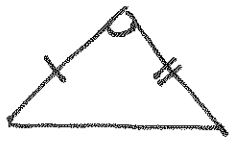
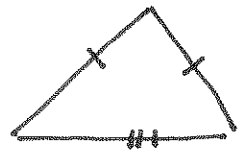
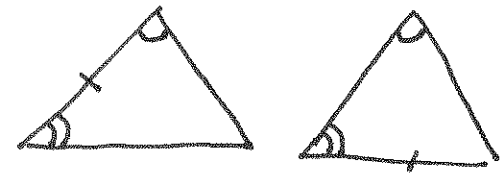
- The Ambiguous Case. (More than one triangle possible)



SAS
(Law of Cosine)

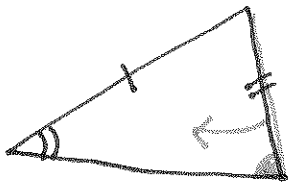


SSS
(Law of Cosine)

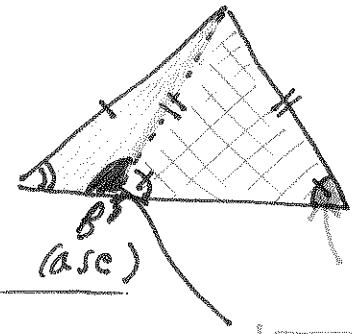


ASA OR AAS
(Law of Sine)

- Law of Cosine: $a^2 = b^2 + c^2 - 2bc\cos A$
- Law of Sine: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$.

- 

SSA (The ambiguous case)

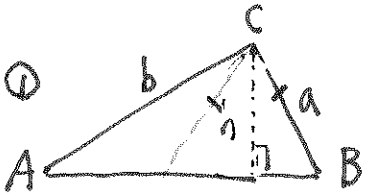
$\Rightarrow$ 

$\Leftarrow$ Two possible Triangles.

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

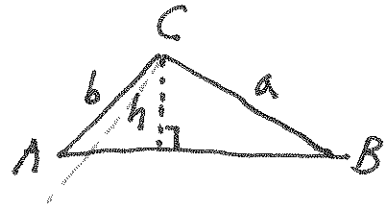
$B' = 180° - B$

- How to identify the two triangles for SSA.

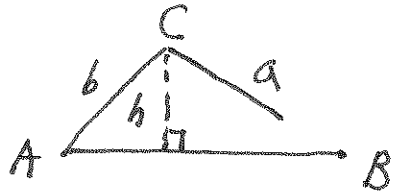
① 

$b < a < b$ $\Rightarrow$ Two Triangles.
(When opposite side length is shorter than adjacent side length)

where $h = b\sin A$

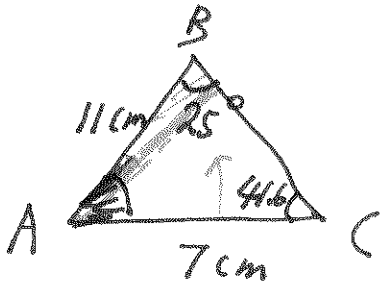
② 

$a > b$ $\Rightarrow$ one triangle.
(When opposite side length is greater than adjacent side length)

③ 

$h > a$ $\Rightarrow$ No triangle.

Example 1) Find the measure of angle C in $\triangle ABC$ if $AC = 7$ cm, $AB = 11$ cm, and angle B measures 25°.



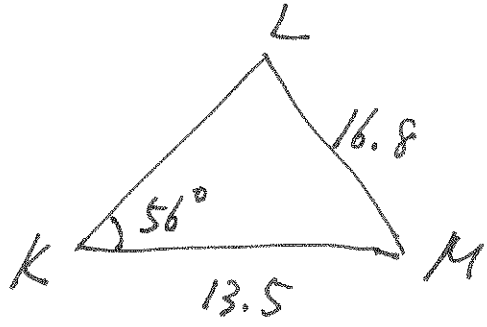
$h = 11 \sin 25° \approx 4.65$ cm $< a$ ⇒ Two $\triangle$s

$$\frac{\sin 25°}{7} = \frac{\sin C}{11}$$

① $C = 41.6°$ ⇒ A

② $C' = 180° - 41.6° = 138°$

Example 2) Find the measure of angle L in $\triangle KLM$ given that the angle K measures 56°, $LM = 16.8$ m, and $KM = 13.5$ m.



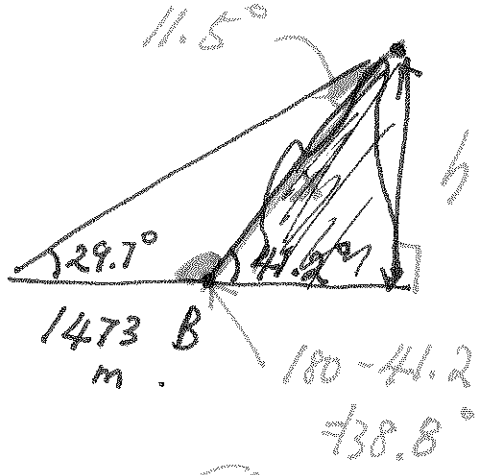
$h = 13.5 \sin 56° = 11.2$ m. ⇒ one $\triangle$

$$\frac{\sin L}{13.5} = \frac{\sin 56°}{13.5}$$

IB Pre HL
Applications

Name: Key
Period: ____

Example 1) The angle of elevation to the top of a mountain are measure from two beacons A and B at sea level. The angle A and B are 29.7 degrees and 41.2 degrees respectively. If the beacons are 1473 m apart, how high is the mountain?

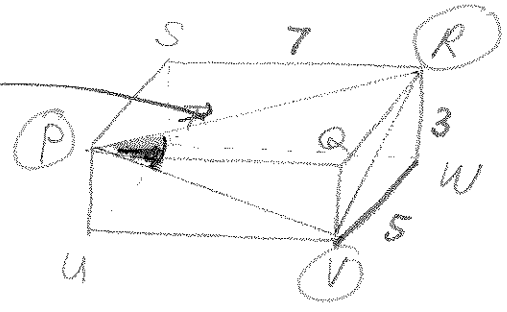


$$\frac{\sin 11.5^\circ}{1473} = \frac{\sin 29.7^\circ}{X}$$

$$X = \left[\frac{(\sin 29.7)(1473)}{\sin 11.5^\circ}\right](\sin 41.2)$$ A

$$\sin 41.2 = \frac{h}{x} \qquad h = (X)(\sin 41.2)$$

Example 2) Find the measure of $R\hat{P}V$



$$\overline{PR} = \sqrt{7^2+5^2}$$

$$\overline{PV} = \sqrt{3^2+7^2}$$

$$\overline{RV} = \sqrt{3^2+5^2}$$

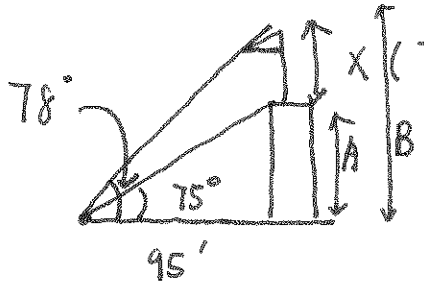
Solve for $\angle P$.

Law of Cosine:

$$\overline{RV}^2 = PV^2 + PR^2 - 2 \cdot PV \cdot PR \cdot \boxed{\cos P}$$

Practice)

. A building is of unknown height. At a distance of 95 feet away from the building, an observer notices that the angle of elevation to the top of the building is 75° and that the angle of elevation to a flag on top of the building is 78°. How tall is the flag pole?



(The height of the flag pole)

$X = B - A$.

$A = 95 \cdot \tan 75^\circ$

$B = 95 \cdot \tan 78^\circ$