Introduction to Trigonometric Ratios

by – Eric Prowse

Activity overview

This activity introduces students to the idea of trigonometric ratios sine, cosine, and tangent. The main focus is for students to understand how each of the ratios can be represented as a ratio of the sides of a right triangle.

Concepts

Trigonometric ratios.

Teacher preparation

Students will need to know the basic functions of the TI-nspire. The teacher will need to download the file Intro to Trig Ratios.tns to each of the handhelds.

Classroom management tips

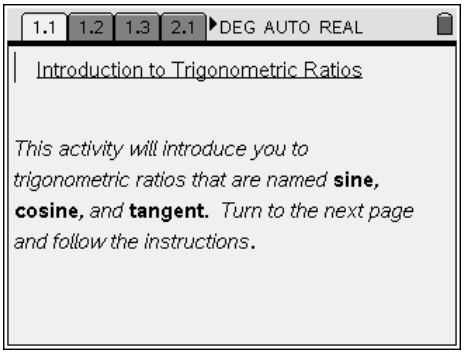
Depending on how well students understand how to the use the nspire, this activity is mostly student led, but can certainly be done together as a class.

TI-Nspire Applications

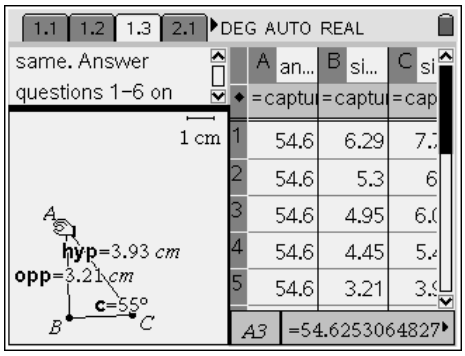
Intro to Trig Ratios.tns

Step-by-step directions

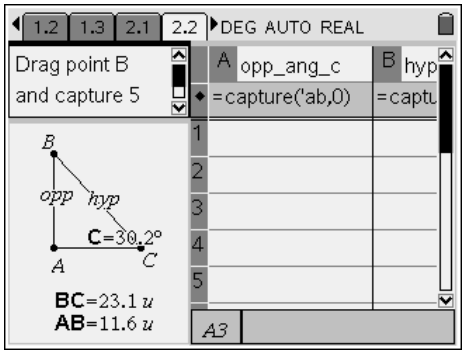
Have students open up the Intro to Trig Ratios.tns file. Students should see the following screen.



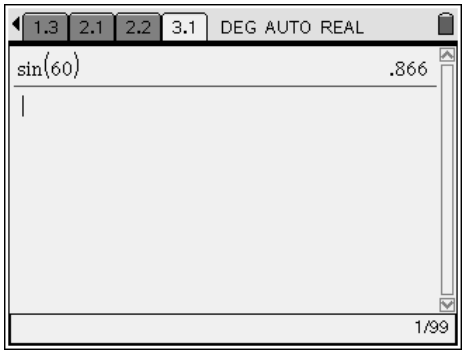
Once the students get to page 1.3, they should grab and move point A and collect 5 data points. To collect data points, they press (ctrl) then (.). The screen at the right shows a possible table of values after the data is captured. From here students need to answer questions 1-6 from the handout. It is this exploration that the students should begin to see that the sine of an angle is equal to the ratio of the side opposite the angle to the hypotenuse.



On page 2.2 students will investigate what happens when the acute angles of a right triangle change as well as the side lengths. This activity may reinforce the relationship of sine and the side lengths of a right triangle.



On page 3.1 there is a calculator that is there for students to do calculations involving sine, cosine, and tangent for problems 8-11.



Assessment and evaluation

- At the end of the activity students should be ready to practice using the sine, cosine, and tangent ratios. Demonstration of that through a problem set would be appropriate.

Activity extensions

- After this activity, students will need to explore how to use the trigonometric ratios to find the lengths of sides when the angles are given and just one side of a right triangle.

Student TI-Nspire Document
Intro to Trig Ratios.tns

Name : _____

Open up *Intro to Trig Ratios.tns* in your TI-nspire. Read the directions on page 1.1 and 1.2 and then turn to page 1.3 to begin the activity.

1.) What measurement on the triangle stayed the same each time you captured data?

2.) Each of the triangles created were similar. Which postulate justifies this statement?

3.) Since the triangles are similar, what should we expect to happen to the ratio of AB to AC in the table?

4.) Fill in the table with the data that was captured on page 1.3.

angle_c	side_ab	side_ac	ratio (ab/ac)	sine_of_angle_c

5.) What happened to the "sine_of_angle_c" each time you captured a new data point?

6.) What do you think we should change on the diagram in order for the value of "sine_of_angle_c" to change?

Turn to page 2.1 to start an activity to see what happens when the measures of the acute angles of a right triangle change.

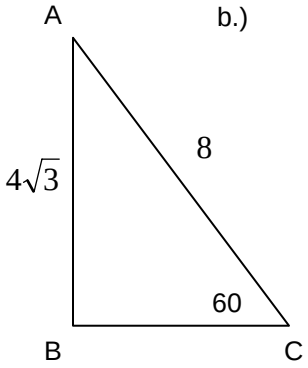
7.) Fill in the table with the data that was captured on page 2.2.

opp_ang_c	hyp	ratio (opp/hyp)	ang_c	sine (of angle c)

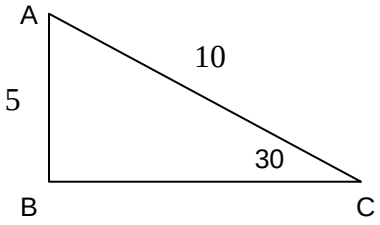
8.) In each case, what do you notice about the value of the ratio of the side opposite $\angle C$ to the hypotenuse and the sine of $\angle C$?

9.) In each of the diagrams, predict the sine of $\angle C$. Then turn to page 3.1 to confirm your predictions by computing sine of $\angle C$ for each diagram.

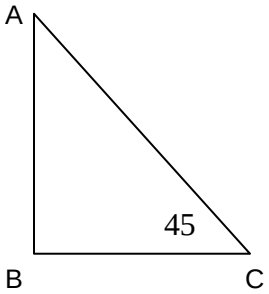
a.)



b.)



c.)



Predictions (show the ratio):

Sin $\angle C$ =

Sin $\angle C$ =

Sin $\angle C$ =

Calculations:

Sin 60° =

Sin 30° =

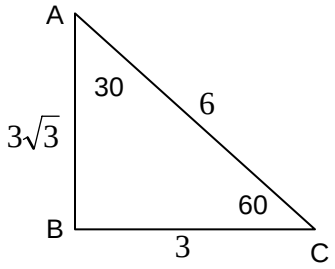
Sin 45° =

10.) **Cosine** is a similar type of ratio, but it compares the side adjacent to an acute angle of a right triangle to the hypotenuse. Predict the cosine of $\angle C$ and $\angle A$ using a ratio, and then use page 3.1 to calculate actual values.

Predictions: Calculations:

Cos $\angle C = \frac{BC}{AC}$

Cos $\angle A = \frac{AB}{AC}$



11.) **Tangent** is the third type of trigonometric ratio. The tangent of an angle compares the side opposite the angle to the side adjacent. Predict the tangent of $\angle C$ and $\angle A$ using a ratio, and then use page 3.1 to calculate actual values.

Predictions: Calculations:

Tan $\angle C = \frac{AB}{BC}$

Tan $\angle A = \frac{BC}{AB}$