Trigonometric Ratios

ID: 9535

Time required
35 minutes

Activity Overview

Students will use their handhelds to discover the relationship between the trigonometric functions sine, cosine, and tangent and the side length ratios of a right triangle.

Topic: Trigonometric Functions

- *Solve any right triangle given an angle and the length of an opposite or adjacent side.*
- *Use technology to obtain the sine, cosine, or tangent of any angle.*

Teacher Preparation and Notes

- *This activity is designed as an introduction to the world of trigonometry. Students will explore the trigonometric ratios (sine, cosine, tangent) of a right triangle.*
- *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 TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter "9535" in the keyword search box.***

Associated Materials

- *TrigRatios_Student.doc*
- *TrigRatios.tns*

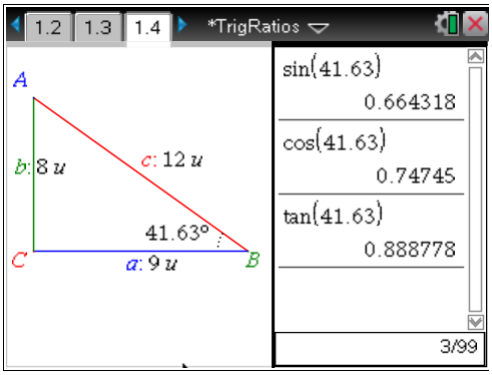
Suggested Related Activities

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

- *Solving for Sides of a Right Triangle (TI-Nspire Technology) — 10229*
- *Ratios of Right Triangles (TI-84 Plus family) — 11576*
- *Exploring Trig Ratios (TI-Nspire Technology) — 9400*

Investigation

On page 1.4, students will calculate the ratios and trigonometric values the students calculate below along with the matching. Remind students that the indicated value for the angle is rounded to two decimal places and is not exact.



$\frac{b}{a} = 0.89$, $\frac{b}{c} = 0.67$, $\frac{a}{c} = 0.75$

sin B = 0.66 , cos B = 0.75 , tan B = 0.89

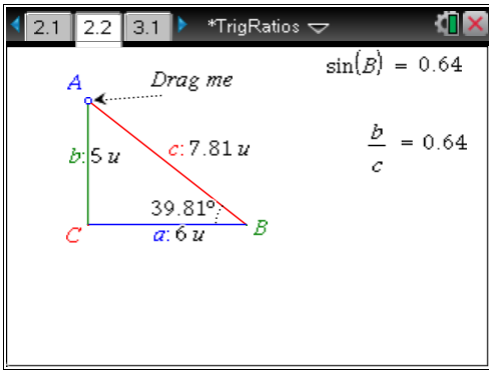
$\sin B = \frac{b}{c}$, $\cos B = \frac{a}{c}$, $\tan B = \frac{b}{a}$

TI-Nspire Navigator Opportunity: *Screen Capture*

See Note 1 at the end of this lesson.

Testing the hypothesis

On pages 2.2–4.1, students are to drag point A to confirm the hypothesis they made about the trig ratios on page 1.5. Point out to the students that as point A is being dragged around and the values for a, b, c, and B are changing, the calculated side length ratio and trigonometric value is not.



Trigonometry, what is it good for?

On pages 5.3–5.5, students will use the trigonometric relationships to find the length of the missing side of the triangle. Below are the worked solutions for the problems in this section.

$$\sin 27.7° = \frac{a}{27.5}$$
$$27.5 \sin 27.7° = a$$
$$27.5 \cdot 0.46 = a$$
$$12.78 = a$$

$$\cos 47.7° = \frac{b}{18.6}$$
$$18.6 \cos 47.7° = b$$
$$18.6 \cdot 0.67 = b$$
$$12.52 = b$$

$$\tan 41° = \frac{13.75}{b}$$
$$b \cdot \tan 41° = 13.75$$
$$b = \frac{13.75}{\tan 41°} = \frac{13.75}{0.87}$$
$$b = 15.82$$

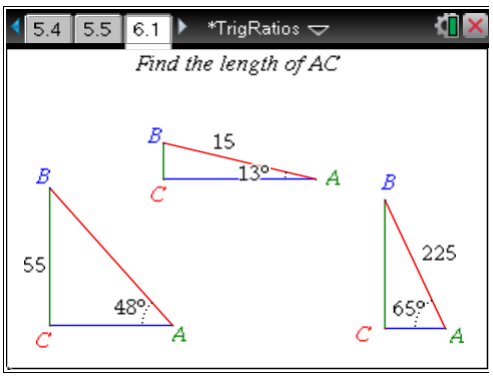
TI-Nspire Navigator Opportunity: *Screen Capture and Quick Poll*

See Note 2 at the end of this lesson.

Student Exercises

Page 6.1 contains student exercises. Students are to find the length of side *AC* of each triangle using the trigonometric relationships.

From left to right: *AC* = 49.52, *AC* = 14.62, *AC* = 95.09



TI-Nspire Navigator Opportunity: *Quick Poll*

See Note 3 at the end of this lesson.

TI-Nspire Navigator Opportunities

Note 1

Problem 1, *Screen Capture*

Do a class *Screen Capture* on page 1.5 to check that students correctly drag each trig operation to its proper ratio.

Note 2

Problem 2, *Screen Capture*

Consider using *Screen Capture* to monitor student progress as they work through pages 5.3 to 5.5.

Note 3

Problem 2, *Quick Poll*

Consider sending a *Quick Poll* for student answers to the three problems on page 6.1.