SLE123 Physics for the Life Sciences

Week 1

What is Physics?

DEAKIN COLLEGE
in association with
DEAKIN UNIVERSITY

What is Physics?

General analysis of nature, conducted in order to understand how the universe behaves (Wikipedia)

Motion and interaction of objects

Everything in nature obeys the laws of physics

Prior knowledge for SLE123

Maths skills:
Solve and manipulate algebraic equations
E.g. rearrange to calculate λ

$$E = hc/\lambda$$

Use scientific notation
Significant figures
Unit conversion
Manipulate small and large numbers
Interpreting graphs

Rearranging equations

If equation is:

$$a = \frac{b}{c}$$

Rearrange the equation to create an equation for b

$$b = a \times c$$

Rearrange the equation to create an equation for c

$$c = \frac{b}{a}$$

Many numbers have associated with them a large number of decimal places or zeros.

Rather than listing these in a large string, Scientific Notation (Standard Form) can be used. e.g.

1543,000,000 can be written as

1.543×10^{9} or

0.00000006543 as 6.543×10^{-8}

The number is written with one number to the left of the decimal point and appropriate power of 10

What are the following Number expressed in Scientific Notation.

25

2.5×10^{1}

261,000

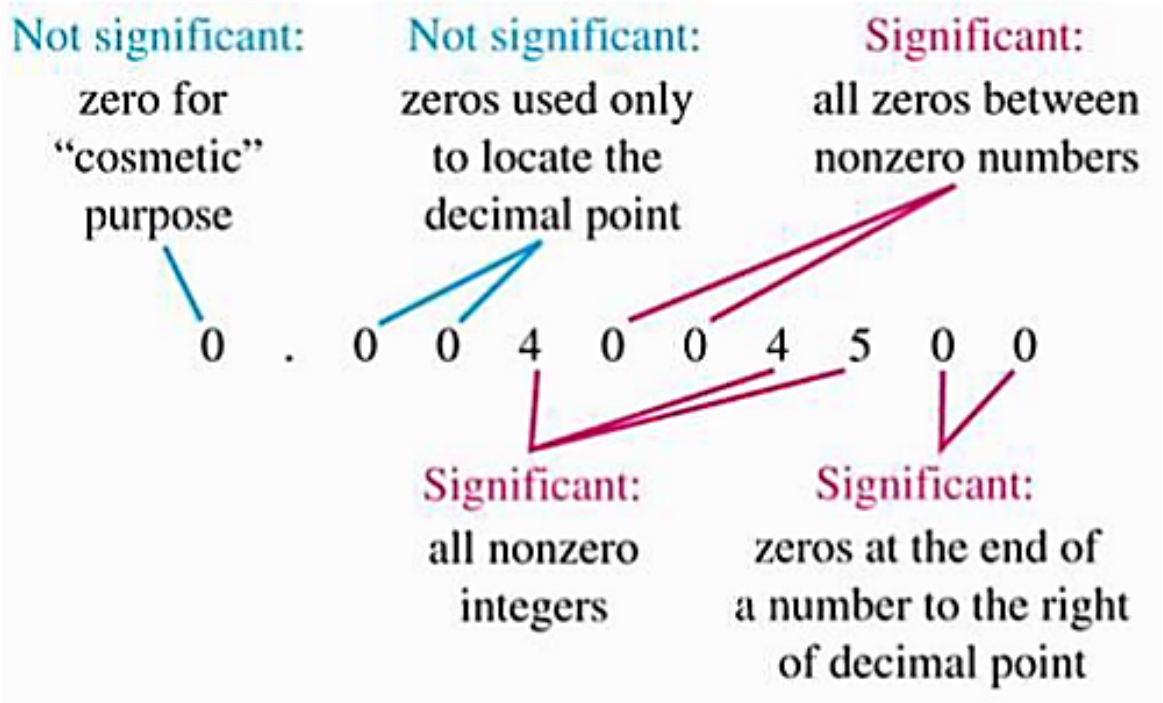
2.61×10^{5}

0.008514

8.514×10^{-3}

Significant Figures

5 Rules for Counting Significant Figures



https://www.youtube.com/watch?feature=player_detailpage&v=Sno64ghj7nA

Significant Figures

$0.03 \rightarrow 1$ significant figure

$0.007\ 5 \rightarrow 2$ significant figure

1500 g $\rightarrow$? significant figures

1.500×10^3 g $\rightarrow$ 4 significant figures

1.50×10^3 g $\rightarrow$ 3 significant figures

1.5×10^2 g $\rightarrow$ 2 significant figures

An officially accepted unit of measure is a standard unit.

The International System of Units (SI)(Systeme International des Unites)

Uses a set of base and derived units to measure the physical world.

SI Units(metric)
- Metres (m)
- Seconds (s)
- Kilograms (kg)

Most other units in physics derived from these
- Eg Newton (N) kg m/s^2

Multiples and Prefixes of Units

Multiple	Prefix	Multiple	Prefix
10^{12}	tera (T)	10^{-1}	deci (d)
10^{9}	giga (G)	10^{-2}	centi (c)
10^{6}	mega (M)	10^{-3}	milli (m)
10^{3}	kilo (k)	10^{-6}	micro (μ)
10^{2}	hecto (h)	10^{-9}	nano (n)
10	deka (da)	10^{-12}	pico (p)

Graphs

Experimenters vary a quantity (the independent variable) and measure another quantity (the dependent variable). One graphs the dependent variable (vertical axis) vs. the independent variable (horizontal axis).

Dependent variable on vertical axis.

Independent variable on horizontal axis.

Graphs

- Always label the axes with both the quantity and its unit. For example, in a graph of position versus time: