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**Goals:**

Students will be able to use pictometry on-line to compare experimentally obtained heights of objects, buildings, amusement park rides etc.

**Objectives:**

- . The students will be able to use pictometry on-line tools.
- . The students will be applying their trigonometry knowledge base.
- . Students will be expected to use correct experimental procedures.

**Standards:**

*Math*

2.10.3.A Identify right angles in the environment.

2.10.5.A Identify and compare parts of right triangles, including right angles, acute angles, hypotenuses and legs.

2.10.11.B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

*Science*

3.7.4.A. Explore the use of basic tools, simple materials and techniques to safely solve problems.

3.7.4.D. Use basic computer software.

3.7.7.10.D Utilize computer software to solve specific problems.

**Materials**

Computers

Pictometry On-line software

Protractors

Measuring tape

Pencils

Erasers

Scientific calculator

Notebook

**Prerequisite Skills:**

- Students should be able to open up Pictometry On-Line and be able to use the height measuring tool.
- Students should be able to apply Trig functions to solve the sides of a right triangle.
- Students should be familiar with using good experimental procedure to carefully collect accurate data.

**Procedure:**

*Motivation:*

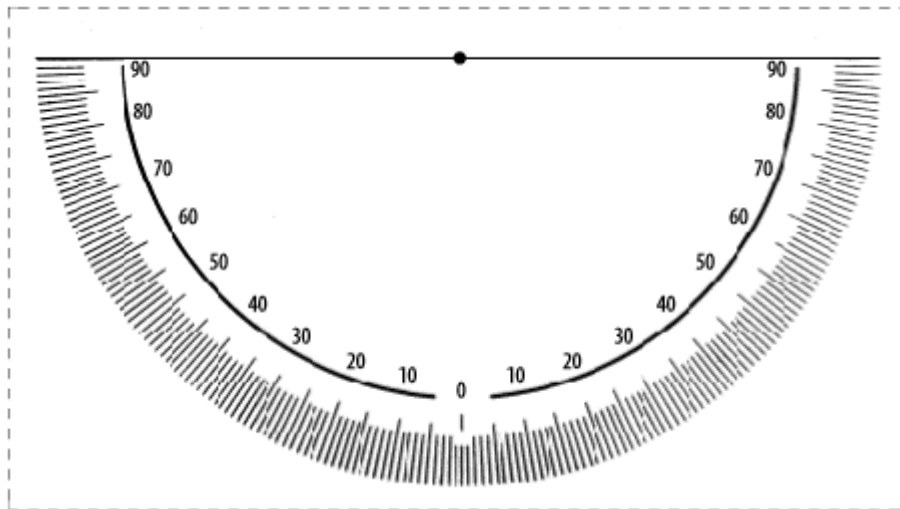
- Review the basics of logging onto the Pictometry On-Line website and introduce using some of the tools.
- Pull up images of some local landmarks, buildings, bridges etc. and demonstrate how the program will give a value for height.
- Pass out activity instructions.

*Development:*

- Review instructions and procedures with the class.
- Students will then go outside to measure various angles. The school building, flagpole, landmarks etc. can be used. A protractor will be used to measure the angle to the top of these objects from a measured distance. Trig will be used to calculate the heights of these objects.
- After the students compute the heights their answers will be compared to the real heights found on Pictometry On-line. This can be extended to measuring the approximate height of buildings within a town or amusement park rides for educational

day field trips to amusement parks. A percent error may also be calculated with the true heights.

Example procedure: Students will measure the exact distance to various objects or buildings on the campus with a tape. From these distances, students will measure the angle to the height of these objects with a protractor. Using the trig function of  $\text{Tan}\theta = \text{opp}/\text{adj}$  students will solve the height of the object. The student's eye level height should be factored in also. Further trials may be done on the same object by measuring the angle at different distances, which should come out to be a similar height. This height will then be compared to the Pictometry On-line height. If good procedure is followed, a similar value should be obtained. Both of these values can be compared to known values of height. This can be extended to compare the measurement of the height of buildings and amusement park rides.



A protractor can be purchased or made in the classroom. A template such as the one above can be attached to a piece of cardboard. A string will be attached at the origin. Weight is hung from the string to straighten out the length. A straw can be attached to the bottom for students to look through to their target. The angle to an elevation can be obtained by a student as his/her partner looks at the target through the straw.

