

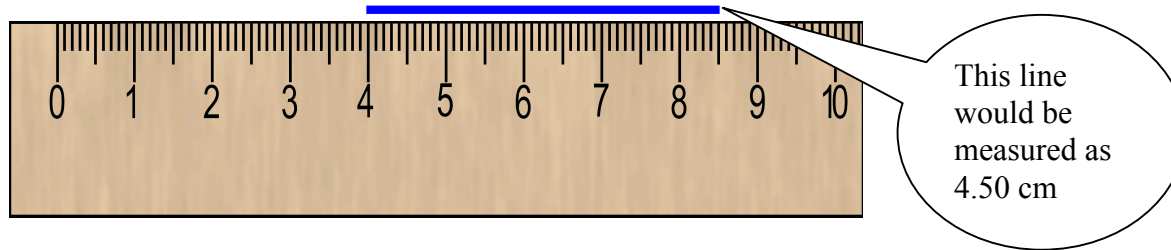
Precision Practice Mini-Lab

PURPOSE:

To learn how to measure according to the IB standards.

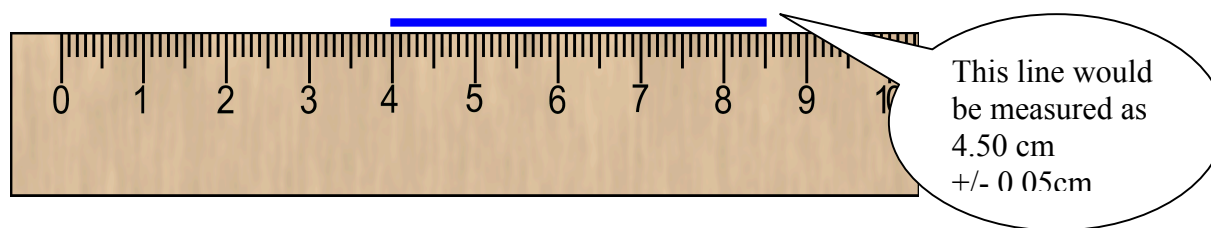
HOW MANY DIGITS DO I INCLUDE?

- Unless there is a digital display, always measure to one spot beyond the smallest unit of **CERTAIN** measurement of the tool.
- For example, if you use a ruler that can accurately measure to the tenth of a centimeter, your measurement would be to the hundredth of a centimeter.



WHAT'S THE UNCERTAINTY?

- **Every measurement has an uncertainty** associated with it, unless it is an exact, counted integer, such as the number of trials performed.
- The lower the accuracy and precision of a measurement instrument are, the larger the measurement uncertainty is.
- The numerical value of a **\pm uncertainty value** tells you the **range of the result**. For example a result reported as 1.23 ± 0.05 means that the experimenter has some degree of confidence that the true value falls in between 1.18 and 1.28
- **To determine uncertainty:**
 - Find the smallest increment of measurement on your measurement device
 - Divide it by two



CONVERSIONS

We'll always and only use metric measurements in class. You should be familiar with the following metric prefixes and be able to convert between them:

Kilo-	Hecto-	Deka-	BASE UNIT	Deci-	Centi-	Milli-	Micro-
k	h	da	--	d	c	m	μ (mu)
10^3	10^2	10	--	10^{-1}	10^{-2}	10^{-3}	10^{-6}
1000	100	10	--	0.1	0.01	0.001	0.000001

Rotate from station to station to practice measuring with accuracy and determining uncertainty.

STATION	MEASURING DEVICE	MEASURES	UNIT(S)	UNCERTAINTY	ITEM	MEASUREMENT OF ITEM	CONVERT TO:
1	Gram Scale				White beans		mg
1	Meter Stick	Length			Lobster length		mm
2	Ruler				Leaf width		m
2	Stop Watch				Reaction time (start-stop)		ms
3	Glass thermometer				Room		Nothing ☺
3	Metal thermometer				Water		Nothing ☺
4	10 graduated cylinder	Volume			Green water		L
4	100 graduated cylinder				Green water		L
5	500 graduated cylinder				Green water		L
5	1000 graduated cylinder				Water		L
6	100 beaker				Water		L
6	250 beaker				Water		L
7	1000 beaker				Yellow water		L
7	250 flask				Green water		L
8	400 flask				Green water		L
8	1000 flask				Green water		L