

Section 2: Electricity

- a) Units
- b) Mains electricity
- c) Energy and potential difference in circuits
- d) Electric charge

a) Units

Students will be assessed on their ability to:

- 2.1 use the following units: ampere (A), coulomb (C), joule (J), ohm (Ω), second (s), volt (V), watt (W).

b) Mains electricity

Students will be assessed on their ability to:

- 2.2 understand and identify the hazards of electricity including frayed cables, long cables, damaged plugs, water around sockets, and pushing metal objects into sockets
- 2.3 understand the uses of insulation, double insulation, earthing, fuses and circuit breakers in a range of domestic appliances
- 2.4 understand that a current in a resistor results in the electrical transfer of energy and an increase in temperature, and how this can be used in a variety of domestic contexts
- 2.5 know and use the relationship:
power = current \times voltage
$$P = I \times V$$

and apply the relationship to the selection of appropriate fuses
- 2.6 use the relationship between energy transferred, current, voltage and time:
energy transferred = current \times voltage \times time
$$E = I \times V \times t$$
- 2.7 understand the difference between mains electricity being alternating current (a.c.) and direct current (d.c.) being supplied by a cell or battery.

c) Energy and potential difference in circuits

Students will be assessed on their ability to:

- 2.8 explain why a series or parallel circuit is more appropriate for particular applications, including domestic lighting
- 2.9 understand that the current in a series circuit depends on the applied voltage and the number and nature of other components
- 2.10 describe how current varies with voltage in wires, resistors, metal filament lamps and diodes, and how this can be investigated experimentally
- 2.11 describe the qualitative effect of changing resistance on the current in a circuit
- 2.12 describe the qualitative variation of resistance of LDRs with illumination and of thermistors with temperature
- 2.13 know that lamps and LEDs can be used to indicate the presence of a current in a circuit

- 2.14 know and use the relationship between voltage, current and resistance:
voltage = current \times resistance

$$V = I \times R$$

- 2.15 understand that current is the rate of flow of charge
- 2.16 know and use the relationship between charge, current and time:
charge = current \times time

$$Q = I \times t$$

- 2.17 know that electric current in solid metallic conductors is a flow of negatively charged electrons

2.18 understand that:

- **voltage is the energy transferred per unit charge passed**
- **the volt is a joule per coulomb.**

d) Electric charge

Students will be assessed on their ability to:

- 2.19 identify common materials which are electrical conductors or insulators, including metals and plastics
- 2.20 describe experiments to investigate how insulating materials can be charged by friction**
- 2.21 explain that positive and negative electrostatic charges are produced on materials by the loss and gain of electrons**
- 2.22 understand that there are forces of attraction between unlike charges and forces of repulsion between like charges**
- 2.23 explain electrostatic phenomena in terms of the movement of electrons**
- 2.24 explain the potential dangers of electrostatic charges, eg when fuelling aircraft and tankers**
- 2.25 explain some uses of electrostatic charges, eg in photocopiers and inkjet printers.**