TRANSFORMER

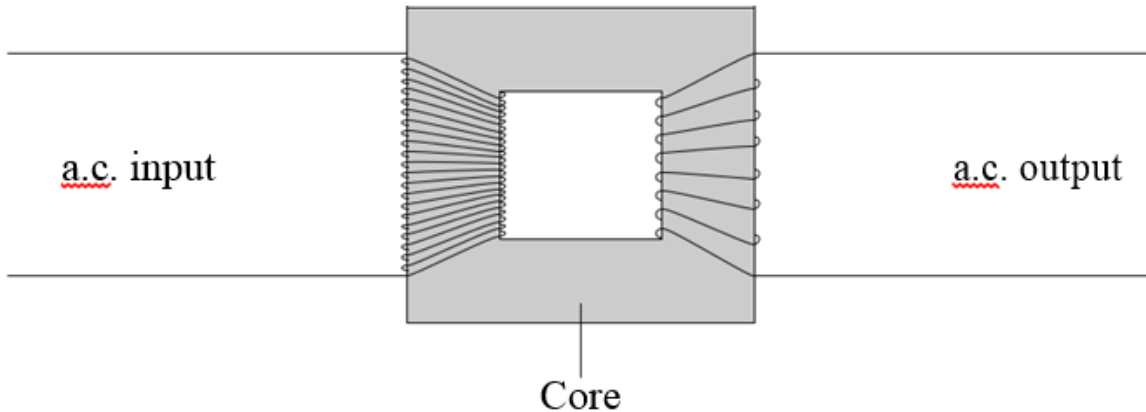**Q1 (a)** The diagram shows a transformer.

Core

(i) Is the transformer in the diagram being used as a step-up transformer or as a step-down transformer?

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

a step-up transformer

a step-down transformer

Explain your answer.

_____

_____

(1 mark)

(ii) Why is insulated wire, and not uninsulated wire, used to make the coils?

_____

(1 mark)

(iii) Why is the core made of iron?

(1 mark)

(b)A transformer has 500 turns on its primary coil and 7500 turns on its secondary coil. The potential difference across the primary coil is 150 volts.

Use the equation in the box to calculate the potential difference across the secondary coil.

p.d. across primary	=	number of turns on primary
p.d. across secondary	=	number of turns on secondary

Show clearly how you work out your answer.

Potential difference across the secondary coil ——————— volts

(2 marks)

(c) Step-down transformers are used between power lines and people's houses. Explain why.

(2 marks)

(d) Before 1926, large towns had their own local power stations. After 1926, these power stations were connected to form the National Grid.
Explain the advantage of having a National Grid system.

Q2. Electricity is generated in power stations. It is then sent to all parts of the country through a network of cables.
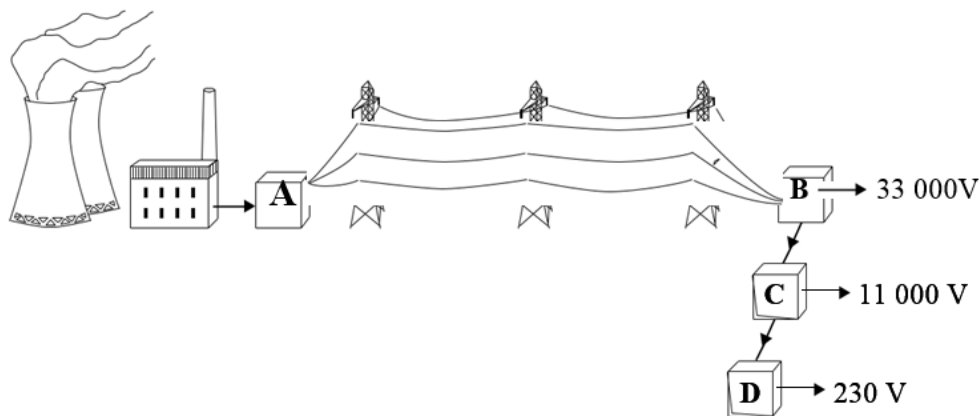
(a) Complete the following sentence by using one of the words in the box.

Grid	Power	Supply

The network is called the National _____

(1 mark).

(b) In the diagram, **A**, **B**, **C** and **D** are transformers

(b)(i) Which transformer, A, B, C or D, is a step-up transformer?

Transformer _____

(1 mark)

(b)(ii) Which transformer, A, B, C or D, will supply homes, offices and shops?

Transformer _____

(1 mark)

(c) Complete the following sentence by drawing a ring around the correct line in the box. In a step-down transformer, the potential difference (p.d.) across the
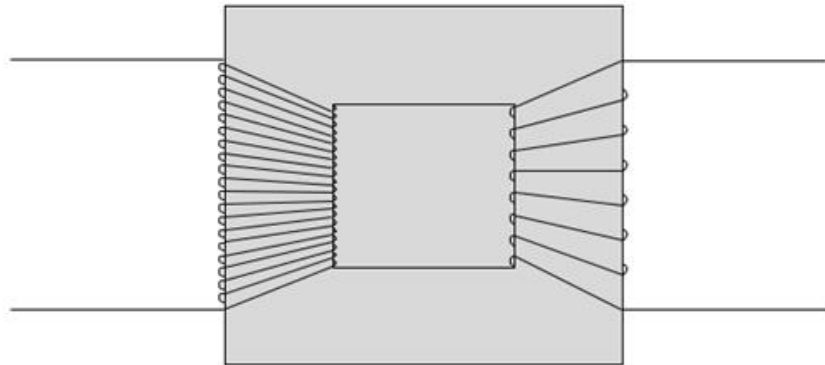
primary coil is

less than
the same
more than

as the p.d. across the secondary coil

(1 mark)

3 (a) The basic structure of a transformer is a primary coil of insulated wire, an iron core and a secondary coil of insulated wire.

(i) Why is the core made of iron?

_____

_____

(1 mark)

(ii) Explain how a transformer works.

_____

_____

_____

_____

_____

_____

_____

(4 marks)

(b) A small step-down transformer is used in the charger for an electric screwdriver.

The input to the transformer is 230 V a.c. mains supply and the output is 5.75 V a.c.

There are 3200 turns on the primary coil.

Use the equation in the box to calculate the number of turns on the transformer's secondary coil.
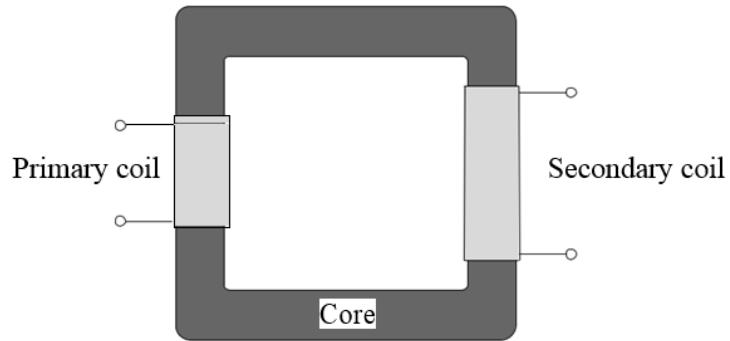
p.d. across primary	=	number of turns on primary
p.d. across secondary	=	number of turns on secondary

Show clearly how you work out your answer.

_____

_____

_____

_____

Number of turns =   _____

(2 marks)

Q4 (a) The diagram shows the basic structure of a step-up transformer.


(i) What is the core made of?

_____

_____

(1 mark)

(ii) Explain how an alternating input produces an alternating output.

_____

_____

_____

_____

_____

_____

_____

(3 marks)

(b) Fly killers are used in kitchens and food stores because flying insects carry diseases which cause food poisoning.

The diagram shows the inside of one design. Insects are attracted to a fluorescent lamp. The metal grids have a high potential difference (p.d.) between them. The insects are killed as they fly between the grids.
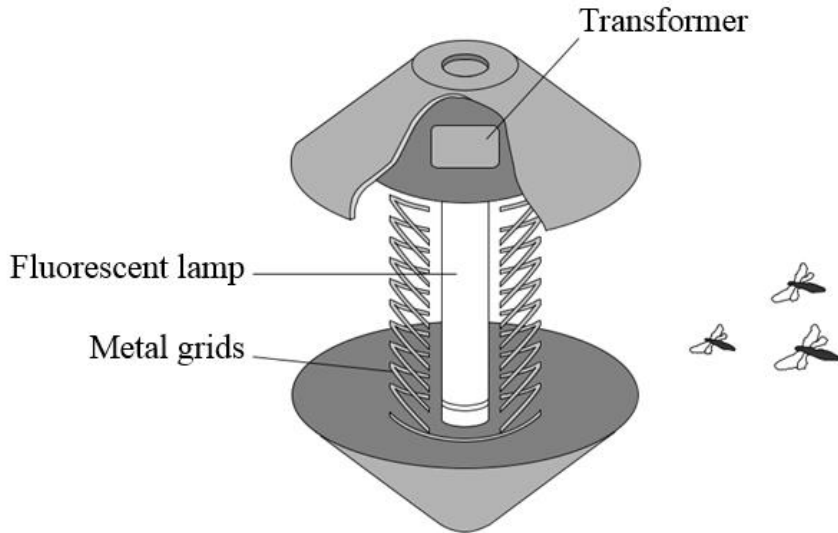
A transformer is used in the fly killer. There is a p.d. of 230 V across the primary coil.

There are 300 turns of wire on the primary coil and 4000 turns on the secondary coil.

Use the equation in the box to calculate the p.d. across the secondary coil.
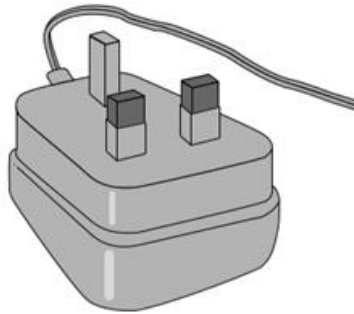
p.d. across primary	=	number of turns on primary
p.d. across secondary	=	number of turns on secondary

Show clearly how you work out your answer.

_____

_____

Potential difference _____ V

(2 marks)

Q5. The drawing shows the plug for operating a radio from the mains.

This plug contains a transformer. There are 4600 turns on its primary coil and 200 turns on its secondary coil. The plug is used on the mains supply and has a potential difference (p.d.) of 230 V across its primary coil.

Use the equation in the box to calculate the p.d. across the secondary coil of the transformer.

Use the equation in the box to calculate the p.d. across the secondary coil.

p.d. across primary	=	number of turns on primary
p.d. across secondary	=	number of turns on secondary

Show clearly how you work out your answer.

_____

_____

Potential difference ——————— V

(2 marks)

(b) The coils of the transformer are made of insulated wire.
Why is the wire insulated?

_____

_____

(1 mark)

(c) (i) What material is the core of a transformer made from?

_____

_____

(1 mark)

(c) (ii) Why is the core made from this material?

_____

_____

(1 mark)

Total: 32 marks