## P2.4 Mains electricity and power

### P2.4.1 Household electricity

- Understand the principles of safe practice and recognise dangerous practice in the use of mains electricity
- Explain the difference between direct current (d.c.) and alternating current (a.c.)
- Compare and calculate the potential differences of d.c. supplies and the peak potential difference of a.c. supplies from diagrams of oscilloscope traces
- **(HT) Determine the period and therefore the frequency of a supply from diagrams of oscilloscope traces**
- Remember the frequency and peak potential difference of the UK mains electricity supply
- Describe the structure of two-core and three-core electrical cable
- Evaluate and explain the need to use different cables for different appliances
- Describe the structure and materials used in a three-pin plug and explain how to wire one safely
- Describe the role of fuses or circuit breakers in disconnecting circuits if an electrical fault causes the current to become too great
- Explain how a fuse disconnects a circuit if the current exceeds the rating of the fuse
- Compare the uses of fuses and circuit breakers
- Remember that residual current circuit breakers (RCCBs) work by detecting a difference in the current between the live and neutral wires
- Describe how the earth wire and fuse together protect the wiring of the circuit in appliances with metal cases (unless they are double insulated)

### P2.4.2 Current, charge and power

- Describe the effect of electrical charge flowing through a resistor, and use this idea to explain why filament bulbs waste so much energy
- Consider the factors involved when making a choice of electrical appliances, including efficiency and power
- Explain that the power of an electrical appliance is the rate at which it transforms energy
- Calculate the rate of energy transfer, or power \( P \) from the energy transferred \( E \) and time \( t \)
- Calculate power \( P \) from current flowing through \( I \) and potential difference across \( V \) an appliance
- **(HT) Calculate energy transferred \( E \) from potential difference \( V \) and charge \( Q \)**