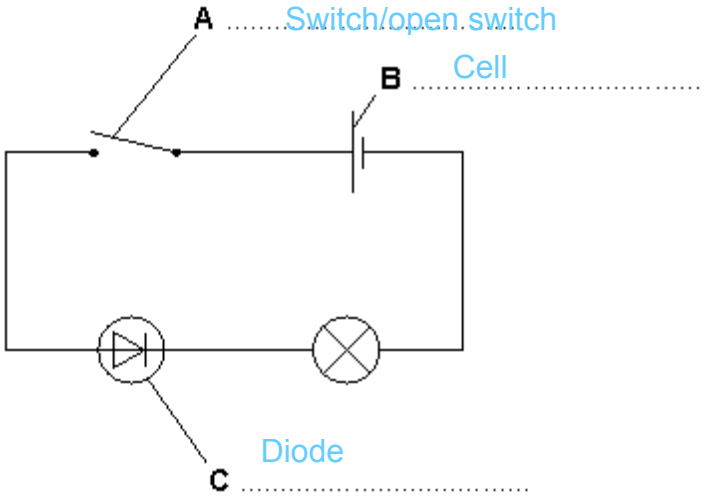
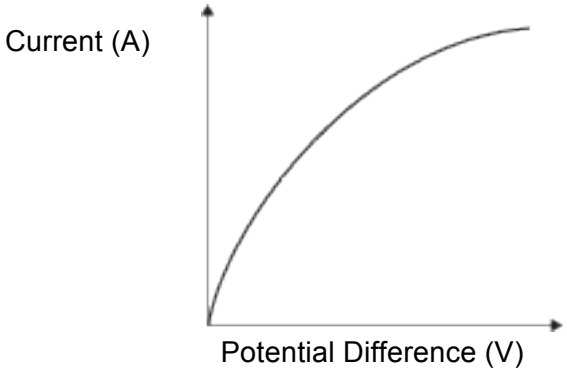
1 Label the components, A, B, and C, in the circuit diagram.



(3 marks)

Total 3 marks

2 The diagram shows the circuit used to obtain the data needed to plot the current–potential difference graph for a filament bulb.



2 (a) (i) What is the meaning of the following terms:

Potential Difference

Work done (energy transferred) per coulomb of charge [1 mark]

Do not write outside the box

Current

The flow of charge or the flow of electrons. [1 mark]

(2 marks)

2 (a) (ii) The resistance of the metal filament inside the bulb increases as the potential difference across the bulb increases.

Explain why.

Metals contain free electrons (and ions) [1 mark]

As temperature of filament increases ions or atoms vibrate faster / with a bigger amplitude or vibrate more [1 mark]

Electrons collide more (frequently) with the ions **or** (drift) velocity of electrons decreases [1 mark]

(3 marks)

2 (a) (iii) The bulb is operating at a potential difference of 12V. Calculate the power of the bulb when the current through it is 2A. Use the correct equation from the Physics Equations Sheet.

The correct equation is P =V x I

12 x 2 [1 mark]

There are usually no marks for writing the correct equation.

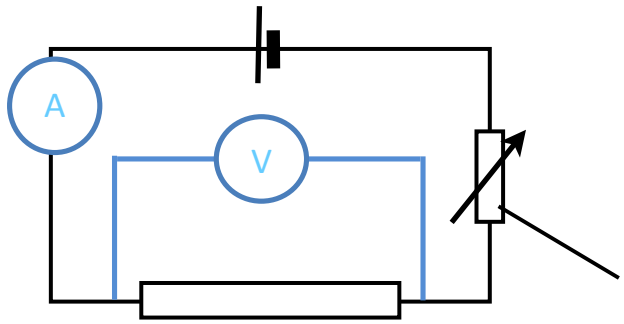
Power = ...24..... W

(3 marks)

Total 8 marks

Do not write outside the box

3 The diagram shows the circuit used to investigate the resistance of a fixed resistor. The ammeter and voltmeter are missing.



Component X

3 (a) (i) Draw the symbols for the ammeter and voltmeter on the diagram in the correct places.

The ammeter can go anywhere along the main circuit.

(2 marks)

3 (a) (ii) What is the purpose of component X in this circuit?

To change/vary the current.

(1 mark)

3 (a) (iii) The resistance of the fixed resistor can be calculated using readings from the voltmeter and the ammeter.

Calculate the resistance of the resistor when the reading on the voltmeter is 6 volts and the current is 0.2 A. **Give the correct unit.**

Use the correct equation from the equation sheet to help you.

Show you working.
V = IR is the correct equation but it needs to be rearranged to R = V/I

6 / 0.2 = [1 mark]

30 [1 mark]

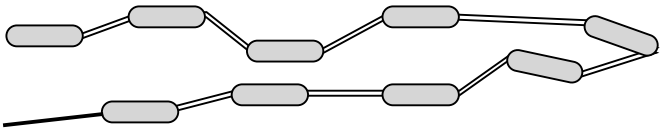
Ohms (or Ω) [1 mark]

Resistance = ...30 Ohms (or Ω)

(3 marks)
Total 6 marks

Do not write outside the box

4 A set of decorative lights is made from nine identical lamps connected in series.



Each lamp is designed to take a current of 0.5 A. The set plugs directly into the 230 V mains electricity supply.

4 (a) (i) Calculate the resistance of **one** of the lamps.

Use the correct equation, from the equations sheet.

Show clearly how you work out your final answer and give the unit.

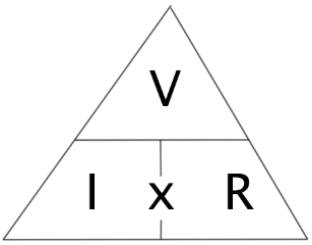
V = IR is the correct equation but it needs to be rearranged to R = V/I

230 / 0.5

460

Ohms (or Ω) [1 mark]

The formula triangle would be useful here.



Resistance = ...460 ohms.....

(3 marks)

4 (a) (ii) What is the total resistance of the set of lights?

4140

or

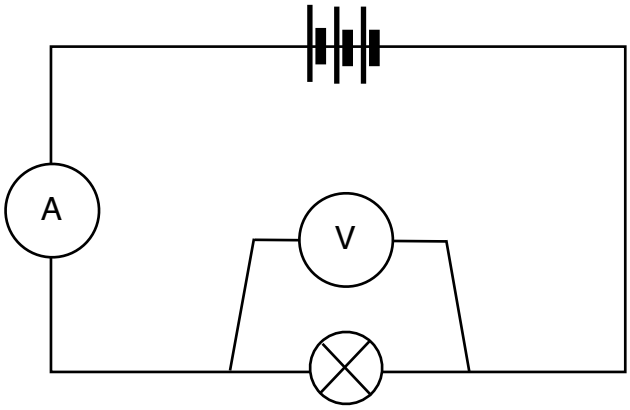
9 x the answer from 4 (a) (i)

(1 mark)

(Total 7 marks)

Do not write outside the box

5 The diagram shows a circuit that lights a lamp. The ammeter measures the current flowing in the circuit.



5 (a) (i) What could be done to decrease the brightness of the **given lamp** in the circuit?

Decrease the number of cells
or
Add a resistor/another component

(1 mark)

5 (a) (ii) In the circuit above, the lamp transfers 36 Joules of energy when 4 coulombs of charge pass through it.

Calculate the reading on the voltmeter.

Use the correct equation from the equation sheet.

Show your working clearly.

The correct equation is V = W / Q (no marks for writing this out)

36 / 4 [1 mark]

9 V [1 mark]

(2 marks)

Do not write outside the box

5 (a) (iii) Calculate the current in the circuit if the charge of 4 coulombs passes the ammeter in 4 seconds.

Calculate the reading on the ammeter.

Use the correct equation from the equation sheet.

Show your working clearly.

The correct equation is I = Q / t (no marks for writing the equation)

4 / 4 [1 mark]

1 A or amp [1 mark]

(2 marks)

(Total 5 marks)

- End of questions -