Name _____
Partner's Name _____
Date _____

Significant Figures and Measurement Lab Activity

In this activity you will learn the concept behind significant figures and how to make measurements and calculations using that concept.

Materials: 1 wooden splint, 1 sheet of lined paper

Any measuring device is limited in its precision. To a large degree, the precision of a measurement is determined by the nature of measuring instrument itself. Specifically, to what degree the instrument is subdivided will determine to what decimal place the measurement will be reported. In science, we typically limit ourselves to measuring scales that have been divided based on powers of ten. A meter stick, for instance, might be divided into tenths, hundredths, and thousands of a meter if the smallest scale division marked on the ruler is the millimeter. Each of the digits you report in your measurement is considered a significant figure. In general, we report measurements by including all of the digits of which we are certain plus one estimated digit. In making measurements with a metric scale, it is conventional to report measurements to the smallest scale division marked on the scale, plus one estimate beyond the smallest scale division. There are exceptions to these rules that differ based on what you are measuring or the measurement technique, but these rules are generally followed.

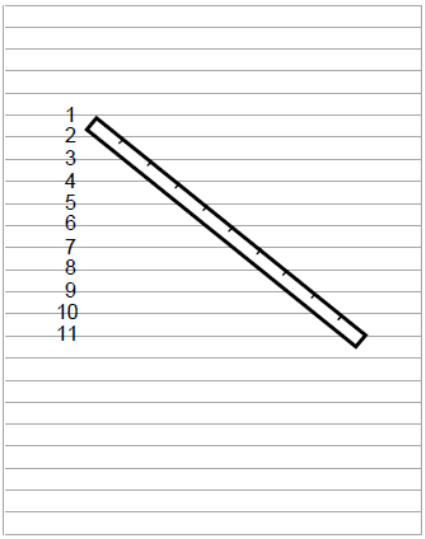
Procedure: For this activity, you will be measuring the geometric shapes on the back of this page using the stick that has been provided to you. All Trial 1 measurements are to be made with the side of the stick which has not been subdivided. This is the "uncalibrated" side of your stick. Trial 2 measurements will be made with the "calibrated" side of the stick.

1. Measure the following quantities using the unmarked stick.
    a. The length and width of the rectangle
    b. The base, height, and all three sides of the triangle
    c. The radius and diameter of the circle.

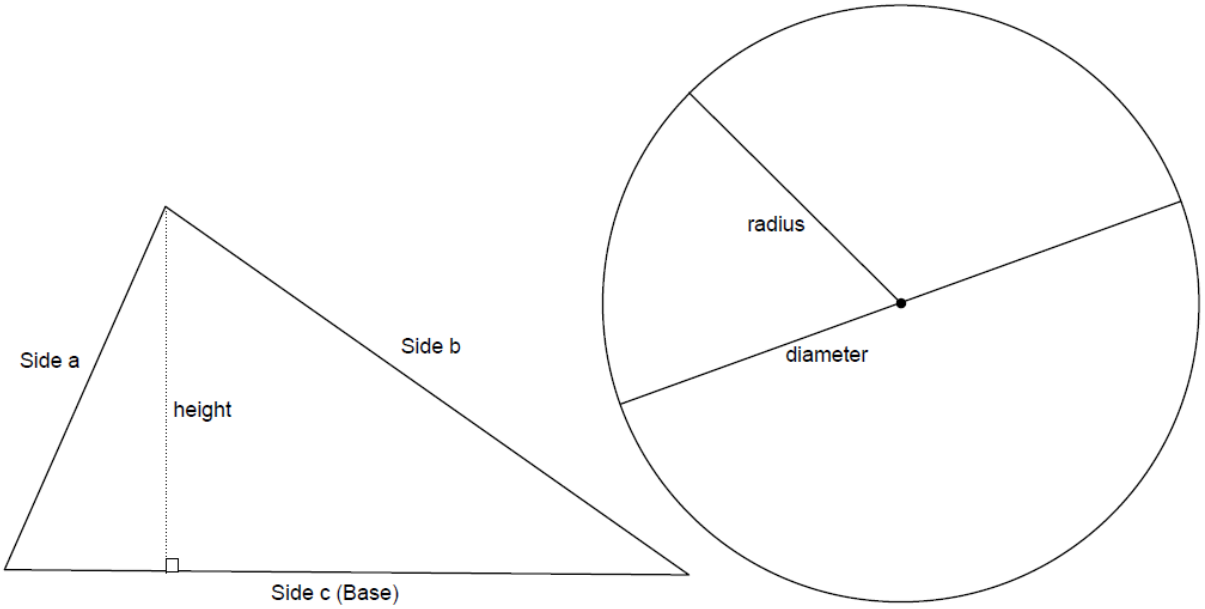
2. Record your measurement in the trial 1 section of the data table, to the correct number of significant figures based on the concepts described above.

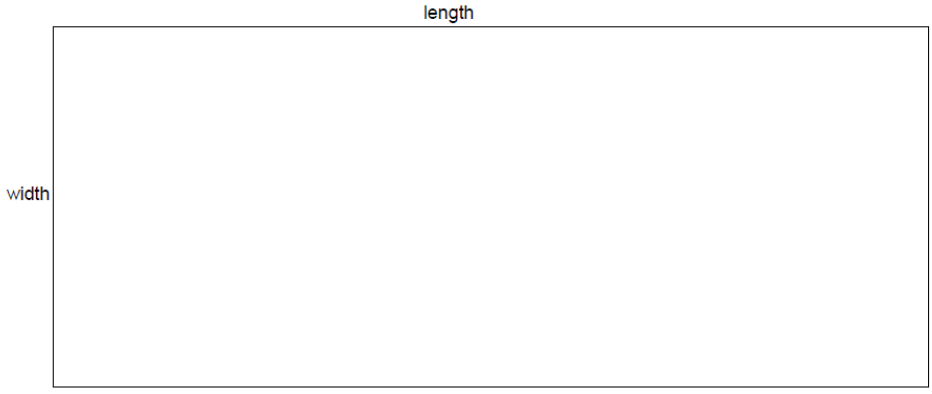
3. Make the following calculations based on the measurements.
    a. Perimeter and area of the rectangle
    b. Perimeter and area of the triangle
    c. Circumference and area of the circle

4. You will now divide your stick into tenths. To do this, write the numbers 1 – 11 on consecutive lines of a sheet of lined paper. Be sure the numbers are on the line, not in the space between lines. This will divide the space between the first and eleventh lines into 10 equal spaces. Now angle the stick on the paper so that one corner of the stick is on line 1 and the corner on the opposite end of the same edge is on line 11. The points where the lines on the paper intersect the edge of the stick will divide the stick into ten equal spaces. As carefully as possible, mark the stick with small lines that are perpendicular to the stick at the precise places where the lines intersect the edge of the stick. Your stick should now be divided into 10 equal spaces. If so, your stick has now been calibrated to tenths of sticks.



5. Repeat steps 1 and 2, this time with the calibrated side of the stick. All measurements and calculations made with the calibrated stick should be recorded in the appropriate trial 2 spaces.





RECTANGLE			TRIANGLE			CIRCLE		
	Trial 1	Trial 2		Trial 1	Trial 2		Trial 1	Trial 2
UNITS⇒								
length			base			radius		
width			height			diameter		
			Side a					
			Side b					
			Side c					
perimeter			perimeter			circumference		
area			area			area		

Analysis

1. To what precision (decimal place) did you report each of the measurements made in trial one? Explain why.

2. Was the number of significant figures in each of your measurements in trial one constant? Explain.

3. Explain how you determined how many significant figures to include in the result of each of the calculations done for trial 1.

4. To what precision (decimal place) did you report each of the measurements made in trial 2? Explain why.

5. Was the number of significant figures in each of your measurements in trial 2 constant? Explain.

6. Explain how you determined how many significant figures to include in the result of each of the calculations done for trial 2.