IB Physics SL Y2 – Paper 1 and Paper 2 Review – Topic 5 (Electric Current)

Name: _____ Date: _____ Period: _____

Objectives:
5.1 Electric potential difference, current, and resistance
5.2 Electric circuits

5.1.1 Define electric potential difference.

5.1.2 Determine the change in potential energy when a charge moves between two points at different potentials.

5.1.3 Define the electronvolt.

5.1.4 Solve problems involving electric potential difference.

5.1.5 Define electric current.
It is sufficient for students to know that current is defined in terms of the force per unit length between parallel current-carrying conductors.

5.1.6 Define resistance.
Students should be aware that R = V/I is a general definition of resistance. It is not a statement of Ohm's law. Students should understand what is meant by resistor.

5.1.7 Apply the equation for resistance in the form $R = \frac{\rho L}{A}$ where ρ is the resistivity of the material of the resistor.
For example, students should be able to draw I–V characteristics of an ohmic resistor and a filament lamp.

5.1.8 State Ohm's law

5.1.9 Compare ohmic and non-ohmic behaviour.

5.1.10 Derive and apply expressions for electrical power dissipation in resistors.

5.1.11 Solve problems involving potential difference, current and resistance.

5.2.1 Define electromotive force (emf).

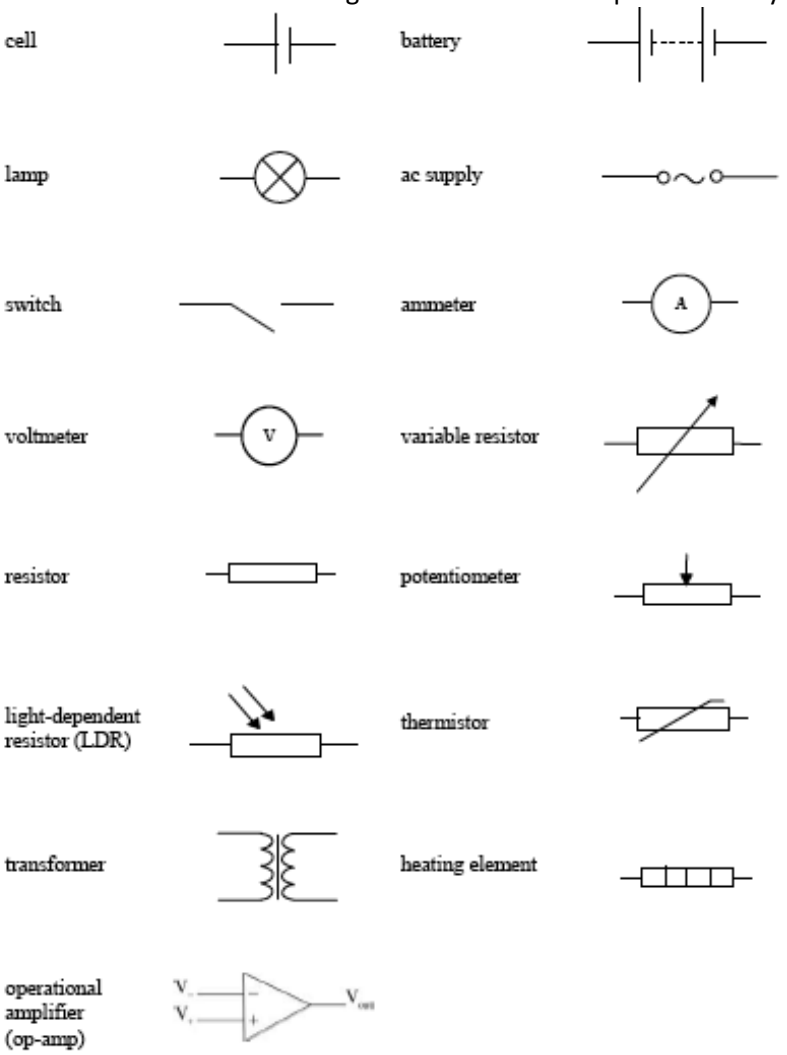
5.2.2 Describe the concept of internal resistance.

5.2.3 Apply the equations for resistors in series and in parallel.

This includes combinations of resistors and also complete circuits involving internal resistance

5.2.4 Draw circuit diagrams.

Students should be able to recognize and use the accepted circuit symbols.



5.2.5 Describe the use of ideal ammeters and ideal voltmeters.

5.2.6 Describe a potential divider

5.2.7 Explain the use of sensors in potential divider circuits.

Sensors should include light-dependent resistors (LDRs), negative temperature coefficient (NTC) thermistors and strain gauges.

5.2.8 Solve problems involving electric circuits.

Students should appreciate that many circuit problems may be solved by regarding the circuit as a potential divider. Students should be aware that ammeters and voltmeters have their own resistance.

Formula Sheet:

$Ve = \frac{1}{2}mv^2$

$I = \frac{\Delta q}{\Delta t}$

$R = \frac{V}{I}$

$R = \frac{\rho L}{A}$

$P = VI = I^2R = \frac{V^2}{R}$

$\mathcal{E} = I(R + r)$

$R = R_1 + R_2 + \cdots$

$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$

V: potential difference (V or JC^{-1})
e:elementary charge/charge of an electron (1.6×10^{-19} C)
I: current (A)
Δq: charge (C)
R: resistance (ohms, Ω)
ρ:resistivity (Ωm)
L: length of conductor/wire (m)
A: cross-sectional area of conductor/wire (m^2)
P: power (W or Js^{-1})
ε:emf (V)
r: internal resistance (Ω)