PHYSICS DEFINITIONS:

Physical Quantities, Units and Measurement Techniques

Accuracy:
How close the measured value is to the true or accepted value

- How good the instrument is
- Improved when systematic error reduced

Precision:
How close together a group of measurements are to each other

- How good the method/process is
- Improved when random error reduced

Random Error:
Random errors are errors in measurement that lead to measureable values being inconsistent when repeated measures of a constant attribute or quantity are taken

- Unpredictable fluctuations in the readings of a measured apparatus
- Human error (Parallax, reaction time)
- Reduced by making repeated measurements

Systematic Error:
Systematic Errors are biases in measurements which lead to the situation where the mean of many separate measurements differs significantly form the actual value of the measured attribute

- Imperfect calibration of measurement instruments (Zero error)
- Changes in the environment which interferes with the measurement process
- Imperfect methods of observations (Parallax error)
- Estimate based on a mathematical model or physical law
- Error is predictable

Waves

Wave:
A wave is a phenomenon in which energy is transferred through vibrations

Displacement:
Distance of the oscillating particle in a wave from its equilibrium position at any instant

Amplitude:
Maximum displacement of the oscillating particle in a wave from the equilibrium position

Period (T):
Time taken to complete one oscillation of the wave

Frequency (f):
Number of oscillations made by the wave per unit time

Wavelength:
Distance between corresponding points in successive waveforms
(Such as two successive crests, troughs, equilibrium points)

Transverse Wave:
A wave in which particles of the medium move in a direction perpendicular to the direction of travel of the wave

- EM waves
- Ropes
- Water waves

Longitudinal Wave:
A wave in which particles of the medium move in a direction parallel to the direction of travel of the wave

- Sound waves
- Springs

In Phase:
Any 2 points moving in the same direction and have a same speed and the same displacement from the equilibrium point, and they are separated by a wavelength or its multiple are said to be in phase

Wavefronts:
Wavefronts are lines that join all the peaks of a water wave or all identical points of a water wave

Sound

Ultrasound:
Sound of frequency greater than the audible range (Above 20 kHz)

Infrasound:
Sound of frequency lower than the audible range (Below 20 Hz)

Reverberations:
When there are multiple reflections of sound, reverberation occur

EM Spectrum

Electromagnetic Wave:
Produced by the simultaneous vibrations of electric and magnetic fields

Lenses

Principal Axis:
The line passing through the centres of curvature of the lens

Principal Focus: (OR focal point)
A point on the principal axis where rays of light parallel to the principal axis converge

Focal Length:
The horizontal distance between the principal focus and the optical centre of the lens

Optical Centre:
An imaginary point inside a lens which a light ray is able to travel without being deviated

Linear magnification factor:
The ratio of the image size to the object size (could be height or any other corresponding linear measurement)

- *v* larger than *u*, magnification factor is greater than 1
- *u* larger than *v*, magnification factor is less than 1

Convex lenses:
Converging lenses are thicker in the middle than on the outer edges, and will cause light passing through to converge, to bend towards the optical axis.

Concave lenses:
Diverging lenses are thinner in the middle than on the outer edges, and will cause light passing through to diverge, to bend away the optical axis.

Kinematics

Displacement:
Distance moved in a specific direction

Speed:
Rate of change of distance travelled with respect to time

Velocity:
Rate of change of displacement with respect to time

Instantaneous Velocity
Rate of change of displacement at a particular instant of time

Acceleration:
Rate of change in velocity with respect to time

Terminal Velocity:

When the air resistance becomes the same as the weight of the object, and the velocity of the object ceases to increase, the final velocity attained is known as the terminal velocity.

Scalars and Vectors

Scalars

Scalars are quantities that are fully described by a magnitude alone

Vectors

Vectors are quantities that are fully described by both a magnitude and a direction