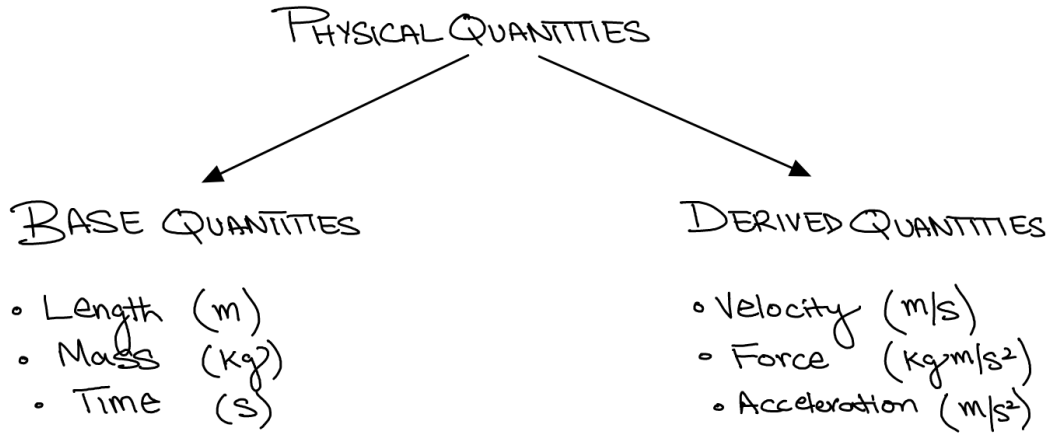


## PHYSICAL QUANTITIES

- Measurable
- Express Physical laws.



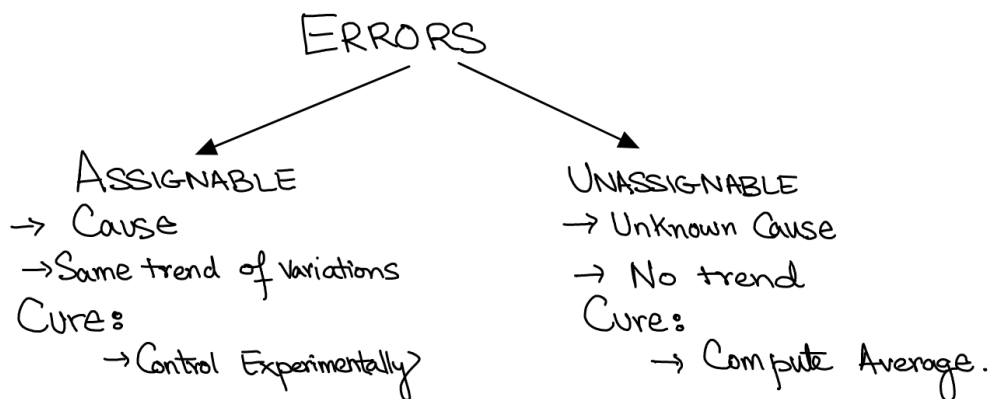
## SCIENTIFIC NOTATION

- Expresses a # in power of ten ( $10^x$ ).
- A non-zero digit to left of decimal.

- Kilo  $10^3$       K
- Giga  $10^9$       G
- Pico  $10^{-12}$     p
- Nano  $10^{-9}$       n
- Femto  $10^{-15}$     f

## ERROR

- STANDARD VALUE - EXPERIMENTAL VALUE.



# SIGNIFICANT FIGURES

- Due to uncertainty
- Standard of writing a numerical value of a measurement.
- All accurately known digits
- First doubtful digit
- Accurate measurements have higher SF.

## RULES OF SIGNIFICANT FIGURES.

- 1) All non-zero digits are significant figs.  
Eg: 3.456 → 4 SF  
12.3456 → 6 SF
- 2) Zeros b/w non-zeros are significant  
Eg: 2306 → 4 SF  
200894 → 6 SF
- 3) Zeros locating position of decimal in #s < 1 not significant.  
Eg: 0.000458
- 4) Final zeros to the right of decimal point are significant.  
Eg: 3.0000
- 5) Zeros that locate decimal point in #s > 1 are not significant.  
Eg: 30000 1 SF  
1400 2 SF.

## ALGEBRA WITH SIGNIFICANT FIGURES.

### DIVISION $\Rightarrow$ MULTIPLICATION.

$$\frac{4.54 \times 2.324}{1.3365} = 7.89447063 = 7.89$$

Note: A factor having smallest # S.Fs is least accurate.

### ADDITION $\Rightarrow$ SUBTRACTION

- least # of decimal places.
- Counting SFs not required.

$$\text{Eg: } 4.345 + 23.51 = 27.855 = 27.86$$

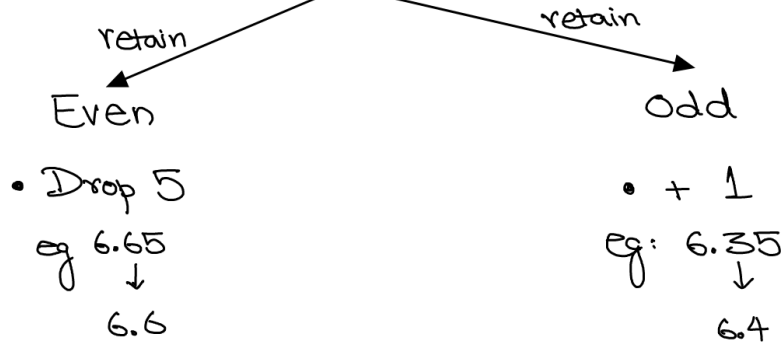
# ROUNDING DATA

## RULES:

1) Digit to drop  $> 5$ , +1 to last digit i.e. to stay and drop the rest to right  
eg:  $3.677 \rightarrow 3.68$

2) Digit to drop  $< 5$ , drop it right away.  
eg:  $6.632 \rightarrow 6.63$

3) Digit to drop = 5



# PRECISION & ACCURACY

## PRECISION

- Least count of instrument.
- Precise means small least count.

## ACCURACY

- Fractional uncertainty in measurement
- Accurate means smaller % error.

TIP: Count more readings to reduce errors.

# DIMENSIONAL ANALYSIS

- Symbol for physical quantity is dimension.
- Derive formulae
- To check homogeneity of formula.

Q The energy of a photon of light of freq  $f$  is given by  $hf$ ;  $h$  is Planck's constant. What are base units of  $h$ ?

$$E = hf$$

$$f = 1/t \Rightarrow 1/s$$

$$E \rightarrow J$$

$$E = F \cdot d \Rightarrow \frac{kgm}{s^2} \cdot m \rightarrow \frac{kgm^2}{s^2}$$

$$\frac{E}{f} = h$$

$$\frac{kgm^2}{s^2} \times \cancel{s} \Rightarrow \boxed{\frac{kgm^2}{s} \rightarrow h}$$