

Sine. It's the Law.

ID: 11852

Time Required

15 minutes

Activity Overview

In this activity, students will explore the Law of Sines. They will derive the formula through exploration and solve some application problems. As an extension, students will prove of the Law of Sines through guided questions.

Topic: Right Triangles & Trigonometric Ratios

- *Law of Sines*

Teacher Preparation and Notes

- *This activity is geared towards geometry students and only the simplest case of the Law of Sines is explored. The ambiguous case is not explored in this activity.*
- *To complete this activity, students will need to know how to change between pages, grab and move points.*
- *Notes for using the TI-Nspire™ Navigator™ System are included throughout the activity. The use of the Navigator System is not necessary for completion of this activity.*
- ***To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to education.ti.com/exchange and enter "11852" in the keyword search box.***

Associated Materials

- *SineLaws_Student.doc*
- *SineLaws.tns*
- *SineLaws_Soln.tns*

Suggested Related Activities

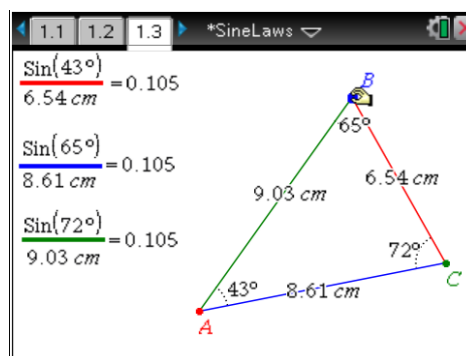
To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.

- *Law of Sines and Cosines (TI-Nspire technology) — 9849*
- *Discover Law of Sines (TI-84 Plus family) — 5367*
- *Law of Sines (TI-Nspire technology) — 8812*
- *SSA Ambiguity (TI-Nspire technology) — 9632*

Problem 1 – Law of Sines

Students will begin this activity by looking at a triangle and investigating the ratio of the sine of an angle to the length of the opposite side. On page 1.3, students are given triangle ABC with the measures of angles A , B , and C ; the measure of sides a , b , and c ; and the measures of some ratios

Students are asked to drag points A , B and C while making note of any changes that they observe to discover the Law of Sines.

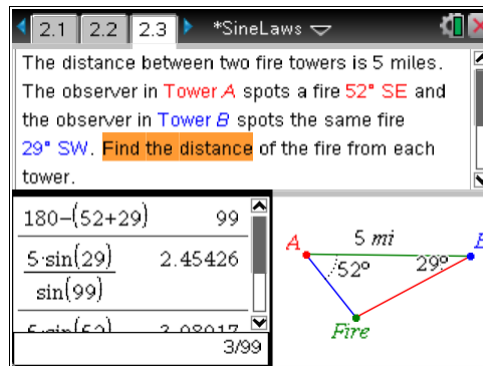


TI-Nspire Navigator Opportunity: Quick Poll, Live Presenter

See Note 1 at the end of this lesson.

Problem 2 – Application of the Law of Sines

In Problem 2, students are asked to apply what they have learned about the Law of Sines. Note that if students are using CAS technology, they will need to press $\text{ctrl} + \text{enter}$ to approximate the solution.

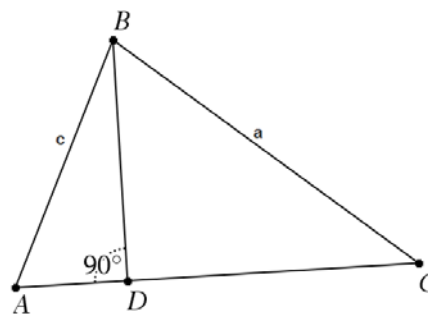


TI-Nspire Navigator Opportunity: Quick Poll, Screen Capture

See Note 2 at the end of this lesson.

Extension – Proof of the Law of Sines

As an extension, students are asked to prove the Pythagorean theorem through guided questions.



Student Solutions

1. While the measure of the angles and sides is constantly changing, the ratios are always equal.
2. $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
3. $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
4. Distance from Tower A: 2.45 mi; Distance from Tower B: 3.99 mi
5. 36.95 ft tall
6. Distance from lighthouse A: 6.65 mi; Distance from lighthouse B: 9.38 mi
7. $\sin(A) = \frac{BD}{c}$
8. $\sin(C) = \frac{BD}{a}$
9. BD ; $c \cdot \sin(A) = BD$ and $a \cdot \sin(C) = BD$
10. $c \cdot \sin(A) = a \cdot \sin(C)$
 $\sin(A) = \frac{a \cdot \sin(C)}{c}$
 $\frac{\sin(A)}{a} = \frac{\sin(C)}{c}$

TI-Nspire Navigator Opportunities**Note 1****Problem 1, Quick Poll, Live Presenter**

Consider using *Live Presenter* to guide the discussion in Problem 1. Ask students to create obtuse, acute, scalene, isosceles, and right triangles to gather observations and begin to form a conjecture. Send a *Quick Poll* to obtain their conjecture.

Note 2**Problem 2, Quick Poll, Screen Capture**

Consider sending multiple *Quick Polls* for the exercises in Problem 2 as well as using *Screen Captures* to monitor student progress.