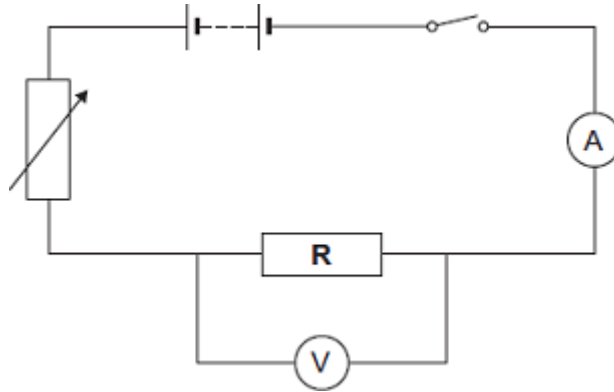


Command Words in Electricity

Describe

Give a detailed account of what you would see occur or a sequence of events. Remember in PAG questions to outline necessary equipment and how this is used.

1. A resistor is a component that is used in an electric circuit.



Describe how a student would use the circuit to take the readings necessary to determine the resistance of resistor **R**.

(6)

2. The diagram shows a fuse.



Describe the action of the fuse in a circuit.

(3)

Command Words in Electricity

Explain

Outline why a process or action occurs, this may involve an initial description

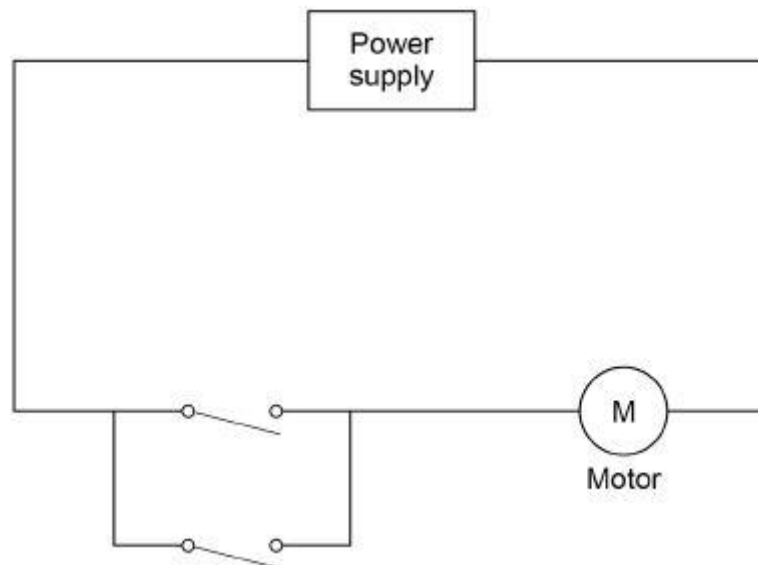
3. **Figure 1** shows a lift inside a building.

Figure 1



Figure 2 shows part of the circuit that operates the lift motor.

Figure 2



The lift can be operated using either of the two switches.

Explain why.

Command Words in Electricity

Calculate

Use mathematics and formulae knowledge to produce an answer, make sure answers are stated to an appropriate number of significant figures and unites are given. This may involve the application of several different formulae.

4. A motor in the lift does 120 000 J of work in 8.0 seconds.

Calculate the power output of the motor in the lift.

Use the equation:

$$\text{Power output} = \frac{\text{work done}}{\text{time}}$$

(2)

5. The power of the washing machine varies between 0.7 kW and 2 kW depending on which part of the wash cycle is operating.

Calculate the maximum current drawn from the mains electricity supply by the washing machine.

The mains electricity supply is at a potential difference of 230 V.

(2)

6. The maximum power output of this solar cell is 0.52 W

When the light intensity is 450 W/m² the cell has an efficiency of 0.15 at the maximum power output.

Calculate the area of the solar cell.

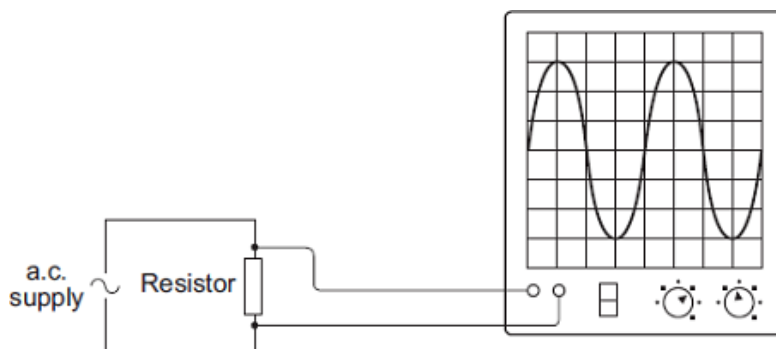
(4)

Command Words in Electricity

Use the diagram or graph to.....

Make sure your examiner can see that you have made use of the graph or figure. Quote values explicitly and/or draw on the graph.

7. The diagram shows the trace produced by an alternating current (a.c.) supply on an oscilloscope.

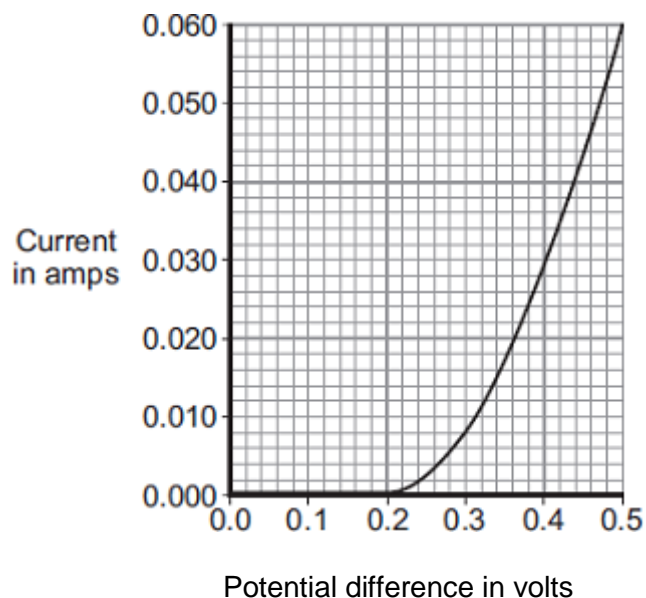


Each horizontal division on the oscilloscope screen represents a time of 0.01s.

- (i) Calculate the frequency of the a.c. supply.

(2)

8. A student obtained a set of data and plotted the graph below.



- (i) At what potential difference did the diode start to conduct an electric current?

(1)

- (ii) Use data from the graph to calculate the resistance of the diode when the potential difference across the diode is 0.3 V.

(3)

Command Words in Electricity

Compare (and contrast)

State the advantages and disadvantages of two or more methods/processes. Each advantage given should link to a disadvantage of the other method/process.

9. **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

(If you see this statement then the examiner is looking for structure linkage of ideas, make sure relevant ideas are together and your argument is organized)

Information about the two electricity generation systems is given in **Figure 2**.

Figure 2

<p>The wind turbine costs £50 000 to buy and install. The hydroelectric generator costs £20 000 to buy and install. The average power output from the wind turbine is 10 kW. The hydroelectric generator will produce a constant power output of 8 kW.</p>
--

Compare the advantages and disadvantages of the two methods of generating electricity.

Use your knowledge of energy sources as well as information from **Figure 2**.

(6)

Command Words in Electricity

Suggest

Present one or several feasible arguments to back up an idea.

10. New research has shown that many people underestimate the hazards of using mains electricity.

It is important that people do understand the hazards of using mains electricity.

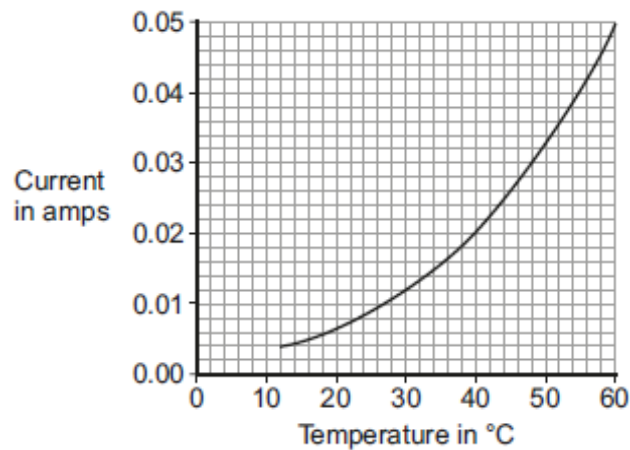
Suggest why.

(1)

11. To get a range of results, hot water at 60 °C was poured into the beaker. The temperature of the water and current through the thermistor were then recorded as the water cooled.

The results of the investigation are shown in **Figure 2**.

Figure 2



- (i) Suggest **one** way the investigation could have been changed to give a wider range of temperatures.

(1)

Command Words in Electricity

Markscheme

Describe

1. any **six** from:

- switch on
- read both ammeter and voltmeter
allow read the meters
- adjust variable resistor to change the current
- take further readings
- draw graph
- (of) V against I
allow take mean
- $R = V / I$
allow take the gradient of the graph

6

2. if current is above 5 A / value of fuse

fuse melts

allow blows / breaks

*do **not** accept exploded*

breaks circuit

3

Explain

3. the switches are in parallel

(so) closing either switch completes the circuit

2

Calculate

4.
$$P = \frac{120\,000}{8.0}$$

2

$P = 15\,000 \text{ (W)}$

5. 8.7

accept an answer that rounds to 8.7

allow 1 mark for correct substitution ie $2000 = 230 \times I$

an answer of 0.0087 or 0.009 or 3.0(4) or 5.65 or 5.7 gains 1 mark

2

Command Words in Electricity

6. $0.15 = \frac{0.52}{\text{total P}}$

total P = 3.47 (W)

area = $\frac{3.47}{450}$

area = 7.7×10^{-3} (m²)

*an answer of 7.7×10^{-3} (m²) scores 4 marks
allow use of student's calculated incorrect total
power for last 2 marking points*

4

7. 25

allow 1 mark for obtaining period = 0.04(s)

2

8. (i) 0.2 (V)

accept any value between 0.20 and 0.21 inclusive

1

(ii) 37.5

allow 1 mark for $I = 0.008$

2

Command Words in Electricity

9. Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should apply a 'best-fit' approach to the marking.

Level 3 (5 – 6 marks):

clear comparison of advantages **and** disadvantages of **each** method

Level 2 (3 – 4 marks):

at least **one** advantage **and** **one** disadvantage is stated for **one** method **and** a different advantage **or** disadvantage is stated for the other method

Level 1 (1 – 2 marks):

at least **one** advantage **or** **one** disadvantage of either method

Level 0 (0 marks):

No relevant information

examples of physics points made in the response

Advantages of both methods:

- both renewable sources of energy
- both have no fuel (cost)
- both have very small (allow 'no') running costs
- no carbon dioxide produced

accept carbon neutral

accept no greenhouse gases

accept doesn't contribute to global warming

Advantages of wind:

- higher average power output

produces more energy is insufficient

Advantages of hydroelectric:

- constant / reliable power (output)
- lower (installation) cost

Disadvantages of wind:

- higher (installation) cost
- variable / unreliable power output
- (may) kill birds / bats

Disadvantages of hydroelectric:

- lower power output
- (may) kill fish or (may) damage habitats
- more difficult to set up (within river)

Disadvantages of both methods:

- (may be) noisy
- visual pollution

ignore payback time unless no other relevant points made

ignore time to build for both

Command Words in Electricity

10. reduce chance of an electric shock

accept to reduce the risk of an accident

accept prevent electric shock

accept prevent electrocution

accept prevent or reduce the risk of an (electrical) fire

accept an electric shock can kill you

accept it can kill you

accept so you can use it safely

1

11. use hotter water (than 60 °C)

accept use boiling water

accept use water at any stated temperature above 60 °C

or

add ice cubes

accept add water at any stated temperature below 12 °C

use different temperatures is insufficient

1