

O Level Physics

Tutorial 1: Measurement

Syllabus :

(a) show an understanding that physical quantities typically consist of a numerical magnitude and a unit

(b) recall the following base quantities and their units: mass (kg), length (m), time (s), current (A), temperature (K), amount of substance (mol)

1. (a) State the a unit for each of the following:

- weight
- mass
- length
- speed
- electric charge
- heat
- voltage
- electric current
- electric charge
- amount of oxygen gas
- time
- amount of substance
- temperature

(b) State 6 base units in SI units, and the corresponding quantities. (The unit candela not in the syllabus.)

(c) use the following prefixes and their symbols to indicate decimal sub-multiples and multiples of the SI units: nano (n), micro (μ), milli (m), centi (c), deci (d), kilo (k), mega (M), giga (G), tera (T)

2. Rewrite the following in standard form in SI units without prefixes. E.g. 1 cm means 0.01 m. The letter c in cm is called a prefix, the letter m is the SI unit for length.

1 ng, 2 μ m, 3 mg, 4 cA, 5 dm, 6 kK, 7 Mmol, 8 GHz, 9 Tg

(d) show an understanding of the orders of magnitude of the sizes of common objects ranging from a typical atom to the Earth

3. Write down the orders of magnitude of each of the following :

proton diameter
hydrogen atom diameter
human hair width
human height
diameter of Earth

(e) select and explain the use of appropriate measuring instruments to measure or determine physical quantities listed in 'Summary of key quantities, symbols and units' taking into consideration the range and precision of the instrument

(Will cover in the relevant topics.)

(f) state what is meant by scalar and vector quantities and give common examples of each

4. What is a scalar quantity?

What is a vector quantity?

Give 2 examples of each.

(g) add two vectors to determine a resultant by a graphical method.

5. Scalar can take on physical meanings, like 1 minute, 1 cm, etc.

Vector also, like displacement, force, ...

Let vectors $\mathbf{a}$ and $\mathbf{b}$ represent 2 forces. Vector $\mathbf{a}$ is 4 N to the east, and $\mathbf{b}$ is 3 N to the north. Using a graphical method, find the resultant force $\mathbf{a}+\mathbf{b}$ using a graphical method.

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