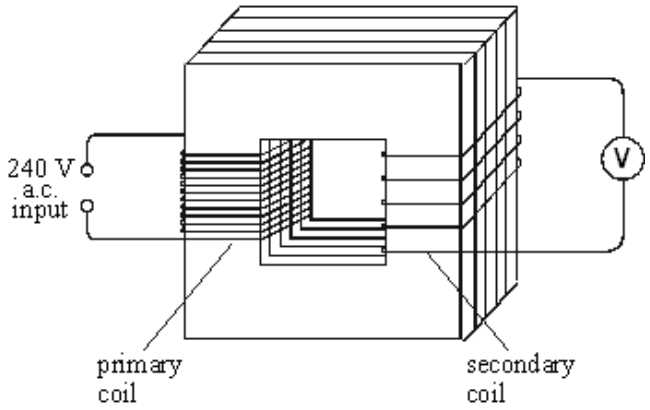
Q1. The diagram below shows a transformer.



(i) Name the material used to make the core of the transformer.

.....

(1)

(ii) The primary coil has 48 000 turns and the secondary coil 4000 turns.

If the input voltage is 240 V a.c., calculate the output voltage.

.....

.....

Answer V

(2)

(iii) Explain how the use of such a transformer could be adapted to transform a low voltage into a higher voltage.

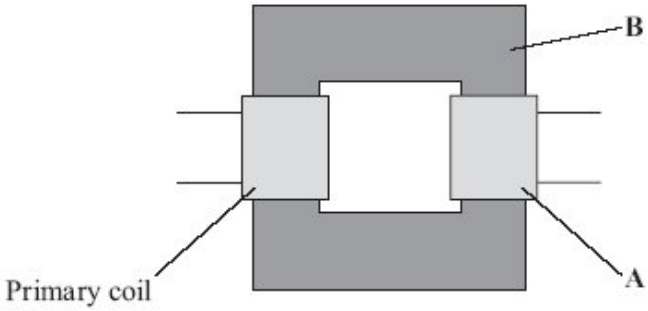
.....

.....

(1)

(Total 4 marks)

Q2. (a) The diagram shows a transformer.



(i) What is part **A**?

.....

(1)

(ii) What is part **B** and what is it made of?

.....

.....

(2)

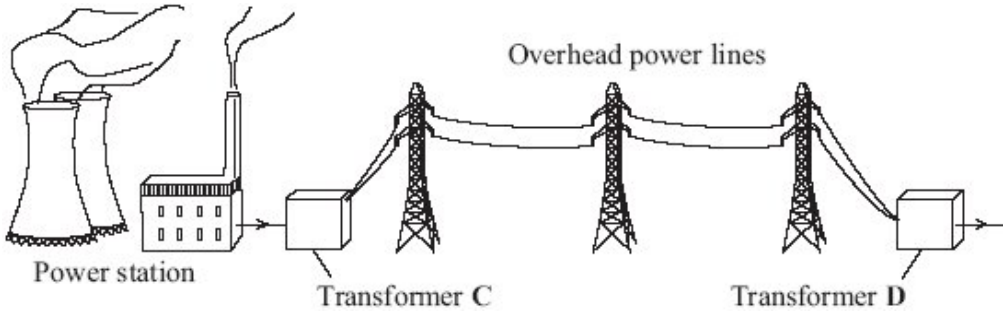
(iii) When there is an alternating current in the primary coil, what is produced in part **B**?

.....

.....

(2)

(b) Transformers are used in the National Grid. The diagram shows part of the National Grid.



Complete the **two** spaces in the sentence.

Transformer **C** is a ..... transformer and transformer **D** is

a ..... transformer.

(1)

(c) This is an item from a newspaper.

Health at risk from power lines?

Are high voltage power lines a health risk to people who live near them?

Some scientists think that scientific evidence shows that they are.

Other scientists do not think that the scientific evidence supports this conclusion.

Which **two** suggestions would reduce the possible risk to people's health?
Put a tick (✓) in the box next to your answers.

Do not build new houses near to existing power lines. ☐

Move the power lines so that they take the shortest routes. ☐

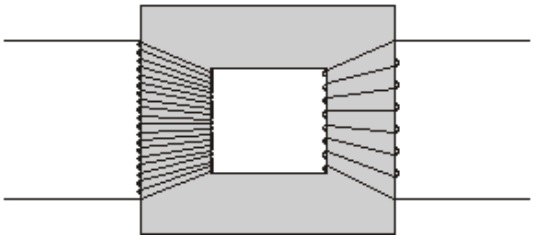
Move each power station to the centre of the nearest city. ☐

Build new power lines away from where people live. ☐

Use more transformers in the National Grid. ☐

(2)
(Total 8 marks)

Q3. (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)

(ii) Explain how a transformer works.

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(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.

$$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$$

Show clearly how you work out your answer.

.....

.....

Number of turns = ...

(2)

(Total 7 marks)

Q4. The diagram shows a USB power adapter which plugs into a 230 V a.c. mains socket.

The adapter contains a small step-down transformer.

(a) The core of the transformer is made of laminated soft iron.

Why is iron used?

.....

.....

(1)

(b) The coils of the transformers are made of insulated copper wire.

Why is the wire insulated?

.....

.....

(1)

(c) There are 500 turns on one coil of the transformer and 20 000 turns on the other coil.

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

$$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$$

Show clearly how you work out your answer and give the unit.

.....

.....

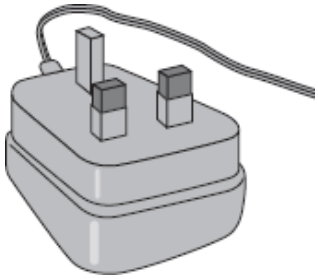
.....

p.d. across the secondary = ...

(3)

(Total 5 marks)

Q5. (a) 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.

$$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$$

Show clearly how you work out your answer.

.....

.....

.....

.....

p.d. across secondary = ... V

(2)

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

Why is the wire insulated?

.....

.....

(1)

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

.....

(1)

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

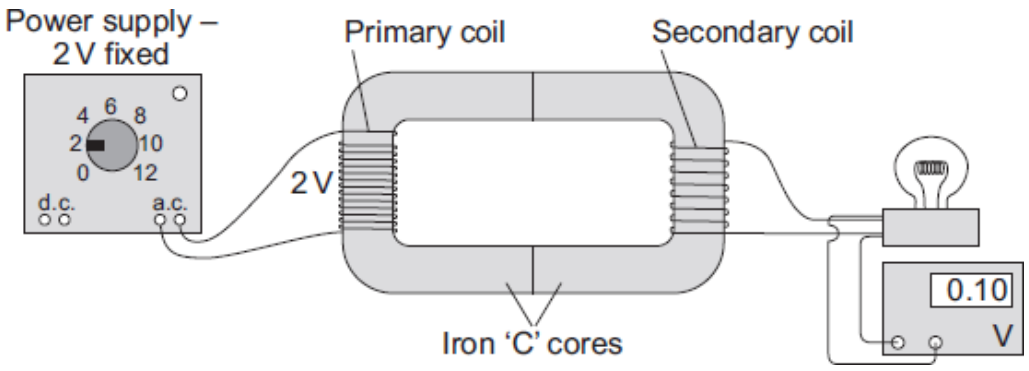
.....

.....

(1)

(Total 5 marks)

Q6. The diagram shows the apparatus used by a student to investigate a transformer.



(a) The transformer made by the student would not have worked if the core had been made from aluminium and not iron.

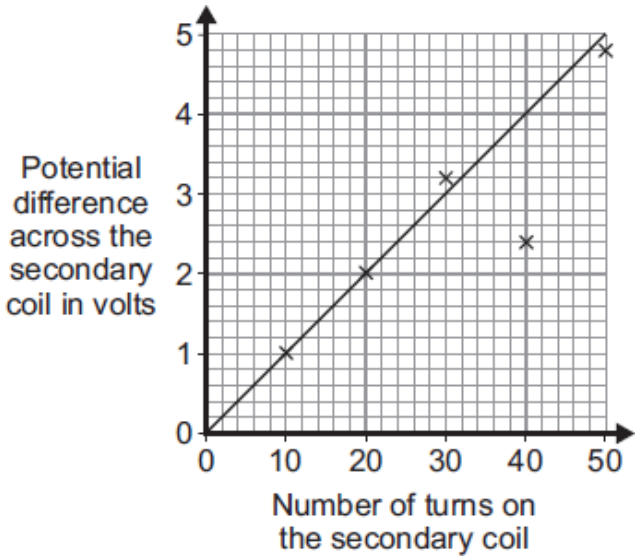
Why?

.....

.....

(1)

(b) The student made changes to the number of turns used to make the secondary coil. He then measured the potential difference across the secondary coil after each change. The graph shows the student's results.



(i) What range of values was used for the number of turns on the secondary coil?

From ..... to .....

(1)

(ii) When he drew the line of best fit, the student ignored one of the data points.

Why?

.....

.....

(1)

(iii) What is the minimum number of turns needed on the secondary coil for the transformer to act as a step-up transformer?

.....

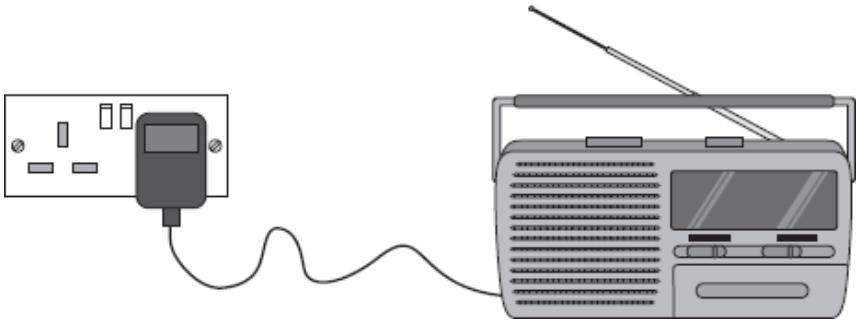
Give a reason for your answer.

.....

.....

(2)

(c) A radio can be used with a 9 V battery or it can be plugged into the 230 V mains electricity supply using an adapter. The mains adapter contains a transformer.



Why must the mains adapter contain a transformer?

.....

.....

(1)
(Total 6 marks)