Exploration of Trig Ratios
ID: 13419

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.

- *The screenshots demonstrate expected student results.*
- *Make sure students have their calculators in **Degree** mode.*
- *This activity is intended to be **teacher-led**. You may use the following pages to present the material to the class and encourage discussion. Students will follow along using their handhelds. Be sure to cover all the material necessary for students' total comprehension.*
- ***To download the student TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter "13419" in the quick search box.***

Associated Materials
- *ExplorationOfTrigRatios_Student.doc*
- *ExplorationOfTrigRatios.tns*

Suggested Related Activity
To download any activity listed, go to <u>education.ti.com/exchange</u> and enter the number in the quick search box.
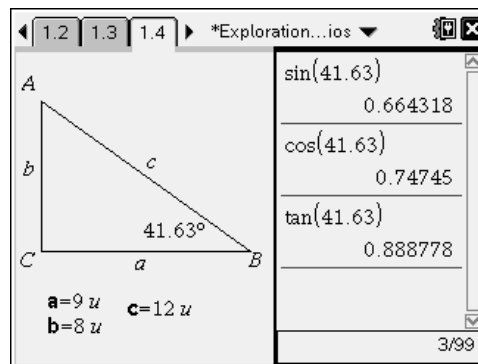- *Trigonometric Ratios (TI-84 technology) — 9534*
- *Trigonometric Ratios (TI-Nspire technology) — 9535*

Problem 1 – Investigation

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

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

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

On page 1.5, students will use the information from page 1.4 to match the ratio with the trigonometric function.

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

Problem 2 – Application

On pages 2.3–2.5, 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.

1.

$$\sin 24.7° = \frac{a}{27.5}$$
$$27.5 \sin 24.7° = a$$
$$27.5 \cdot 0.42 = a$$
$$11.49 = a$$

2.

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

3.

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

Problem 3 – Extra Practice

The extra practice exercises on page 3.1 can be used as an assessment of student understanding.

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