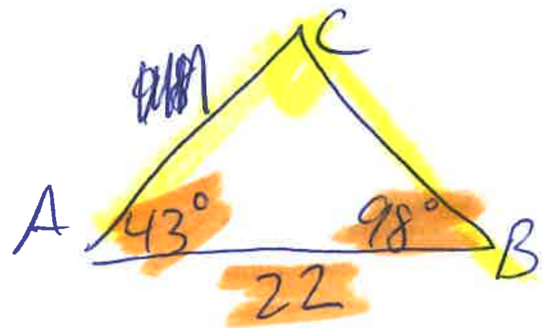
$a = 43.1$

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

$c = 55.7$

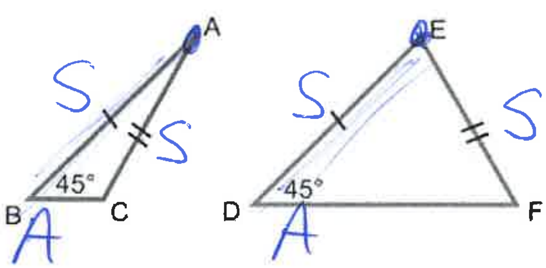
2.) Solve the triangle

A = 43° B = 98° c = 22 ft



Remember Congruent Triangle Shortcuts? The two above scenarios look like AAS **and** ASA**.**

Also, recall there was no SSA theorem, since it's ambiguous and can lead to two different looking triangles, for example:

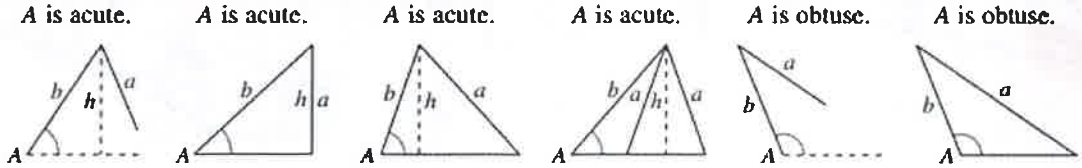


Notice that $\overline{CA}$ and $\overline{EF}$ have the SAME length, but lead to different triangles since angles A and E are not FIXED.

So, when you have a SSA triangle, you have to respect some ground rules

The Ambiguous Case (SSA)

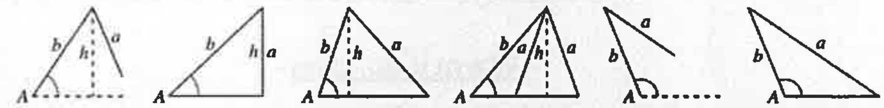
Consider a triangle in which you are given a, b, and A ($h = b \sin A$).

	A is acute.	A is acute.	A is acute.	A is acute.	A is obtuse.	A is obtuse.
Sketch						
Necessary condition	$a < h$	$a = h$	$a \geq b$	$h < a < b$	$a \leq b$	$a > b$
Possible triangles	None	One	One	Two	None	One

The Ambiguous Case (SSA)

Consider a triangle in which you are given a, b, and A ($h = b \sin A$).

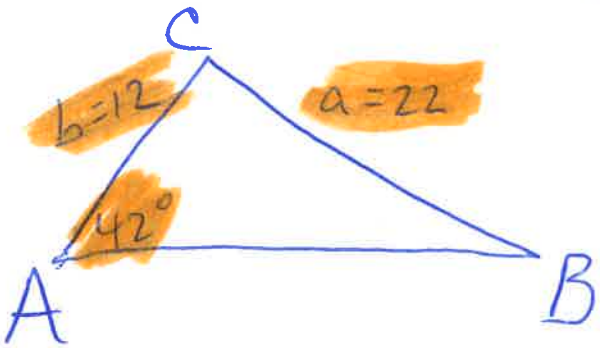
	A is acute.	A is acute.	A is acute.	A is acute.	A is obtuse.	A is obtuse.
Sketch						
Necessary condition	$a < h$	$a = h$	$a \ge b$	$h < a < b$	$a \le b$	$a > b$
Possible triangles	None	One	One	Two	None	One



3.). Single-solution Case: SSA

a = 22 b = 12 A = 42°

Solve the Triangle



① Do you have SSA?

② $a \ge b$

$22 \ge 12$ ✓

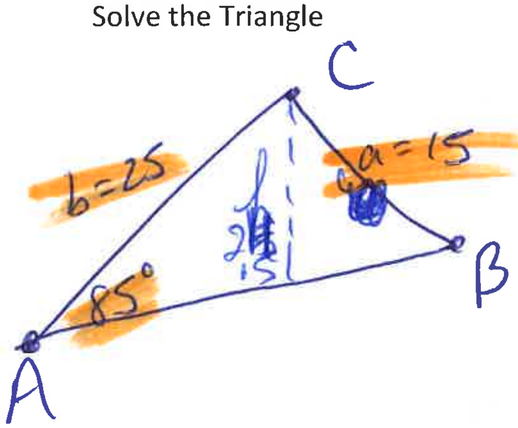
yes - proceed w/ L.o.S.

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

4.) No-Solution Case: SSA

a = 15 b = 25 A = 85°

Solve the Triangle



① SSA?? yes

② $a \ge b$

$15 \not\ge 25$ NOT 1 Triangle

③ put in height, h

$$25 \cdot \sin 85 = \frac{h}{\cancel{25}} \cdot \cancel{25}$$

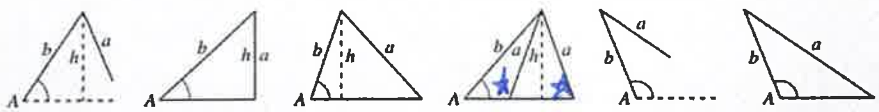
$$\boxed{24.9 = h}$$

Since $a < h$ NO

$15 < 24.9$ Triangle

The Ambiguous Case (SSA)

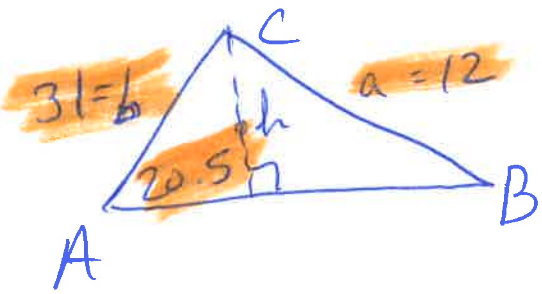
Consider a triangle in which you are given a, b, and A ($h = b \sin A$).

	A is acute.	A is acute.	A is acute.	A is acute.	A is obtuse.	A is obtuse.
Sketch						
Necessary condition	$a < h$	$a = h$	$a \ge b$	$h < a < b$	$a \le b$	$a > b$
Possible triangles	None	One	One	Two	None	One

5.) ~~Single~~ Two solution Case: SSA

a = 12 b = 31 A = 20.5°

Solve the Triangle



① SSA? yes

② is $a \geq b$ No (Not single Δ)

③ Find h

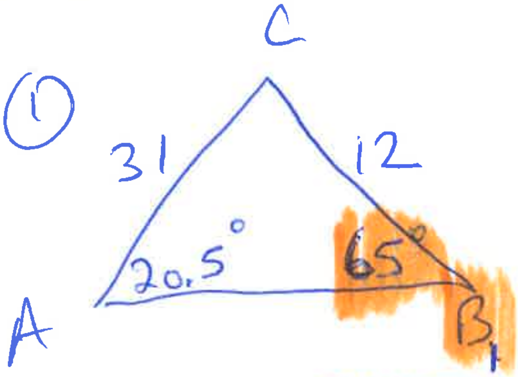
$31 \cdot \sin 20.5 = \frac{h}{\cancel{31}} \cancel{31}$

$10.9 = h$

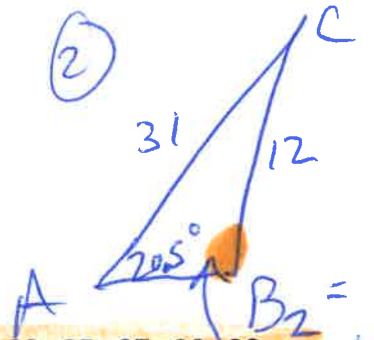
④ Is $a < h$

$12 < 10.9$ No ("No" Triangle)

Thus, there's 2 Triangle



OR



$B_2 = 180 - B_1$

$180 - 65$

$= 115$

Assignment: Book. Page 414, #3, 7, 8, 13, 15, 17, 19, 20, 25, 27, 30, 38

$$\frac{31}{\sin B_1} = \frac{12}{\sin 20.5}$$