The power of television

1 Modern televisions use small amounts of power.

(a) Which of these describes power?

Put a cross (☒) in the box next to your answer.

(1)

- ☐ **A** distance travelled per second
- ☐ **B** energy transferred
- ☐ **C** energy transferred per second
- ☐ **D** work done

(b) A television is connected to the 230 V mains.
When it is switched on, the current in the television is 0.25 A.

(i) Calculate the power consumption of the television when it is switched on.

(2)

power consumption = ... W

(ii) Describe what is meant by **current**.

(2)

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(c) When the television is switched to standby, the power consumption falls to 0.5 W.

(i) State how this changes the current in the television.

(1)

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(ii) The cost of electricity is 26p per kW h.

Show that the cost of leaving the television on standby for 48 hours is less than 1p.

(3)

(iii) It is cheaper to switch the television off instead of leaving it on standby.

Suggest another reason why it is better not to leave the television on standby.

(1)

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(Total for Question 4 = 10 marks)

Electrostatics

2 A light, polystyrene ball is coated with a thin layer of metal.
Diagram 1 shows the ball on a metal plate.
In diagram 2, the plate has been charged and the ball is rising to hit the earthed lid.

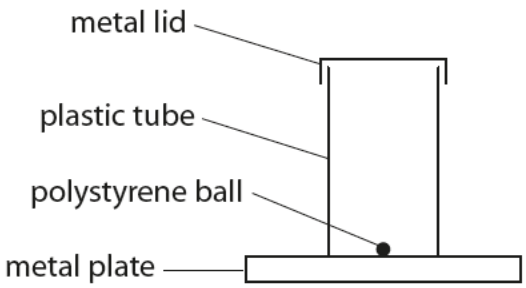


diagram 1

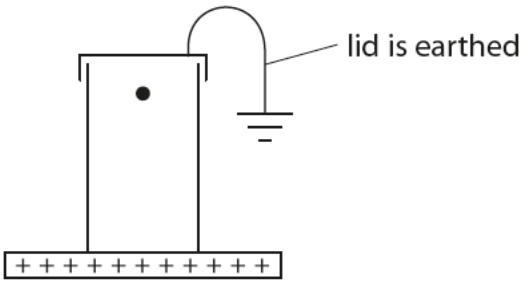


diagram 2

(a) (i) State the sign of the charge on the ball as it moves upwards.

(1)

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(ii) Explain why the ball moves upwards.

(2)

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(b) The ball discharges when it hits the earthed lid.

Explain how the ball loses its charge.

(2)

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(c) The ball continues to move up and down between the charged plate and the earthed lid.

Explain why the ball continues to move up and down.

(2)

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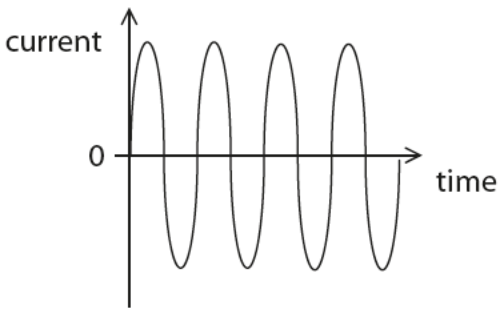
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(d) The current in the wire connected to earth may be described by a graph.

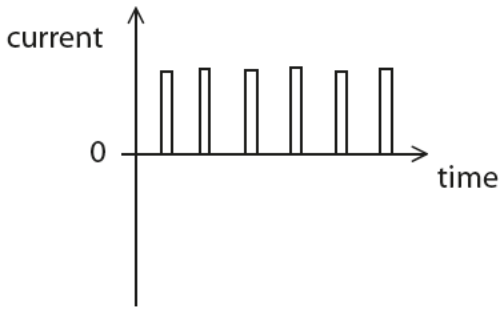
Which of these graphs best shows the current in the earth wire?

Put a cross (☒) in the box next to your answer.

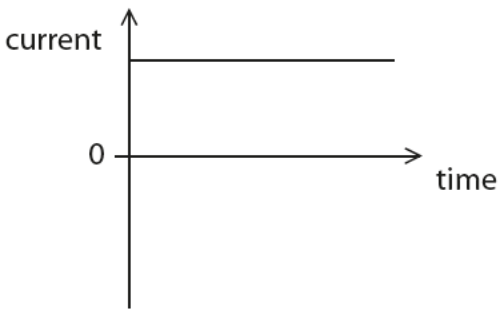
(1)



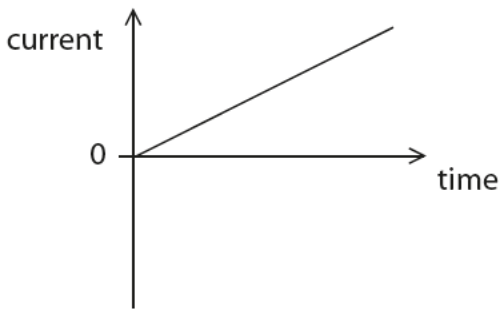
☒ **A**



☒ **B**



☒ **C**

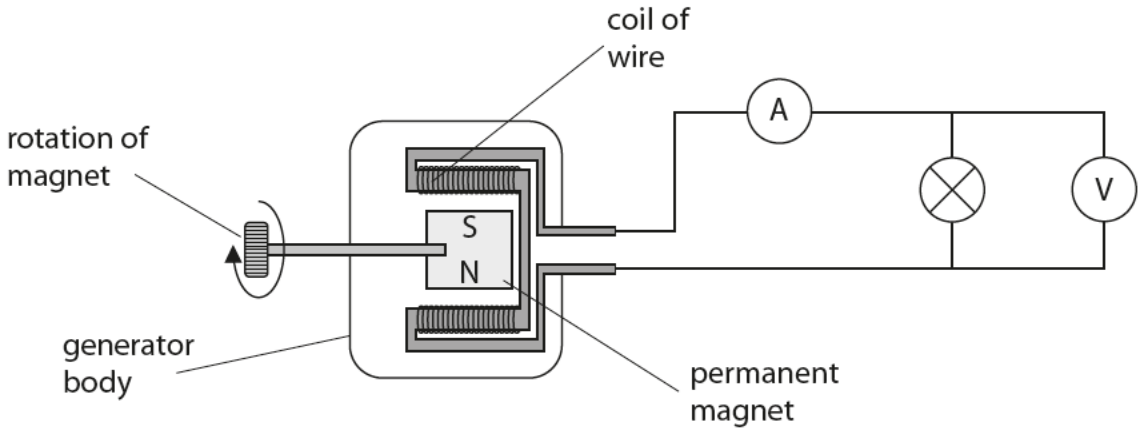


☒ **D**

(Total for Question 2 = 8 marks)

The generation of electricity

3 (a) The diagram shows a simple generator connected to a lamp.



The magnet is made to spin at a steady speed.
The ammeter gives a reading of 1.5 A.
The voltmeter gives a reading of 6 V.

(i) Calculate the output power of the generator.

(2)

output power = ... W

(ii) State two changes to the design of the generator that would give a larger output power for the same speed of rotation.

(2)

1 .....

2 .....

(iii) This generate Typ.
Other types o
Describe the difference between charge movement in a direct current and in an alternating current.

(2)

*(b) The first public power station was built in the centre of New York.

It used generators to supply direct current at 110 V. The cables had to go underground and they could only supply nearby shops and offices.

The electricity was mainly used for electric light.

The development of alternating current generators led to major changes in the way electricity is transmitted and used.

Compare the modern National Grid system with the early system in New York.

(6)

(Total for Question 6 = 12 marks)

4 A battery sends a current through a metal wire.

(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Direct current is movement of charge

(1)

- ☒ **A** backwards and forwards
- ☒ **B** in many directions
- ☒ **C** in one direction
- ☒ **D** up and down

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The particles that flow in the metal wire are

(1)

- ☒ **A** atoms
- ☒ **B** electrons
- ☒ **C** protons
- ☒ **D** neutrons

(b) The current in a wire is 3.7 A.

Calculate the charge that flows into the wire in 13 s.

(2)

charge = ... C

(c) Plastic is an insulator.

A student rubs a piece of plastic with a cloth.

This gives the plastic a negative charge.

(i) Explain how the plastic is charged by the rubbing.

(2)

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(ii) The cloth is also charged when it rubs against the plastic.

Describe the charge on the cloth.

(2)

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(Total for Question 1 = 8 marks)