Names: _____     _____

_____     _____

| Grade | |
|-------|--|

# Angular Size

# Pre-Lab Quiz:

Record you team's answer as well as your reasonings and explanations.

| |
|---|
| 1. |
| 2. |
| 3. |
| 4. |

# Part 1: Calculating an Angle

1.) Suppose the building in the picture to the right is 50 feet tall and 30 feet away from you (H = 50 ft., D = 30 ft.). Which side (H or D) is the opposite side of the tangent relationship? Which side is the adjacent side?

2.) If you were to calculate $\theta$, does the small angle formula apply in this instance? Why or why not?

3.) Calculate the apparent angular size $\theta$ of the building, and show your work.

4.) Pick a small angle (< 10 degrees) and show that the tangent of a small angle is roughly equal to the angle in radians. Show the error of this estimate using the [percent error formula](), where you take tan θ to be the theoretical number and θ to be the experimental number. Hint: remember that 1 radian = 57.3 degrees.

5.) Explain how you would determine the angular size of an object in the classroom. Can you use the small angle formula -- why or why not? Does the angular size of the object depend on where you stand?

# Part 2: Angular Measurement Tool Calculations

1.) Describe the angular size measurement tool your group constructed and draw a diagram of your tool in the space provided. Be sure to label important features, distances, and angles in your diagram. Explain how the device is used.

2.) Estimate the precision of your measuring device. Does it measure angles to within a half-degree? Better?

3.) Test the accuracy of your angular size measurement device by using it to find the height of one of your group members. Record the data you collected in a labeled table, as well as the person's actual height. How accurate was your test measurement?

## Part 3: Measuring the Old Capital Dome

1.) Describe the method you used to find the distance between the roof of Van Allen Hall to the Old Capitol Building Dome.

2.) Using the angle you measured with your angular measurement device and the distance you found in question #1, calculate the size of the Old Capitol Building Dome. Create a labeled table of your data.

3.) Based on the precision you estimated in Part 2, what are the maximum and minimum values you could have found for the size of the dome?

4.) At some point, your instructor will tell you the actual diameter of the dome. Does the actual size fall within the range you calculated? If not, what do you think is the source of error?