Transformers

1 The photograph shows a step-down transformer.



(a) Explain why step-down transformers are used in the transmission of electricity in the National Grid.

(2)

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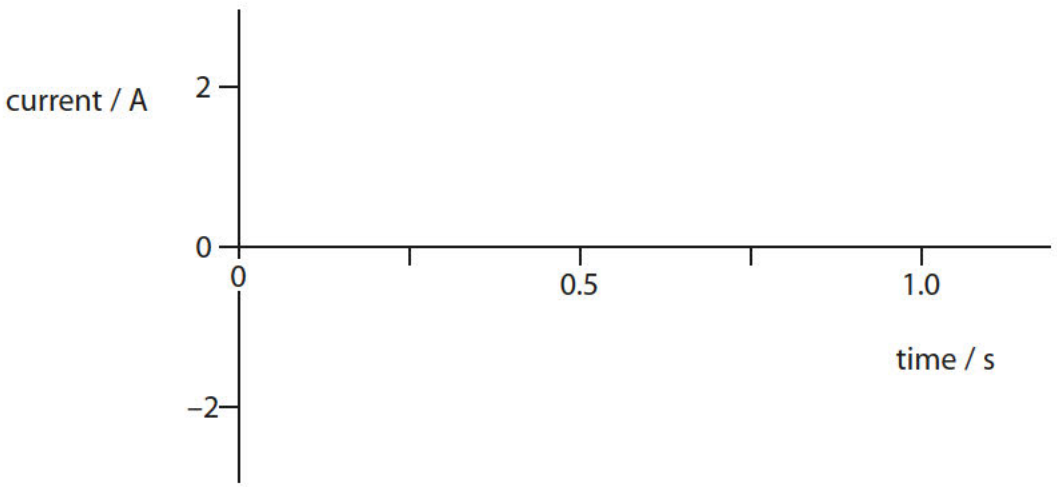
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(b) Transformers need alternating current to work properly.
Sketch a graph of an alternating current with a frequency of 2 Hz.

(2)



(c) A transformer has 2400 turns on the primary coil and 100 turns on the secondary coil.

Calculate the secondary voltage if the primary voltage is 12 V.

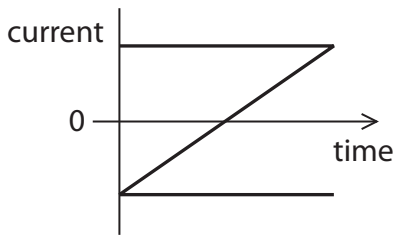
(3)

secondary voltage = ... V

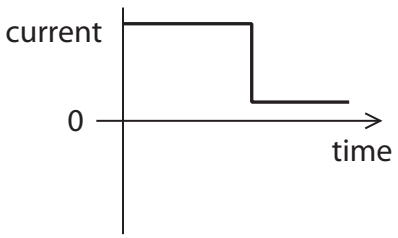
(d) Opening the switch in a circuit produces the opposite magnetic effect to closing the switch.
A scientist connected a switch, a fixed resistor and a battery to the primary coil of a step-up transformer. The scientist also connected a fixed resistor across the secondary coil.
The scientist switched the circuit on and then later switched it off.

Which of these best represents the current in the secondary coil?

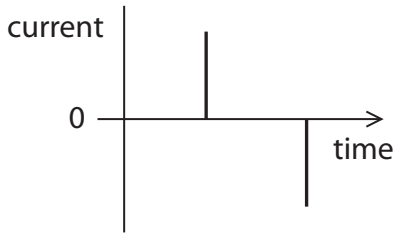
(1)



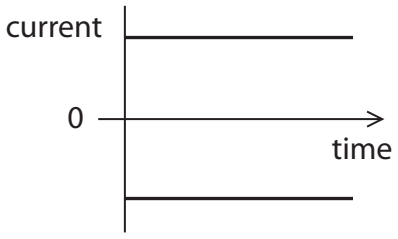
☒ **A**



☒ **B**



☒ **C**



☒ **D**

(Total for Question 2 = 8 marks)

Generating electrical energy

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

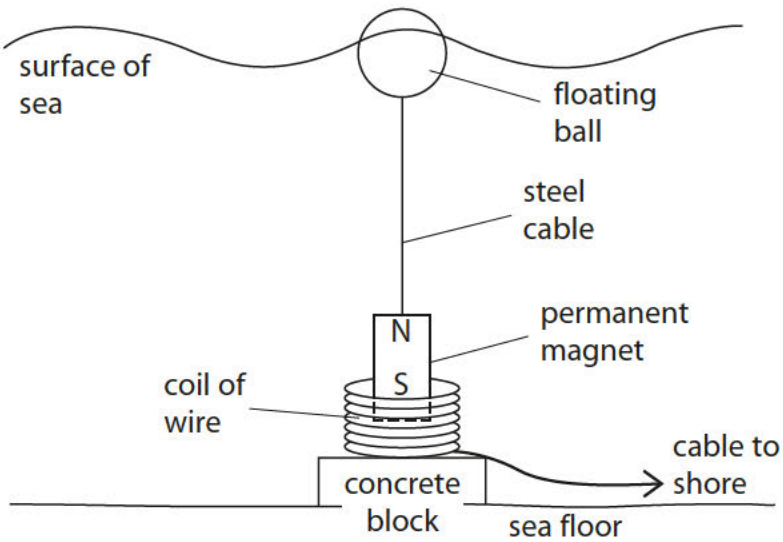
Electrical energy can be measured in

(1)

- ☒ **A** amps
- ☒ **B** kilowatt-hours
- ☒ **C** volts
- ☒ **D** watts

(b) Scientists are looking for new ways to produce electricity from renewable resources.

The diagram shows a model of a device to generate electricity from waves.
The coil is fixed to the concrete block.
The magnet can move freely inside the coil.



(i) Explain how this device produces an electric current.

(3)

(ii) Describe how the device can be altered to increase the electric current.

(2)

*(c) Another way of producing electricity from a renewable source is tidal power.
A dam is built across the mouth of a river.
Tidal water gets trapped behind the dam.



The trapped water is used to generate electricity.

Discuss the advantages and disadvantages of using tidal power rather than other methods of generating electricity.

(6)

(Total for Question 6 = 12 marks)