IB Physics SL Y2 – Paper 1 and Paper 2 Review – Topic 1 (Physics and physical measurement)

Name: ____ Date: _____________________ Period: _______

Objectives:
1.1 The realm of physics
1.2 Measurement and uncertainties
1.3 Vectors and scalars

1.1.1 State and compare quantities to the nearest order of magnitude.

1.1.2 State the ranges of magnitude of distances, masses and times that occur in the universe, from smallest to greatest.

Distances: from 10^{-15} m to 10^{+25} m (sub-nuclear particles to extent of the visible universe).
Masses: from 10^{-30} kg to 10^{+50} kg (electron to mass of the universe).
Times: from 10^{-23} s to 10^{+18} s (passage of light across a nucleus to the age of the universe).

1.1.3 State ratios of quantities as differences of orders of magnitude.

For example, the ratio of the diameter of the hydrogen atom to its nucleus is about 105, or a difference of five orders of magnitude.

1.1.4 Estimate approximate values of everyday quantities to one or two significant figures and/or to the nearest order of magnitude.

1.2.1 State the fundamental units in the SI system.

Students need to know the following: kilogram, metre, second, ampere, mole and kelvin.

1.2.2 Distinguish between fundamental and derived units and give examples of derived units.

1.2.3 Convert between different units of quantities.

For example: J and kW h, J and eV, year and second, and between other systems and SI.

1.2.4 State units in the accepted SI format.
Students should use m s^{-2} not m/s^2 and m s^{-1} not m/s.

1.2.5 State values in scientific notation and in multiples of units with appropriate prefixes.
For example, use nanoseconds or gigajoules.

1.2.6 Describe and give examples of random and systematic errors.

1.2.7 Distinguish between precision and accuracy.
A measurement may have great precision yet may be inaccurate (for example, if the instrument has a zero offset error).

1.2.8 Explain how the effects of random errors may be reduced.
Students should be aware that systematic errors are not reduced by repeating readings.

1.2.9 Calculate quantities and results of calculations to the appropriate number of significant figures.
The number of significant figures should reflect the precision of the value or of the input data to a calculation. Only a simple rule is required: for multiplication and division, the number of significant digits in a result should not exceed that of the least precise value upon which it depends. The number of significant figures in any answer should reflect the number of significant figures in the given data.

1.2.10 State uncertainties as absolute, fractional and percentage uncertainties.

1.2.11 Determine the uncertainties in results.

1.2.12 Identify uncertainties as error bars in graphs.

1.2.13 State random uncertainty as an uncertainty range (±) and represent it graphically as an "error bar".
Error bars need be considered only when the uncertainty in one or both of the plotted quantities is significant. Error bars will not be expected for trigonometric or logarithmic functions.

1.2.14 Determine the uncertainties in the gradient and intercepts of a straight-line graph.
Only a simple approach is needed. To determine the uncertainty in the gradient and intercept, error bars need only be added to the first and the last data points.

1.3.1 Distinguish between vector and scalar quantities, and give examples of each.
A vector is represented in print by a bold italicized symbol, for example, **F**.

1.3.2 Determine the sum or difference of two vectors by a graphical method.
Multiplication and division of vectors by scalars is also required.

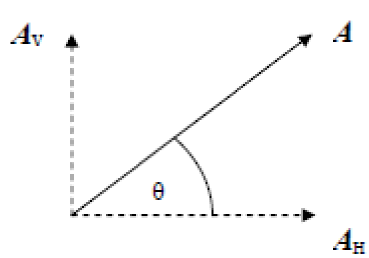
1.3.3 Resolve vectors into perpendicular components along chosen axes.
For example, resolving parallel and perpendicular to an inclined plane.

If $y = a \pm b$

then $\Delta y = \Delta a + \Delta b$

If $y = \frac{ab}{c}$

then $\frac{\Delta y}{y} = \frac{\Delta a}{a} + \frac{\Delta b}{b} + \frac{\Delta c}{c}$



$A_H = A\cos\theta$
$A_V = A\sin\theta$