

Lesson 1

Introduction to Trigonometric Ratios

Class: Math IV or Accelerated Math III

Time: One 50-Minute Class Period

Students Will:

- be introduced to Trigonometry as triangle geometry using similarity properties of right triangles.
- be introduced to hypotenuse, opposite, and adjacent terminology for identifying sides of right triangles in terms of a designated non-right angle.
- be introduced to sine and cosine terminology and define them as ratios of sides of right triangles.
- investigate the relationship between the sine of an angle x and the cosine of an angle y where x and y are in the same right triangle.

GPS Standards Addressed:

- MM4P4. Students will make connections among mathematical ideas and to other disciplines.
- MM4P1. a. Build new mathematical knowledge through problem solving.
- MM4P2. Students will reason and evaluate mathematical arguments.
 - Recognize reasoning and proof as fundamental aspects of mathematics.
 - Make and investigate mathematical conjectures.
 - Develop and evaluate mathematical arguments and proofs.
- MM2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.
 - Discover the relationship of the trigonometric ratios for similar triangles.

- Explain the relationship between the trigonometric ratios of complementary angles.

Supplies Needed:

- Computers with Geometer’s Sketchpad Software
- Provided Procedure Worksheet

Assessment: Students will be assessed on the Procedure worksheet and Class Discussion. Out of 25 points, the breakdown is as follows.

- Participation in Class Discussion – 5 pts.
- Completion of Procedure Worksheet – 10 pts.
- Mathematical Reasoning Demonstrated in Procedure Worksheet – 10 pts.

Timeline:

- Introduction and Getting Started – 5 minutes
- Exploration Using the Procedure – 30 minutes
 - Students will be working independently or in small groups on the assigned tasks in the procedure.
 - During this time the instructor should be walking around the room. Assistance on questions in the procedure should not be given unless absolutely necessary; Allow the students to work with partners to arrive at solutions. Teacher assistance should be focused on issues dealing with software usage as opposed to content.
- Class Discussion – 15 minutes
 - Ensure that proper mathematical terminology is being used and that the terminology is understood.
 - Discuss the proof of equivalent sine ratios for similar right triangles and equivalent cosine ratios for similar right triangles.
 - Discuss the proof of $\sin(\frac{\pi}{2} - x) = \cos(x)$ and $\cos(\frac{\pi}{2} - x) = \sin(x)$ for positive angles x less than $\frac{\pi}{2}$.
 - Discuss any questions that come up or portions of the activity that seem to be problematic for students.

- Discuss anything particularly interesting or unexpected that students have discovered in the exploration.