<u>Significant Digits</u>

Consider your Bounce that Ball lab: (you used a metre stick with cm marking)

52.5789215 cm

not a reasonable measurement

* way too much guessing

52.6 cm

or 53 cm   might be more reasonable.

When you record a measurement you make a guess about the last digit. The other digits are certain. (uncertain)

[When counting significant digits, count the <u>certain</u> digits and the <u>ONE</u> uncertain digit.

Basic Skill Sheet:

17.   2.9910 m   ~▷ 5 sd
      Certain uncertain

19.   0.00670 kg   ~▷   3 sd
      Certain uncertain
      leading zeroes (not significant)

20.   809 g   ~▷   3 sd
      Certain uncertain

18.   5600 km   ~▷ (2)3 or 4 sd
      ? ? ?
      (depends on the precision of the measuring instrument)

A better way to express this measurement is to use scientific notation.

Using scientific notation clearly indicates the # of sds.

5.6×10^3 km → 2 sd
Certain uncertain

5.60×10^3 km ~▷ 3 sd
uncertain

5.600×10^3 km → 4 sd

Calculations with Significant Digits

Addition & Subtraction

$$
\begin{array}{rl}
125.1\underline{3} & g \\
2.\underline{5} & g \\
+\quad 3\underline{9} & g \\
\hline
16\underline{6}3 & g
\end{array}
$$

Round the final answer to the least precise place value.

↑ You can only have ONE uncertain digit

$\approx 167 g$

Multiplication and Division

$$
\begin{array}{rl}
123.\underline{2} & cm \quad (4sd) \\
\times \quad 4.\underline{1} & cm \quad (2sd) \\
\hline
1232 & \\
4928 & \\
\hline
5\underline{0}5.12 & cm^2
\end{array}
$$

When multiplying or dividing, round the final answer to the least # of significant digits used in the calculation.

$510\ cm^2 \quad 5.1 \times 10^2\ cm^2 \quad (2sd)$

Basic Skill Sheet:

21. $\dfrac{2.674\ km}{2.0\ m} = 1.337$

　　 2sd

　　　　$\doteq 1.3$

22. $5.25 L \times 1.3 L = 6.825\ L^2$

　　　　　2sd

　　　　$\doteq 6.8\ L^2$

What if you wanted to round $6.825 L^2$ to 3sd?

$6.825 L^2 \xrightarrow{3sd} 6.82\ L^2$

(round to even #)

$6.835 L^2 \xrightarrow{3sd} 6.84\ L^2$

23. $9.0\ cm + 7.66\ cm + 5.44\ cm = 22.10\ cm$

　　　　　　　　　　　$= 22.1\ cm$

24. $10.07\ g - 3.1\ g = 6.97\ g$

　　　　　　　$\doteq 7.0\ g$