Worst case Scenario method **keep this as notes**

One way to find the uncertainty in a calculation involving measurements with varying uncertainty is to "re-do" the calculation assuming your data was "off " in such a way as to make the calculation as large as possible.

Volume = L x W x H

A block measurement:

L: 12.51 cm ± .08 cm
W: 4.12 cm ± .04 cm
H : 3.89 cm ± .07 cm

12.51 cm x 4.12 cm x 3.89 cm = 200.495268 cm^3

Rather than just round this to 3 sig figs, we now want to try to gauge an estimate of the uncertainty in volume

1. Find worst case Volume:

(12.51 + .08) x (4.12 + 04) x (3.89 + .07)
12.59 x 4.16 x 3.96

= 207.4026 cm^3

2. Subtract original volume from worst case volume:

207.4026 cm^3 - 200.495268 cm^3
= 6.907 cm^3

3. Round the uncertainty to:

a)One sig fig if its first digit is greater than one
b) Two sig figs if its first digit is a one

So, 6.907 cm^3 fall under a) above, so we round it to 7
(use rounding rules)

4. Finally, we round are original volume (200.495268 cm^3)
To match the same decimal place as the rounded uncertainty

The volume is 200 cm^3 ± 7 cm^3
which is best written as : 2.00 x 10^2 cm^3 ± 7 cm^3

Try this:

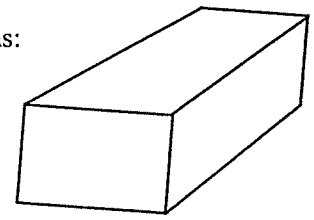
L: 9.53cm ± 0.03 cm
W: 4.22 cm ± 0.02 cm
H : 2.45 cm ± 0.02 cm

Find:

a. Unrounded Volume
b. Worst case Volume (unrounded)
c. Un rounded Uncertainy
d. Rounded uncertainty (look at 3 a&b on front)
e. State the volume rounded with the uncertainty

What is the rationale for rounding this uncertainty to two sig figs instead of one sig fig?

A blocks dimensions are measured as:



Length: 17.23 cm ± 0.07 cm

Width: 4.08 ± 0.03 cm

Height: 2.92 cm ± 0.04 cm

Determine the volume of the block using the worst case scenario method. Round results appropriately.

Finer and more precise measurements

Length: 17.235 cm ± 0.005 cm

Width: 4.080 ± 0.012 cm

Height: 2.923 cm ± 0.010 cm

Determine the volume of the block using the worst case scenario method. Round results appropriately.

Name_____

Regents Physics: Calculations with uncertainty : HW practice

Directions: Calculate the volume with the uncertainty in volume. Use the same process presented in class. Remember, if the uncertainty in volume starts with a one, round it to 2 Sig. Digits. If it starts with a 2 or larger digit, round to one significant digit. Always match the decimal place of your volume to the rounded decimal place of the uncertainty.
Show all steps in writing.

1. Emily measures a block and records these measurements:

   Length: 9.30 cm ± .04 cm

   Width 5.79 cm ± .03 cm

   Height 3.15 cm ± .04 cm

2. If Blake were to measure a rectangular block and record the following measurements:

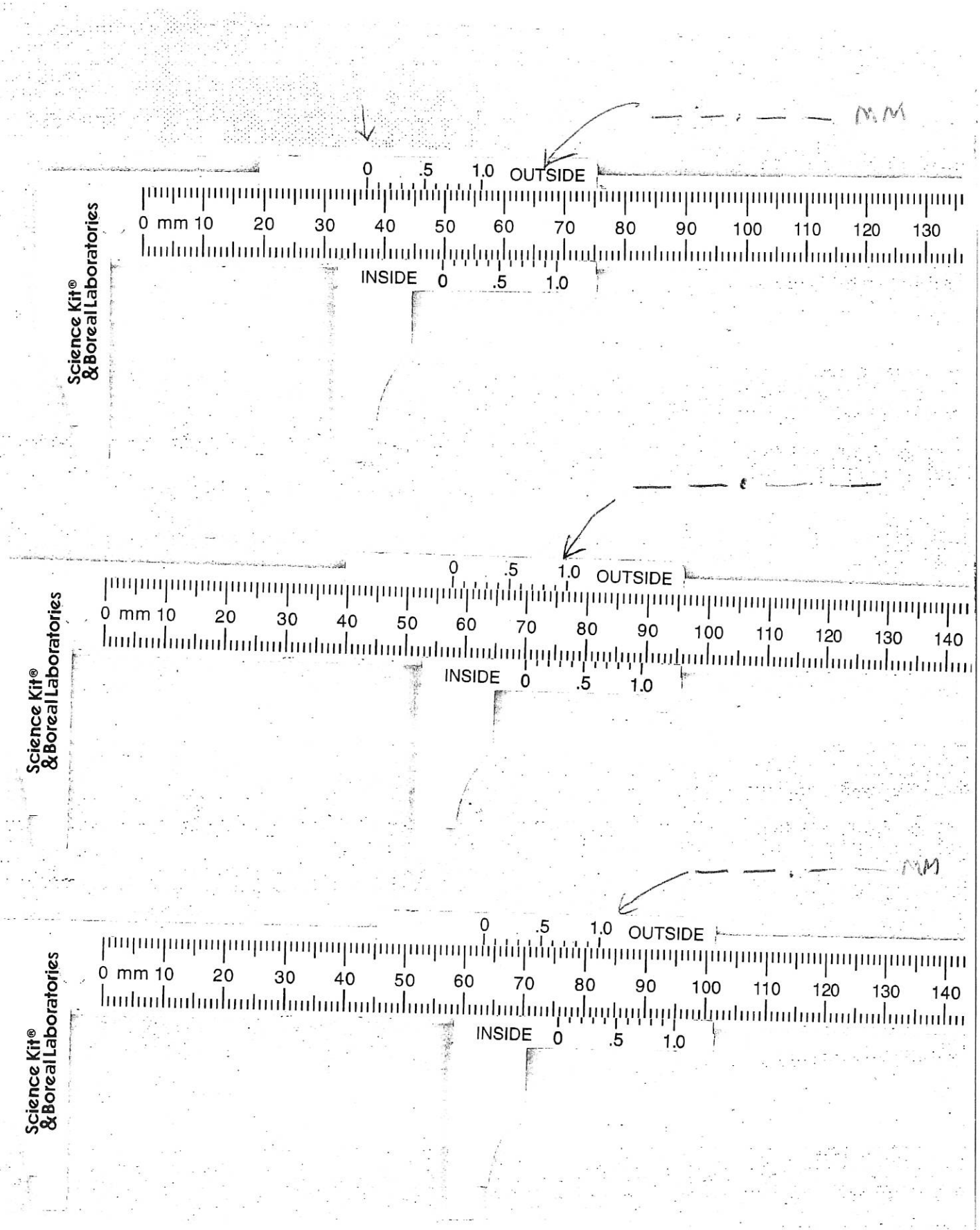
   Length: 7.81 ± .02 cm

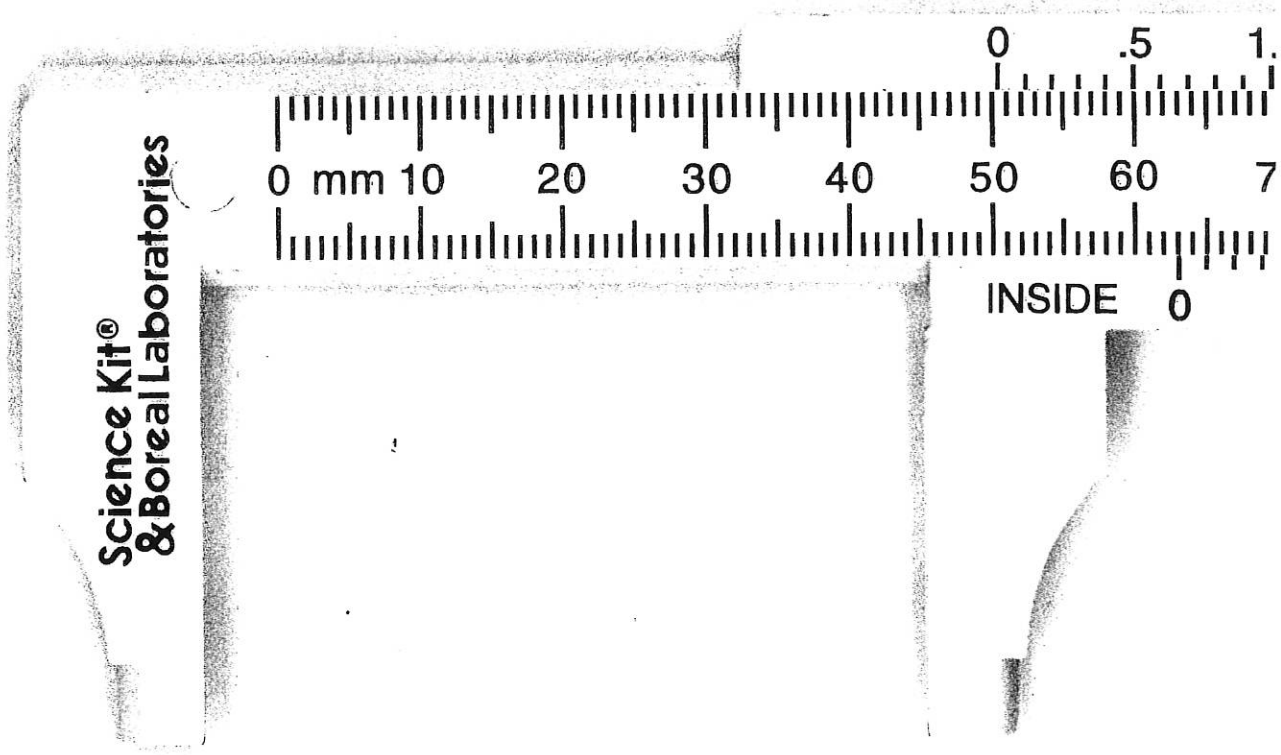
   Width: 4.41 ± .02 cm

   Height: 3.67 ± .02 cm

NAME _____

CALIPER READING
CHAPTER 2

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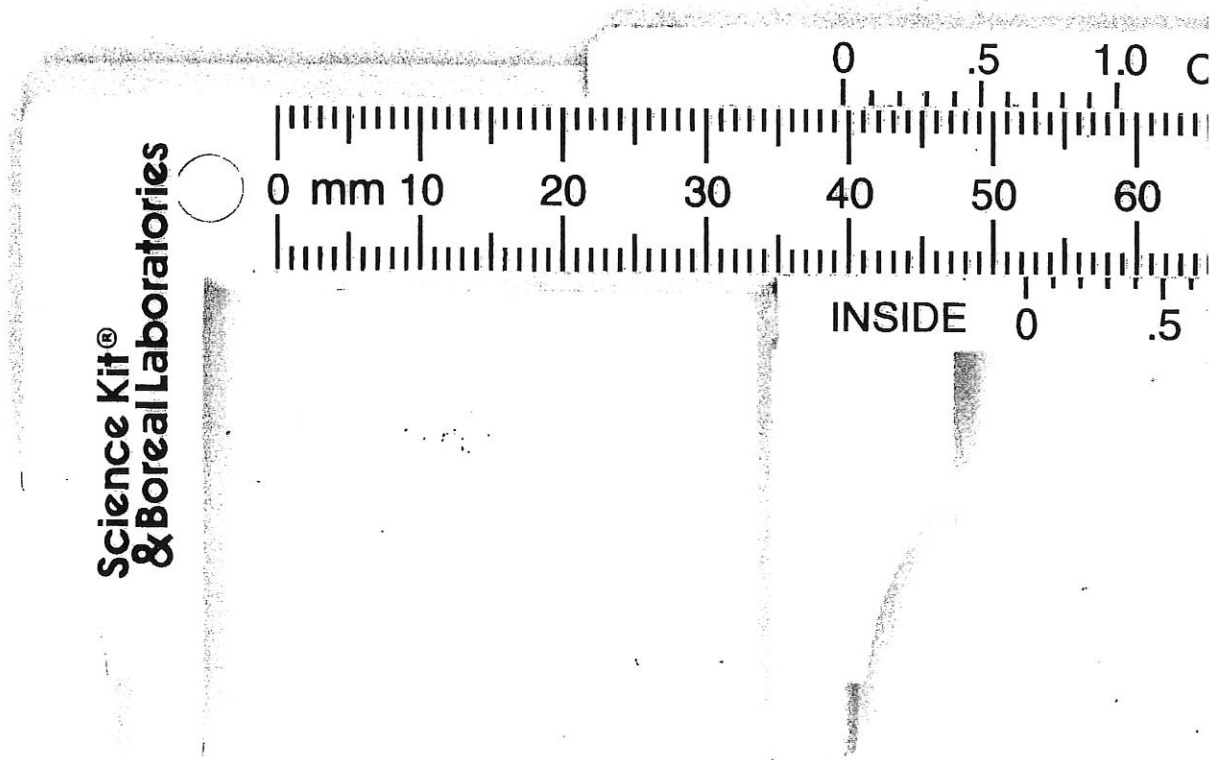
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Relationship name	Basic Equation	Basic Graph	Name of graph