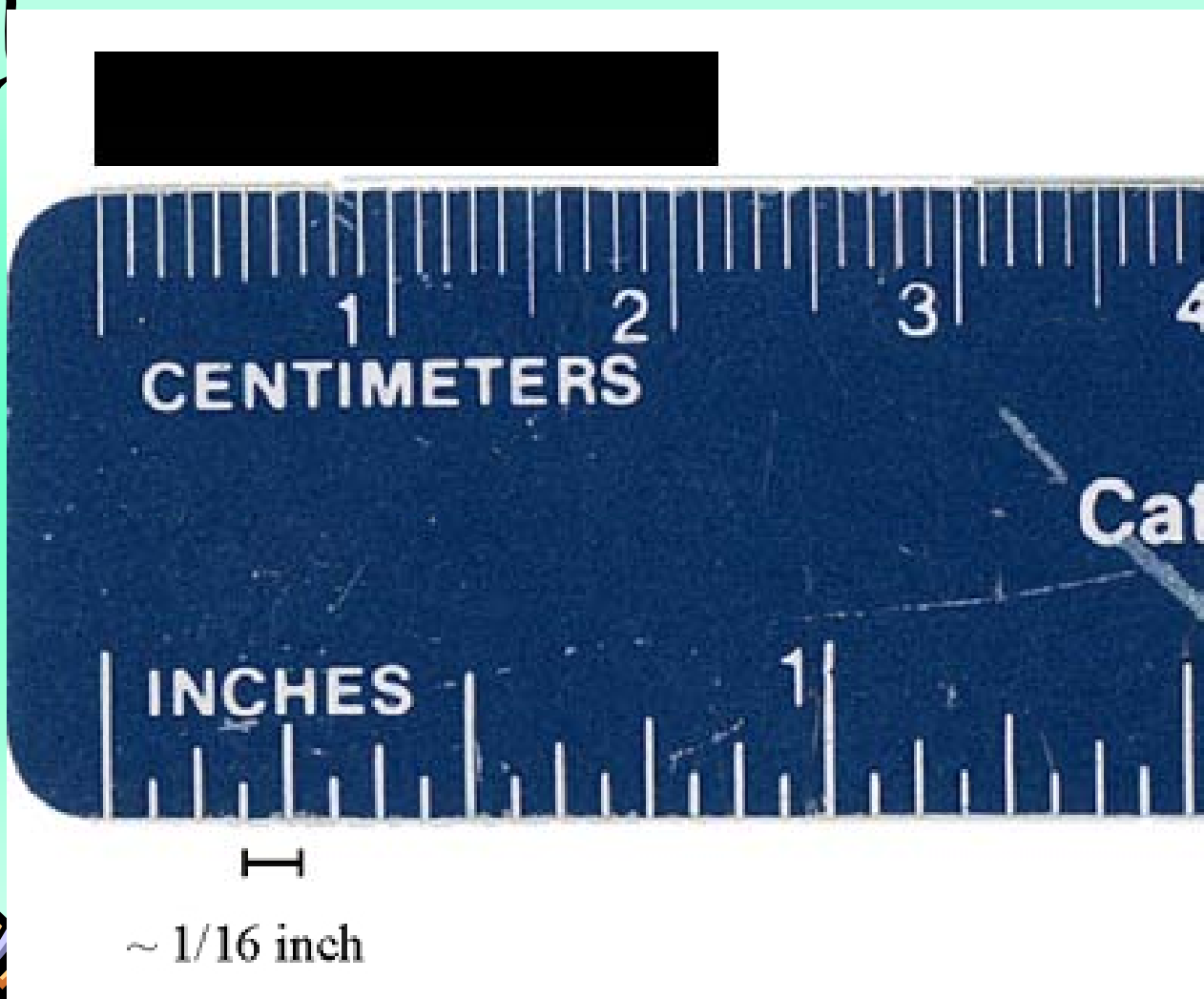


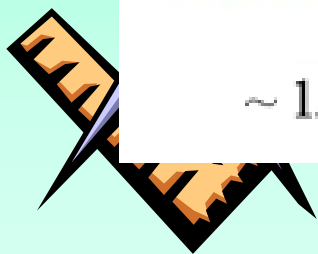
Notes 1 - Significant Figures and Rounding



Significant Figures and Measurements



We record the digits we measure, plus one more that we can estimate.



Significant Figures

- Any digit that is not zero is significant

1.234 kg 4 significant figures

- Zeros between nonzero digits are significant

606 m 3 significant figures

- Zeros to the left of the first nonzero digit are **not** significant

0.08 L 1 significant figure

- If a number is greater than 1, then all zeros to the right of the decimal point are significant

2.0 mg 2 significant figures

- If a number is less than 1, then only the zeros that are at the end and in the middle of the number are significant

0.00420 g 3 significant figures



How many significant figures are in each of the following measurements?

24 mL

2 significant figures

3001 g

4 significant figures

0.0320 m³

3 significant figures

6.4 x 10⁴ molecules

2 significant figures

560 kg

2 significant figures



Significant Figures

Addition or Subtraction

The answer cannot have more digits to the right of the decimal point than any of the original numbers.

$$\begin{array}{r} 89.332 \\ +1.1 \\ \hline 90.432 \end{array} \leftarrow \begin{array}{l} \text{one significant figure after decimal point} \\ \text{round off to 90.4} \end{array}$$

$$\begin{array}{r} 3.70 \\ -2.9133 \\ \hline 0.7867 \end{array} \leftarrow \begin{array}{l} \text{two significant figures after decimal point} \\ \text{round off to 0.79} \end{array}$$

If you round off to a "5", if the next digit is ODD, round up. If it is EVEN, round down (leave it)!

Significant Figures

Exact Numbers

Numbers from definitions or numbers of objects are considered to have an infinite number of significant figures

The average of three measured lengths; 6.64, 6.68 and 6.70?

$$\frac{6.64 + 6.68 + 6.70}{3} = 6.67333 = 6.67 = \cancel{7}$$

Because 3 is an exact number

Rounding

Rule 1

If the digit to be dropped is greater than 5, the last retained digit is increased by one. For example,

$$12.773 = 12.8$$



round to
3 sig figs

Rounding

Rule 2

If the digit to be dropped is less than 5, the last remaining digit is left as it is. For example,

$$44.222 = 44.2$$



round to
3 sig figs

Rounding

Rule 3

If the digit to be dropped is 5, and if any digit following it is not zero, the last remaining digit is increased by one. For example,

$$0.277512 = 0.278$$



round to
3 sig figs

Rounding

Rule 4

If the digit to be dropped is 5 and is followed only by zeroes, the last remaining digit is increased by one if it is odd, but left as it is if even. For example,

$$1.76500 = 1.76$$



round to
3 sig figs

$$1.75500 = 1.76$$



round to
3 sig figs