The Inverse Tangent Function

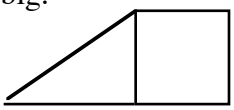
Name _____ Class# _____ Date _____

Objective: To use the inverse tangent function for problem solving.

This is a rather standard problem (most textbooks have something similar to this) involving the viewing angle of a "picture." Such a picture might be a painting, stadium video, a piece of art, or even a "shot sequence" in a movie." One parameter that an artist might consider is how the effect of their work might change with the perception of the viewer. For example, how will perceived size of the image (camera angle...), alter the mood of the scene? Artists, photographers, and movie directors usually develop a "feel" for what we're about to investigate mathematically.

It is a fact of biology that an image will appear largest to human beings if the viewing angle of the image is as large as possible. This is rather reasonable if you consider the two diagrams below.

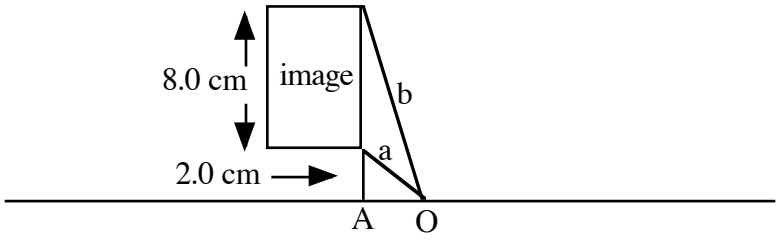
Large viewing angle.
Looks big.



Small viewing angle.
Looks small.

We are interested in investigating the more practical case where the "eye" is not located at the base of the object.

Construct the diagram below to scale. Let point A represent a point directly below the image. Measure off 10.0 centimeters, in 1.0 centimeter increments, along the horizontal, where A = 0.0 cm. At each centimeter, construct another two lines, a and b, as seen in the diagram below.
Measure the angle between a and b by measuring the angle between AOa and the AOb, and then subtracting AOb - AOa. Make a table where x =1.0, 2.0,..., 10.0 cm. and y = the difference of the angles in degrees □□.



x cm	□□

Computational work:
1. Use a piece of graph paper to plot □□ vs. x.

2. Approximately how far from A will the image have its maximum size?

Ans. x =_____

3. Write an equation using arc tangent that will model this problem.

Ans. _____

4. Input your data and your equation into your calculator and compare your results.
Write a paragraph on the back of this paper commenting on your results.