

# Measuring to the Correct Number of Places

## PROBLEM

What is the correct number of decimal places for a measurement?

## INTRODUCTION

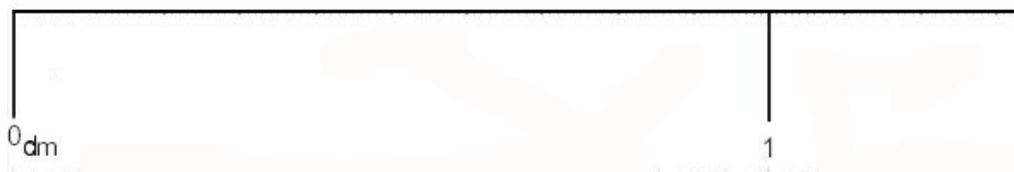
Measuring to the correct number of decimal places is as easy as pi. Pi, you will recall, is the ratio between the circumference of a circle and its radius. It is an irrational number. You may know it as 3.14. Some may say pi is 3.14159. Still others may claim it is 3.141592653589793. These values are all correct, but the last is the most accurate of the three. It is desirable to use the most accurate values that you can, but adding extra decimal places to a value only improves the accuracy if they are correct. You can only be reasonably certain that your values are accurate if you estimate no more and no less than one decimal place beyond what your instruments can measure. In this investigation, you will explore this concept.

## MATERIALS (per group)

3 × 5 index cards

## PROCEDURE

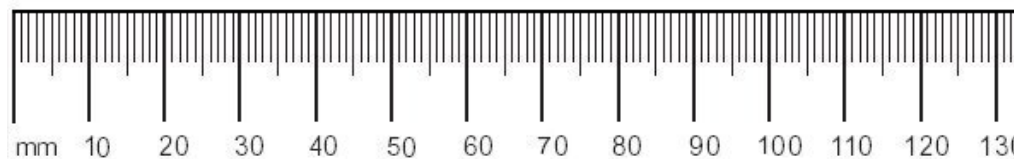
1. Measure the number of decimeters in the length and width of a 3 × 5 index card using the ruler below. If the edges of the index card are not both exactly on a line, you will need to estimate. If they do appear to be exactly on the line, you can still estimate one additional place to be zero. Record your result in the data table on the next page.



2. Measure the number of centimeters in the length and width of a 3 × 5 index card using the ruler below. Estimate one additional place beyond what you can measure. Record your result in the data table on the next page.



3. Measure the number of millimeters in the length and width of a 3 × 5 index card using the ruler below. Estimate one additional place beyond what you can measure. Record your result in the data table on the next page.



4. Convert your first two sets of measurements to millimeters. Record the results in the data table below.

**OBSERVATIONS**

Original Measurement	Length (5")	Width (3")	In Millimeters	
			Length (5")	Width (3")
Decimeters				
Centimeters				
Millimeters				

**CONCLUSIONS**

1. Compare the three sets of measurements in millimeters.
  - a. How are they similar? \_\_\_\_\_  
\_\_\_\_\_
  - b. How are they different? \_\_\_\_\_  
\_\_\_\_\_
2. Why do the similarities and differences you observed exist? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. Which of your measurements is most accurate? Why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. Why weren't all your measurements equally accurate? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. How do you determine the correct number of decimal places for a measurement? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. How many significant figures do each of your measurements have? How is the number of significant figures effected by converting results into millimeters? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_