Relatives of the Sine Law

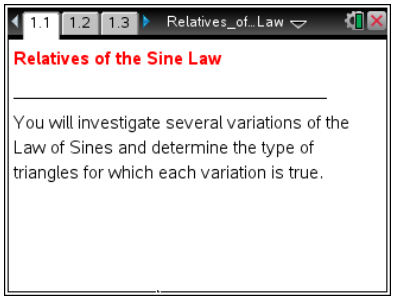
Student Activity

Name _____

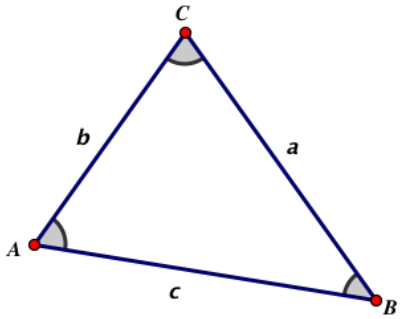
Class _____

Open the TI-Nspire document *Relatives_of_the_Sine_Law.tns.*

In this activity, you will examine several variations of the Law of Sines and determine the type(s) of triangles for which each variation is true.



The Law of Sines states: $\frac{\sin A}{BC} = \frac{\sin B}{AC} = \frac{\sin C}{AB}$ or $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ for any triangle $\triangle ABC$ with angles A, B, and C and sides $AB = c$, $AC = b$, and $BC = a$.



Read page 1.2, and move to page 1.3.

1. Consider $\frac{\sin A}{AC} = \frac{\sin B}{BC}$ $\left(\frac{\sin A}{b} = \frac{\sin B}{a}\right)$. Drag vertices A, B, and C to gather data, and then complete the conjecture below:

   If $\frac{\sin A}{AC} = \frac{\sin B}{BC}$, then $\triangle ABC$ is _____.

2. Verify your conjecture using algebra, the Law of Sines, the Law of Cosines, or other "trig identities."

Read page 2.1, and move to page 2.2.

3. Consider $\frac{\cos A}{BC} = \frac{\cos B}{AC}$ $\left(\frac{\cos A}{a} = \frac{\cos B}{b}\right)$. Drag vertices *A*, *B*, and *C* to gather data, and then complete the conjecture below:

   If $\frac{\cos A}{BC} = \frac{\cos B}{AC}$, then $\triangle ABC$ is _____.

4. Verify your conjecture using algebra, the Law of Sines, the Law of Cosines, or other "trig identities".

Read page 3.1, and move to page 3.2.

5. Consider $\frac{\cos A}{AC} = \frac{\cos B}{BC}$ $\left(\frac{\cos A}{b} = \frac{\cos B}{a}\right)$. Drag the points *A*, *B*, and *C* to gather data, and then complete the conjecture below:

   If $\frac{\cos A}{AC} = \frac{\cos B}{BC}$, then $\triangle ABC$ is _____ or _____.

6. Verify your conjecture using algebra, the Law of Sines, the Law of Cosines, or other "trig identities".

Read page 4.1, and move to page 4.2.

7. Propose another variation (relative) of the Sine Law and then investigate the type(s) of triangles for which your variation is true.
   Hint: Consider a variation involving both sine and cosine, or one involving the tangents of the angles of the triangle.