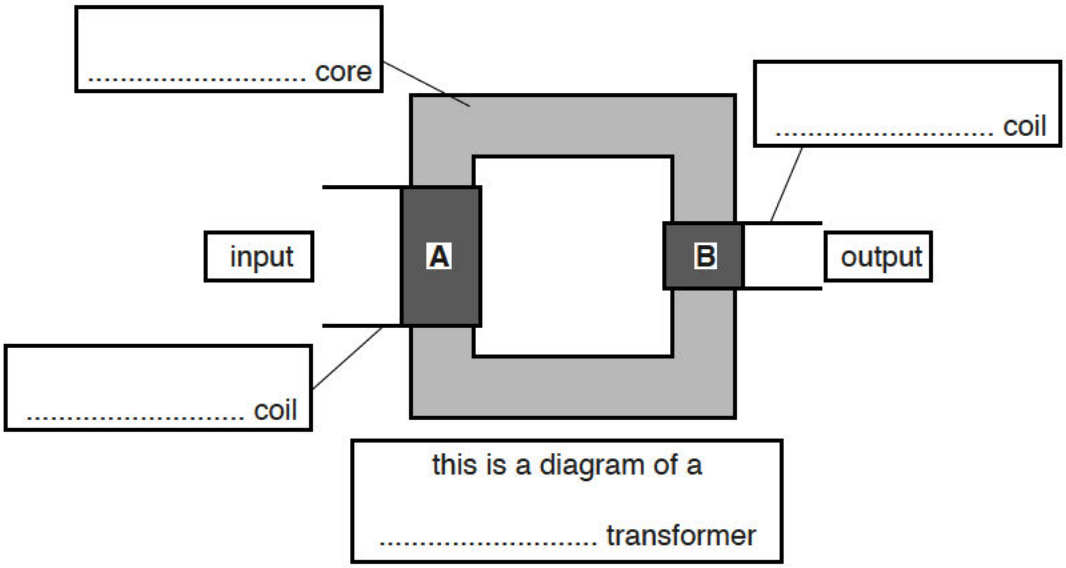
1 Transformers are used in many different appliances.

(a) Look at the simple diagram of a transformer.



A has 4000 turns and **B** has 150 turns.

(i) Complete the **four** labels on the diagram. **[2]**

(ii) The input voltage is 10 000 V.

Calculate the output voltage.

.....

.....

.....

.....

output voltage .....V **[2]**

(b) Transformers are devices that work with alternating current (AC).

Explain why transformers require AC.

.....

.....

..... **[2]**

(c) **Isolating** transformers are an important technological advance.

How have these improved safety in the home?

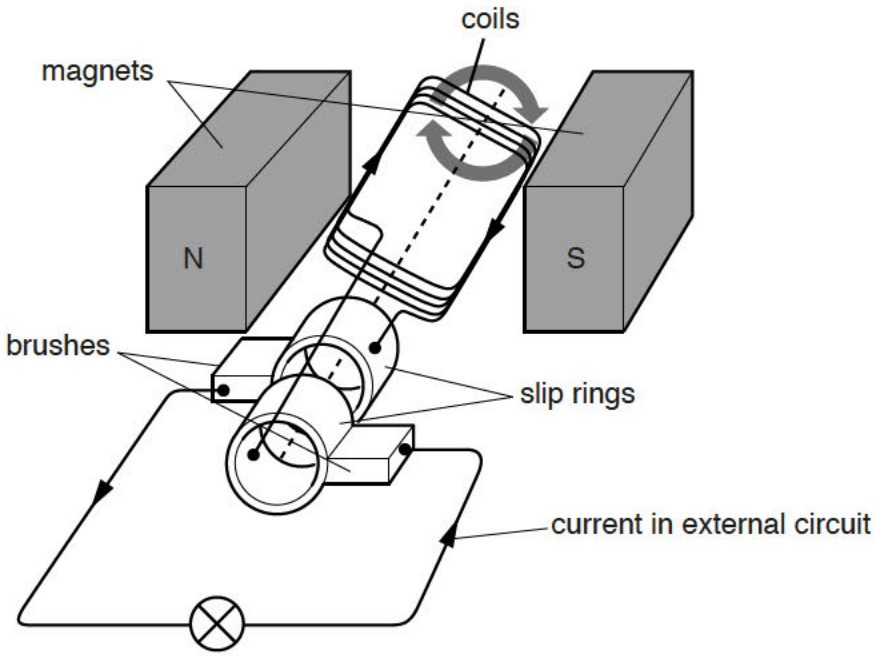
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..... **[2]**

2 AC generators are used to generate electricity.

Here is a diagram of a small AC generator.



(a) Explain how this AC generator works.

Use **all** the labels in the diagram in your explanation.

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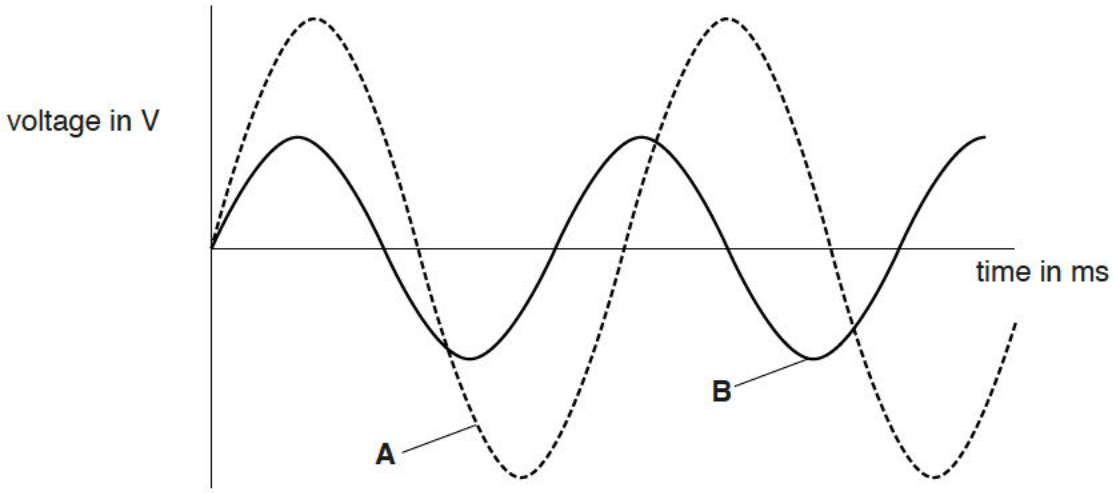
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..... **[2]**

(b) Look at the diagram.



Graph **A** shows the output from this small AC generator.

The generator can also produce the output shown by graph **B**.

Suggest what changes are needed to produce the output shown by graph **B**.

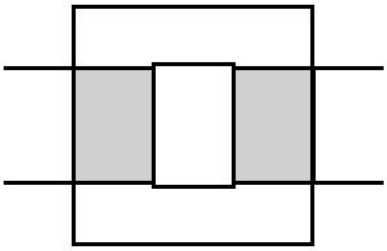
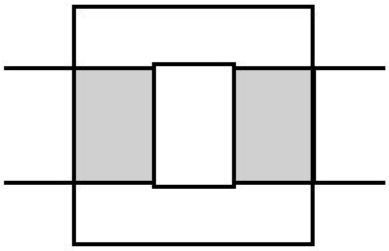
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..... **[2]**

3 This question is about transformers.

Look at the information about two different transformers.

	 transformer A	 transformer B
Type of core	iron	iron
Number of primary turns	500	1000
Number of secondary turns	1000	500
Input voltage	20 volts AC	20 volts AC

Write about the similarities and differences between transformer **A** and transformer **B**.

Include information about how the transformers work, their construction and their output voltages.

The quality of written communication will be assessed in your answer to this question.

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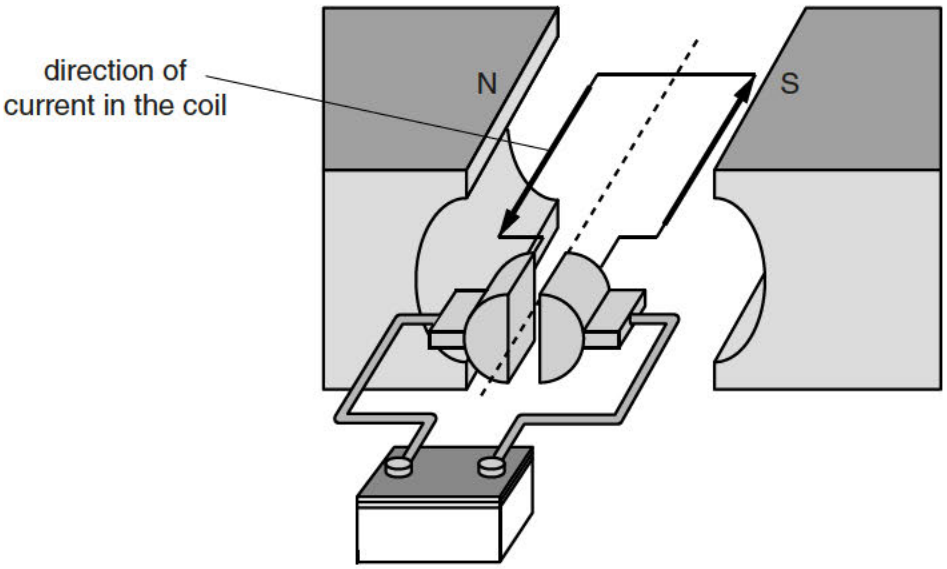
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..... **[6]**

[Total: 6]

4 DC electric motors are used in many different appliances.

(a) Look at the diagram of a DC motor.



Use Fleming's Left Hand rule to predict if the coil will spin **clockwise** (↺) or **anti-clockwise** (↻) in the following arrangements.

The motor is set up as shown in the diagram. It will spin ..... .

The current is reversed. It will now spin ..... .

With the current still reversed, the north and south poles are also reversed.

It will now spin ..... .

[1]

(b) Many motors have different speed settings.

(i) Suggest how the **same** motor can be made to have different speed settings.

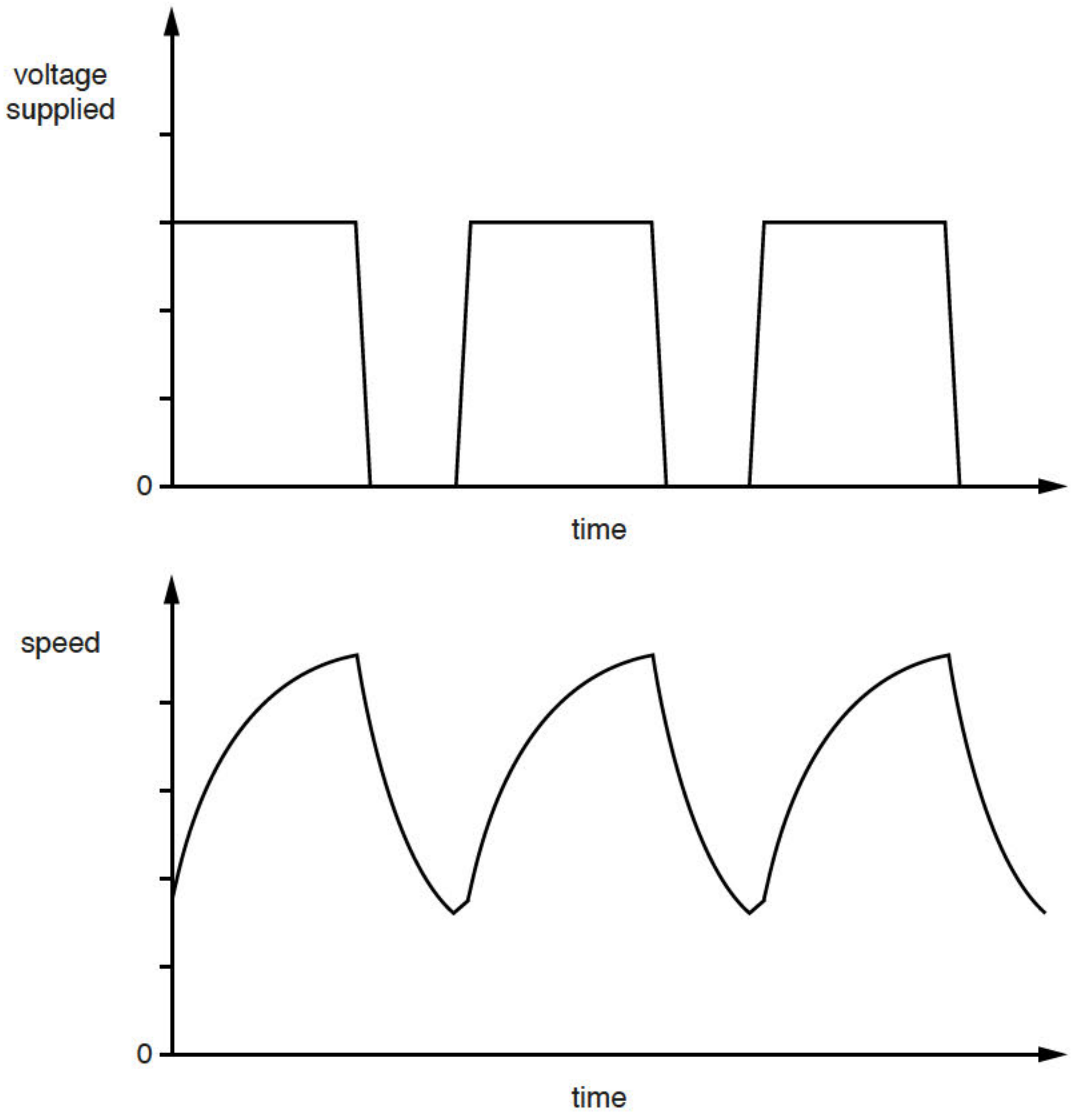
.....

..... **[1]**

(ii) Look at the data on the graphs.

They show how the voltage supplied and the speed of the motor are related.

The supply voltage is switched on **and** off regularly.



Describe what happens to the speed of the motor as the voltage is regularly switched on and off.

.....

.....

..... **[2]**

(iii) Suggest how the speed of the motor will vary if the supply voltage is switched on and off more frequently.

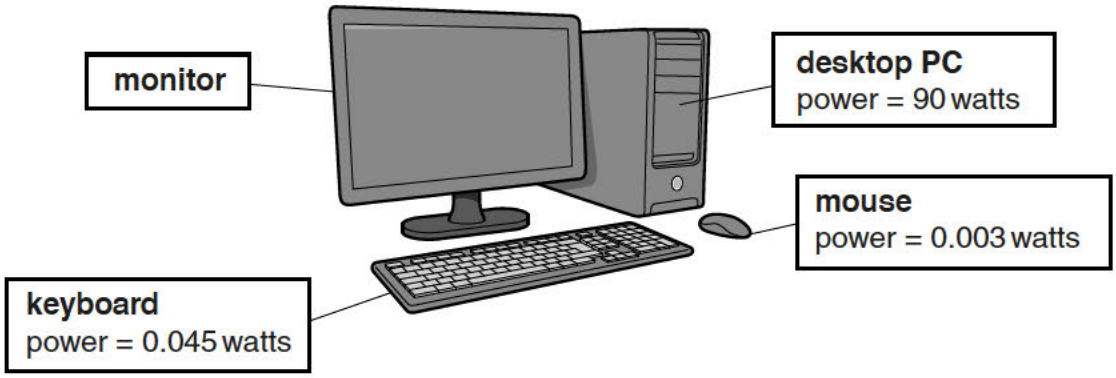
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..... **[1]**

[Total: 5]

5 Kyle has a wireless computing system.

Look at the information in the diagram.



(a) The monitor plugs into a 230 V supply and uses a current of 0.5 A.

Calculate the power of the monitor in kilowatts.

.....

.....

.....

answer ..... kW **[2]**

(b) The energy supplied to the desktop pc in a day is 0.45 kilowatt hours.

How many hours does Kyle use the desktop PC for that day?

.....

.....

.....

answer ..... hours **[2]**

(c) The monitor and the desktop pc are connected to a 230V supply.

The mouse and the keyboard use 3V batteries.

Put the four parts of the system in order of the size of current used.

One has been done for you.

highest current .....

.....

keyboard

.....

lowest current ..... **[1]**

(d) Increasing the use of technology has increased energy consumption.

This may have contributed to global warming.

People have different views about reducing energy use.



Fatima thinks that it would help if everyone changed to using low energy light bulbs.



Claire thinks we could all reduce energy use by walking instead of driving cars.

Analyse these views and discuss how effective they could be for reducing global warming.

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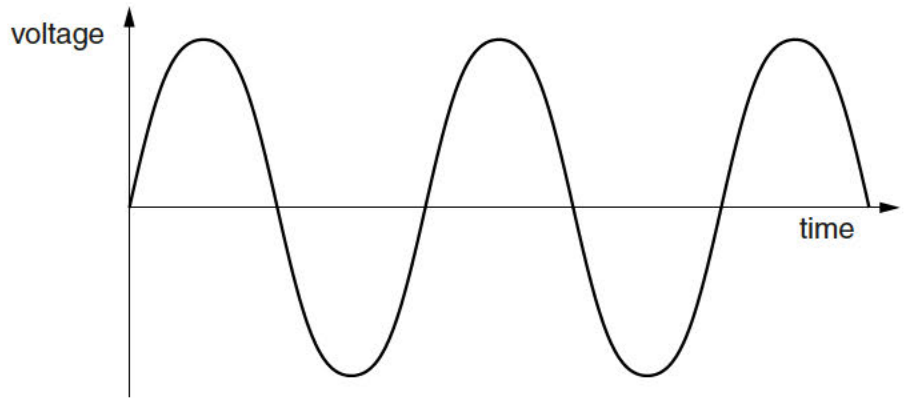
..... **[2]**

[Total: 7]

6 Electrical generators produce alternating current (AC).

Graph **A** is the **voltage-time** graph for an electrical generator.

graph **A**



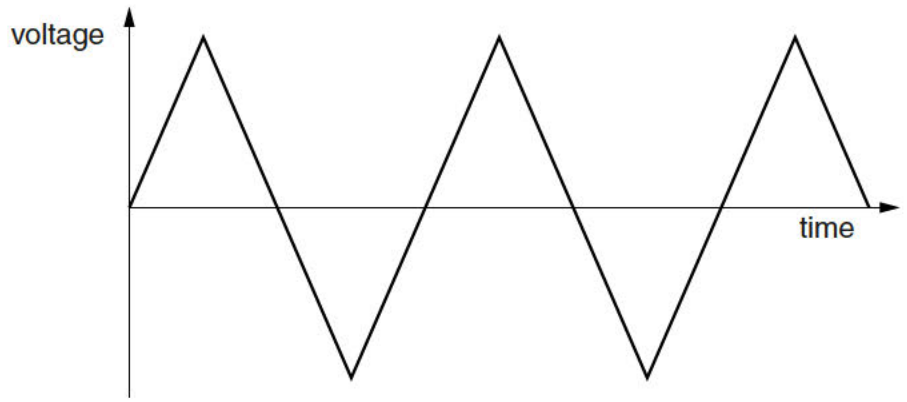
(a) The frequency shown in graph **A** is 50 Hz.

An alternating voltage produces an alternating current.

On graph **A** draw another line with a **higher** frequency. **[1]**

(b) Look at graph **B**.

graph **B**



Does graph **B** also show an alternating voltage?

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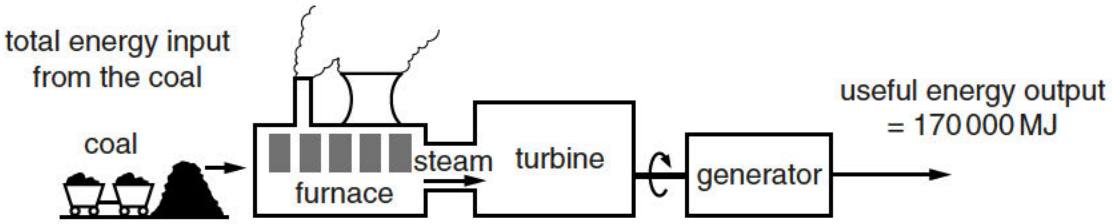
Explain your answer by **comparing** it with graph **A**.

.....

..... **[1]**

[Total: 2]

7 Electricity is generated in power stations.



(a) The efficiency of this power station is 34%.

Calculate the total energy input from the coal.

.....

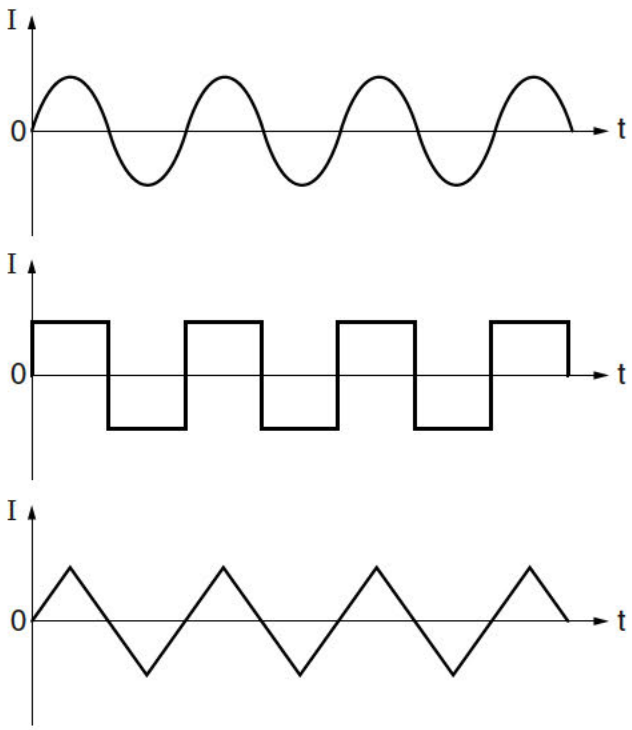
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answer ..... MJ **[1]**

(b) The generator in the power station produces alternating current (AC).

Look at the three different current-time graphs.



Describe why all the graphs show alternating currents.

.....

..... **[1]**

[Total: 2]