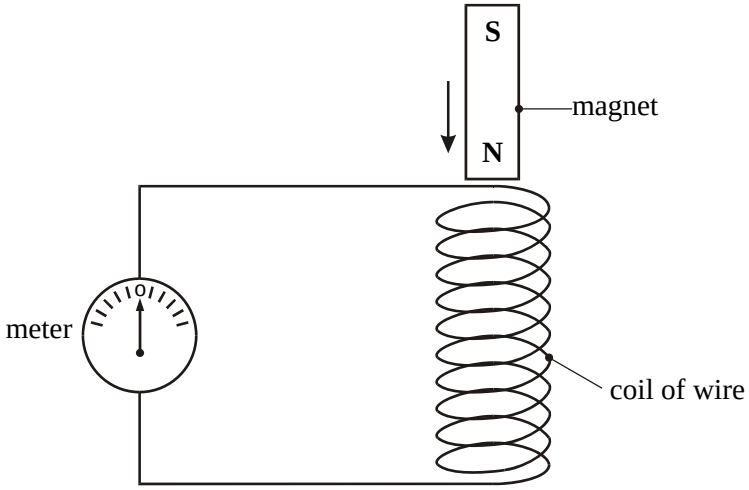
Transformers

1. The diagram below shows a coil of wire connected to a meter which can measure small currents.



(a) What, if anything, happens to the needle of the meter as the magnet is moved into the coil?

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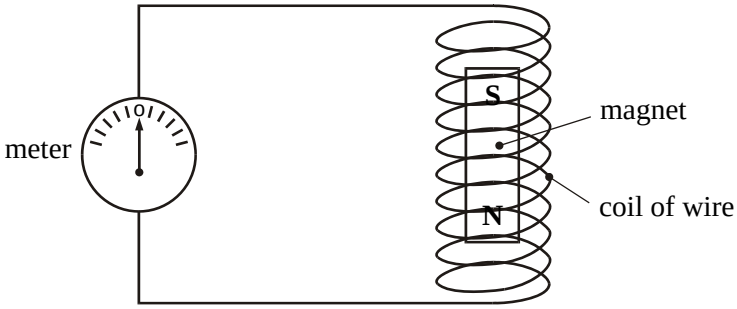
(1)

(b) The magnet is now left stationary inside the coil as shown in the diagram below.



What, if anything, happens to the needle of the meter?

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(1)

(c) What, if anything, happens to the needle of the meter as the magnet is lifted out of the coil?

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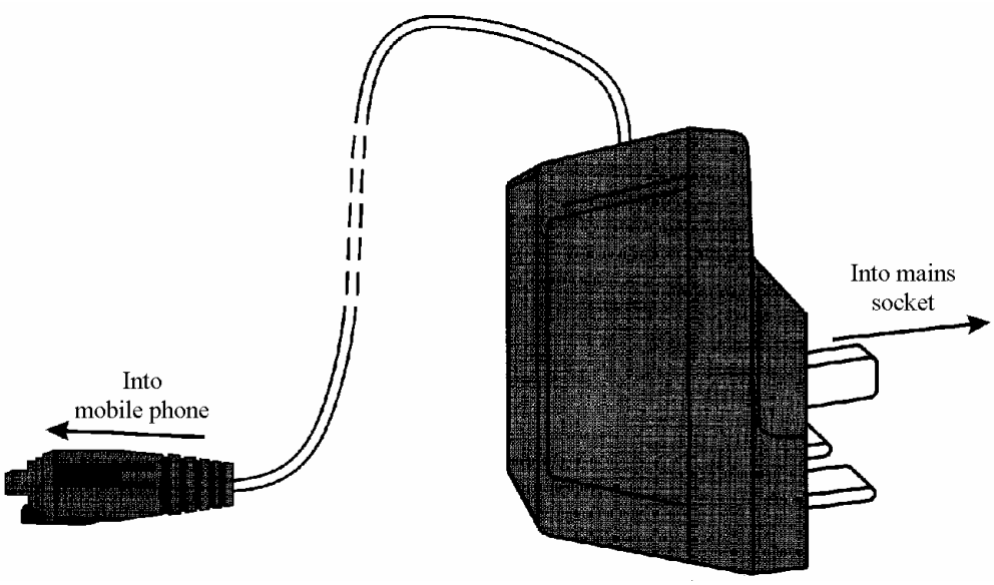
(2)

(Total 4 marks)

2. (a) The drawing shows a small transformer used to recharge the battery in a 4.2 V mobile phone from a 230 V mains supply.



Explain how you know that this is a *step-down* transformer.

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(1)

(b) A transformer consists of an insulated coil of wire, called the primary coil, on one side of a core. Another coil of insulated wire, called the secondary coil, is on the other side.

Give **two** features of the *core*.

1 .....

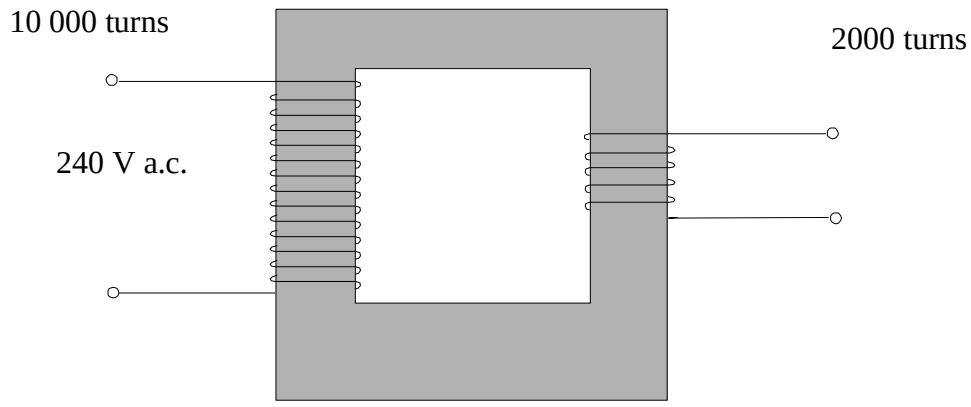
2 .....

(2)

(Total 3 marks)

3. (a) An appliance in a house has a transformer. The transformer is used to reduce the voltage to the level needed by the appliance.

The diagram shows the transformer.



(i) Name the material used for the core of the transformer.

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(1)

(ii) The transformer has 10 000 turns on the input side and 2000 turns on the output side. If the mains voltage of 240 volts is applied to the input, calculate the output voltage. You may find the following information helpful:

$$\frac{\text{output voltage}}{\text{input voltage}} = \frac{\text{number of turns on output coil}}{\text{number of turns on input coil}}$$

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(3)

(b) Explain, in terms of magnetic fields, how a transformer works.

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(4)

(c) A 12 V car battery is connected to the input leads of the transformer. It is hoped to reduce the voltage to 2.4 V in order to run a small motor. When the output voltage is measured it is found to be zero.

Explain why the output voltage is zero.

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(2)

(Total 10 marks)