

The Ambiguous Case of the Sine Law with TI-Nspire Algebra II or Trigonometry

Student Activity

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Activity Overview

Students will determine the number of solutions by using the Ambiguous Law of Sines, given SAS.

TN State Standard

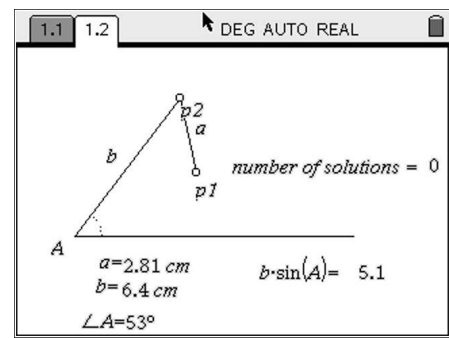
CLE 3103.4.4 Know and use the Law of Sines to find missing sides and angles of a triangle, including the ambiguous case. (Level 3 on Webb's Depth of Knowledge)

1. Given: For a Right Triangle, $\sin(A) = \frac{\textit{opposite}}{\textit{hypotenuse}}$

Explain how $\sin(A) = \frac{\textit{opposite}}{\textit{hypotenuse}}$ is equivalent to: $\textit{hypotenuse} * \sin(A) = \textit{opposite}$?

2. Formula for Ambiguous Law of Sines

If **b** is the hypotenuse and **a** is the opposite side then
 $\textit{hypotenuse} * \sin(A) = \textit{opposite}$ becomes
 _____ * $\sin(A) =$ _____ when we have a
 RIGHT Triangle. But what happens if it is not?



➤ Open the TI-Nspire document Ambiguous Law of Sines.

○ Use **ctrl** **3** to page down.

➤ Press **ctrl** **1** (right side of NavPad) to move to page 1.2 and begin the lesson

3. Complete the table below.

(To grab, ctrl 1) Move point p1 around to get the following cases:	<ul style="list-style-type: none"> How many triangle(s) can you form, if any? Describe what type of triangle(s) is/are formed, if any. 	Number of solutions
$a < b * \sin(A)$		
$a = b * \sin(A)$		
$a > b * \sin(A)$ and $a < b$		
$a > b * \sin(A)$ and $a > b$		

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4. From the chart above, write a **conjecture** between the number of triangles created, if any, and the number of solutions.

5. Place point p1 where the number of solutions equal 1. What do you notice about the length of a and $b \cdot \sin(A)$?

6. Place point p1 where $a = 5.5\text{cm}$. Is it possible for p1 to equal 5.5cm and the number of solutions equal 2? Explain.

7. **Grab** Point p2. Move point p2 so angle A is an obtuse angle. How many triangles can you make now? Explain.

8. Formative Assessment (Complete on a note card):

In each of the following, find the number of solutions. Explain.

a) Angle $A = 45^\circ$, $a = \sqrt{2}$, $b = 2$.

b) Angle $A = 45^\circ$, $a = 1.8$, $b = 2$.

c) Angle $A = 45^\circ$, $a = 2$, $b = 1.5$.

d) Angle $A = 45^\circ$, $a = 1.4$, $b = 2$.