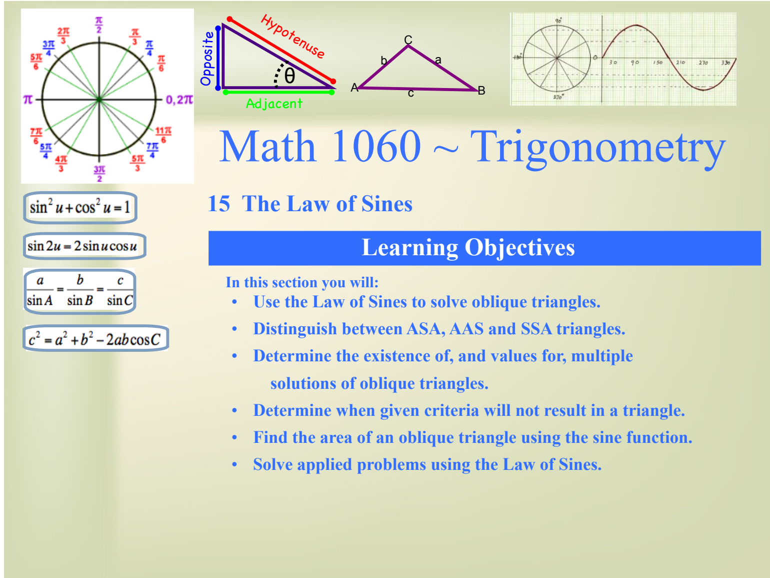
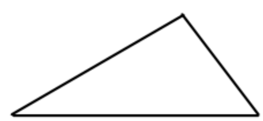


We will now apply our techniques to oblique triangles, those with no right angle.

It is important to label sides and angles of a triangle in a specific way.

Label the vertices A,B,C and the sides opposite them *a,b,c* respectively and the angles α,β,γ respectively.



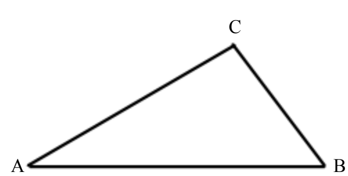
The Law of Sines states that given any triangle ABC, $\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$.

It may also be stated this way: $\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$

We will prove it here.

Given: ΔABC

Prove: $\frac{a}{\sin\alpha} = \frac{b}{\sin\beta}$



Draw altitude $\overline{CD} \perp \overline{AB}$

Let CD = *h*

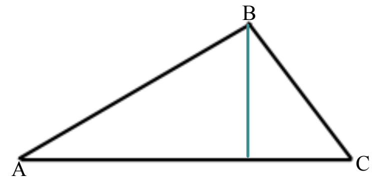
In Δ ACD, sin α =

In Δ BCD, sin β =

Solve each for h and set them equal to each other.

Area of a Triangle:

There are two alternate formulas for the area of a triangle.



We will prove the first one.

$$A = \frac{1}{2}ab\sin\gamma$$

Ex 1: Given triangle KLM, with m = 6 cm and the angle at L measuring 40º and the angle at K measuring 75º, solve for the remaining parts of the triangle and find the area.

Ex 2: Given triangle PQR, with the angle at P measuring 120º, the angle at Q measuring 30º and p = 10 ft, solve for the remaining parts.

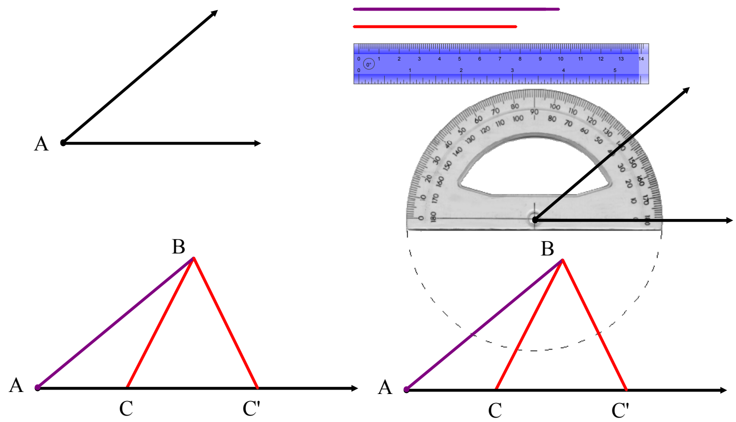
Ex 3: Think back to your congruence postulates in Geometry, ASA, AAS, SAS, SSS and identify each problem above with its postulate.

Let's address the dreaded SSA postulate.

Ex 4: If sin(α) = 0.5 in triangle ABC, what is the measure of the angle at vertex A?

<u>Ambiguous Case</u>: Here is an example that leads to two different triangles in the case of SSA.

Given ΔABC with α = 40º, *c* = 10 cm, and *a* =8 cm, solve for the other parts.



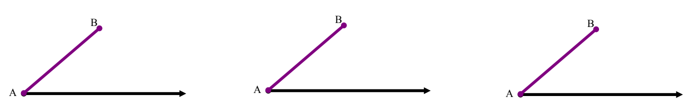
<u>More Ambiguity</u>

Ex 5: In the previous example, consider each of these.

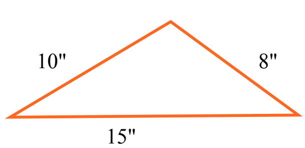
a) What if *a* = 2 cm?

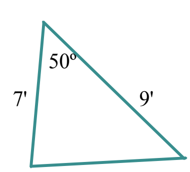
b) Is there a value for *a* which produces exactly one triangle?

c) What if *a* = 10 cm?



Now think about the other two postulates, SSS and SAS. Can we use the Law of Sines to solve for parts on these?





It becomes necessary to have another law.

** The app used in this lesson is at this link:

https://www.geogebra.org/m/CvtkyRM5