Good Measurements

• How close to the “true” value are your measurements & calculations?
• All measurements are subject to error!
• The best measurements are both **accurate** AND **precise**!!!

  – **Accuracy** – Degree of closeness of a measured (or calculated) quantity to its actual value.
  – **Precision** – The degree to which further measurements or calculations show the same, or similar, results.

Accuracy question

• Measurements (x2):
  35.8 ml & 37.2 ml

• True Value = 36.0 ml

• Which is more accurate?
Precision

Precise? Yes or No

Precise? Yes or No

Precision question

• Measurements (x4):
  110 g, 109 g, 111 g, & 110 g

• True Value = Doesn’t Matter

• Are these precise?

Measuring Using a Balance

• Technology has made this a no brainer!
• Record to 2 Decimals
• To make sure you get accurate results, Zero the Balance before each time.

Measuring Using a Meter Stick

• NEVER start measuring from the end of the meter stick.
• Accurate measurements are read to the smallest available unit... then estimate on the next place value.
• Subtract your initial starting value from your final value to get the correct measurement
Measuring Using a Graduated Cylinder

• Choose the correct graduated cylinder
• Measure from the bottom of the meniscus
• Accurate measurements should be read to the unit and rounded to the next place value

General Rule

• The general rule is you want to record using the graduations on the device (reading the units), then estimate one more digit.

• If everyone in the room measured something using the same device...how many digits could be different?

Precision & Accuracy Review

Accurate & Precise
Accurate / Not Precise
Precise / Not Accurate
Not Precise / Not Accurate

Remember - The best measurements are both accurate AND precise!!!