

Name:

Date:

P7 - Test 7  
MAGNETISM  
Advanced

**GCSE**

PHYSICS

AQA - Triple Science

Mark

Grade

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### Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

### Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

### Information

- The marks for the questions are shown in brackets

1.

(a) In the National Grid, very large step-up transformers link power stations to the transmission cables.

A transformer used for this purpose has 800 turns on its primary coil and 12 800 turns on its secondary coil. The p.d. (potential difference) across its primary coil is 25 kV.

Use the equation in the box to calculate the p.d. across its 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.

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p.d. across secondary coil = \_\_\_\_\_

(3)

(b) The primary and secondary coils of a transformer are made of insulated wire.

Why is this insulation necessary?

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(1)

(c) Describe what happens when an alternating potential difference is applied across the primary coil of a transformer.

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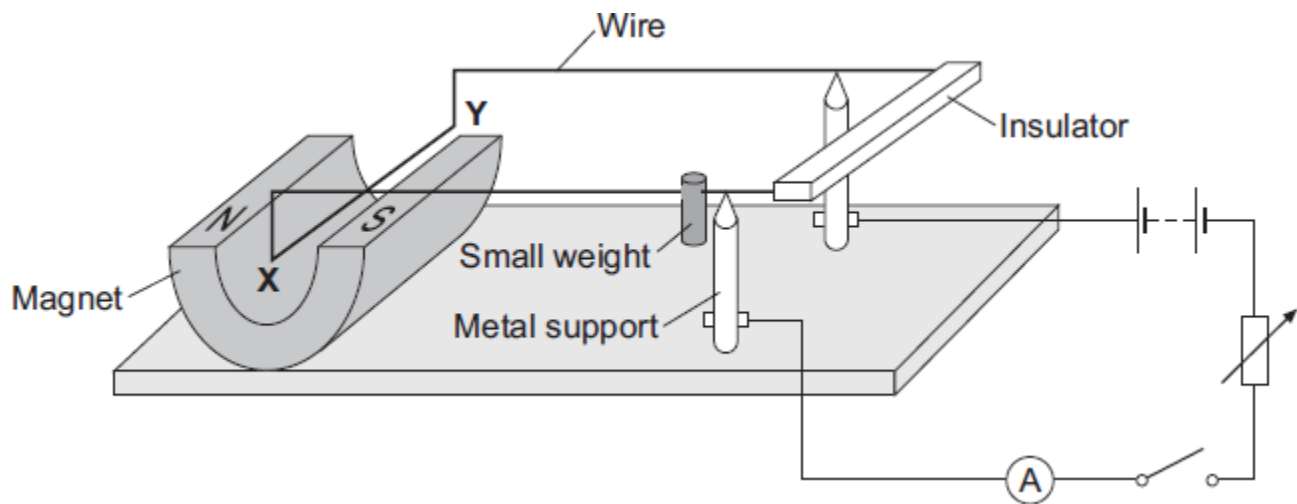
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(3)

(Total 7 marks)

2. The diagram shows a device called a current balance.



(a) (i) When the switch is closed, the part of the wire labelled **XY** moves upwards.

Explain why.

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(2)

(ii) What is the name of the effect that causes the wire **XY** to move?

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(1)

(iii) An alternating current (a.c.) is a current which reverses direction. How many times the current reverses direction in one second depends on the frequency of the alternating supply.

Describe the effect on the wire **XY** if the battery is replaced by an a.c. supply having a frequency of 5 hertz.

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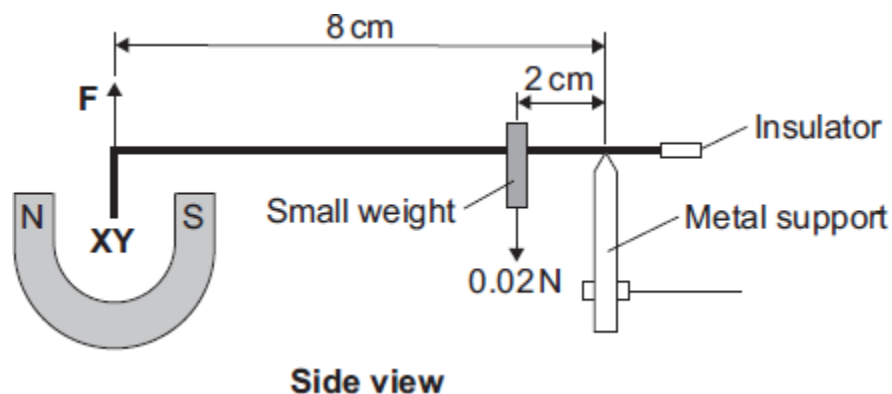
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(2)

- (b) The diagram shows how a small weight can be used to make the wire **XY** balance horizontally.



Use the data in the diagram and the equation in the box to calculate the force, **F**, acting on the wire **XY**.

$\text{moment} = \text{force} \times \begin{matrix} \text{perpendicular distance from the} \\ \text{line of action of the force to the axis} \\ \text{of rotation} \end{matrix}$
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Show clearly how you work out your answer.

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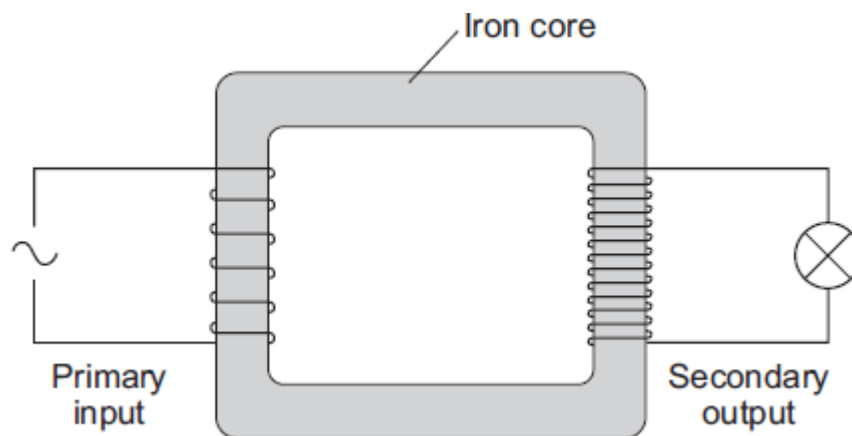
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Force = \_\_\_\_\_ N

(3)

(Total 8 marks)

- 3.** The diagram shows a transformer.



- (a) (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

Give a reason for your answer.

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(1)

- (ii) Why is the core made of iron?

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(1)

- (b) The power supply to a laptop computer contains a transformer designed to change the 230 V mains input to a 15 V output. The transformer has 920 turns on its primary coil.

Use the equation in the box to calculate the number of turns on 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.

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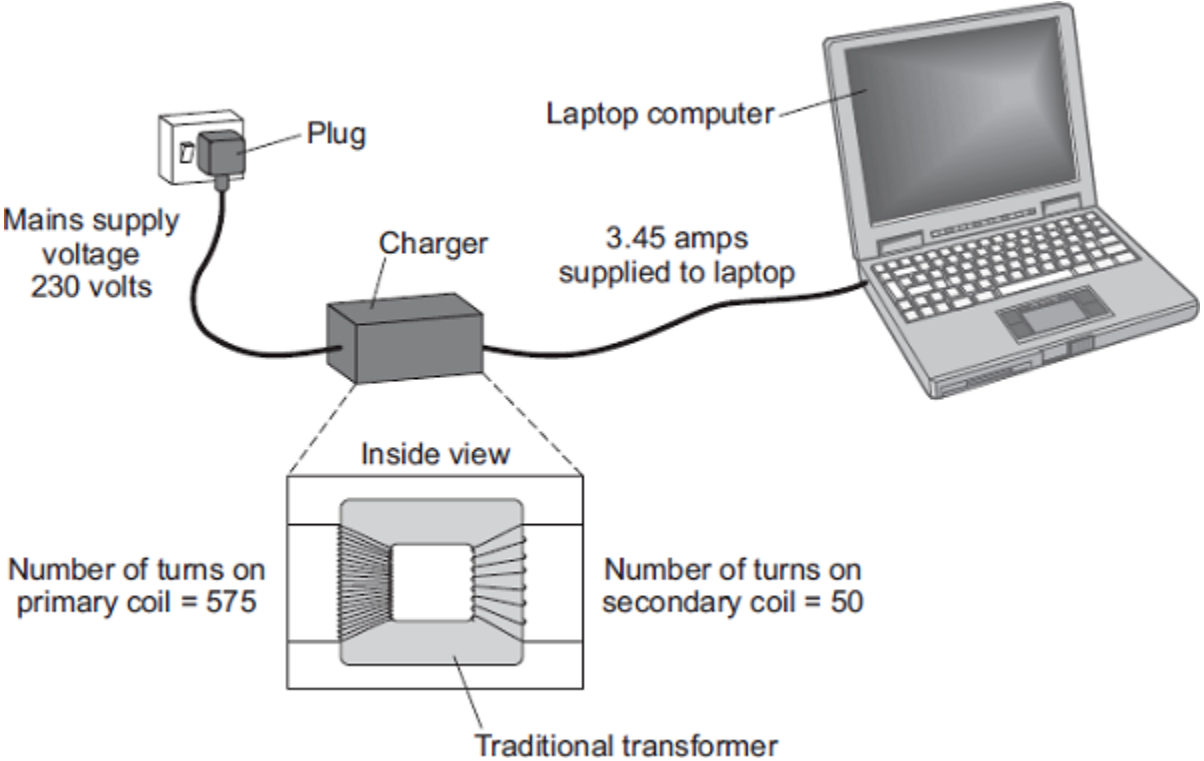
Number of turns on the secondary coil = \_\_\_\_\_

(2)

(Total 4 marks)

4.

Batteries inside laptop computers are charged using laptop chargers. The laptop charger contains a traditional transformer.



- (a) The alternating current flowing through the primary coil of the transformer creates an alternating current in the secondary coil.

Explain how.

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(3)

- (b) (i) Use information from the diagram to calculate the potential difference the charger supplies to the laptop.

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Potential difference = \_\_\_\_\_ V

(2)

- (ii) Calculate the current in the primary coil of the transformer when the laptop is being charged.

Assume the transformer is 100% efficient.

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Current = \_\_\_\_\_ A

(2)

- (c) Laptop batteries and mobile phone batteries can only be recharged a limited number of times. After this, the batteries cannot store enough charge to be useful. Scientists are developing new batteries that can be recharged many more times than existing batteries.

Suggest **one** other advantage of developing these new batteries.

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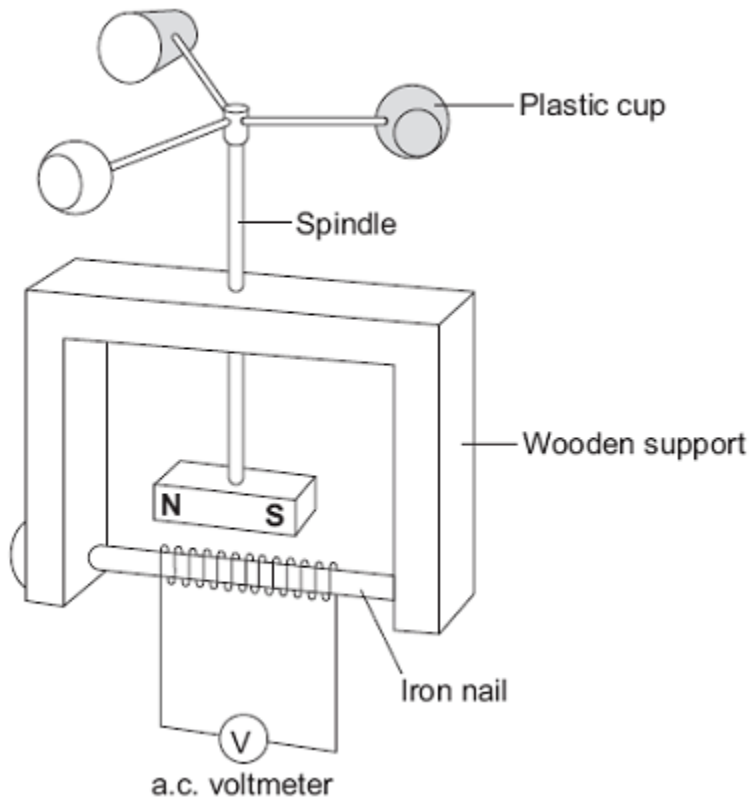
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(1)

(Total 8 marks)

5.

The diagram shows a student's design for a simple wind speed gauge.



(a) Explain why the wind causes the a.c. voltmeter to give a reading. The explanation has been started for you.

*The wind causes the plastic cups to turn* \_\_\_\_\_

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(3)

(b) The gauge is not sensitive enough to measure light winds. Suggest **one** way that the design can be modified to make the gauge more sensitive.

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(1)

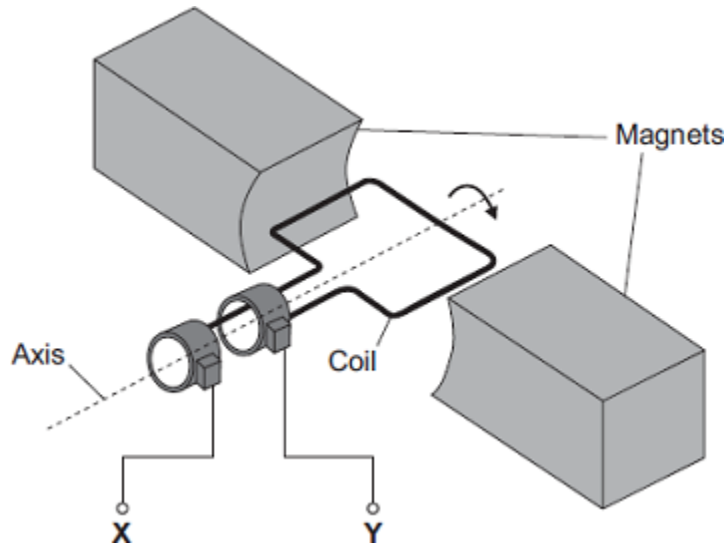
(Total 4 marks)



6.

The diagram shows an a.c. generator.

The coil rotates about the axis shown and cuts through the magnetic field produced by the magnets.



- (a) (i) A potential difference is induced between X and Y.

Use the correct answer from the box to complete the sentence.

electric	generator	motor	transformer
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This effect is called the \_\_\_\_\_ effect.

(1)

- (ii) What do the letters a.c. stand for?

\_\_\_\_\_

(1)

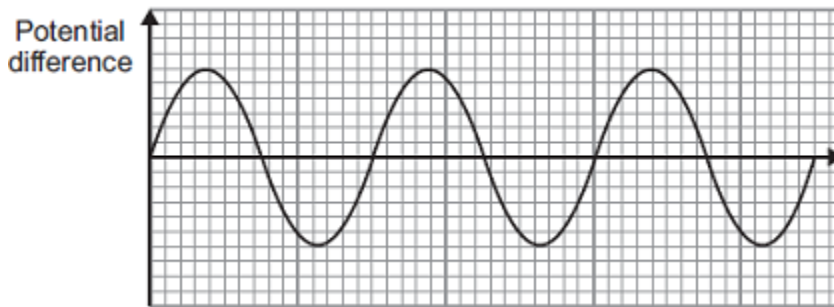
- (iii) Name an instrument that could be used to measure the potential difference between X and Y.

\_\_\_\_\_

(1)

(b) **Graph 1** shows the output from the a.c. generator.

**Graph 1**



(i) One of the axes on **Graph 1** has been labelled 'Potential difference'.

What should the other axis be labelled?

\_\_\_\_\_

(1)

(ii) The direction of the magnetic field is reversed.

On **Graph 1**, draw the output from the a.c. generator if everything else remains the same.

(2)

(c) The number of turns of wire on the coil is increased. This increases the maximum induced potential difference.

State **two** other ways in which the maximum induced potential difference could be increased.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(Total 8 marks)

**7.**

Waves may be either longitudinal or transverse.

(a) Describe the difference between a longitudinal and a transverse wave.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

- (b) Describe **one** piece of evidence that shows when a sound wave travels through the air it is the wave and not the air itself that travels.

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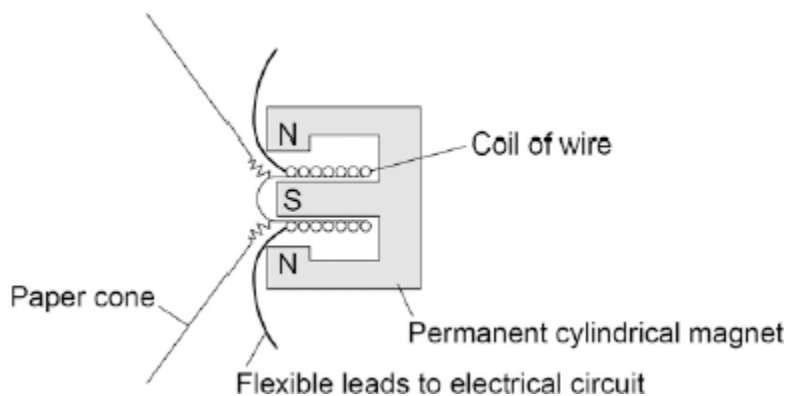
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(1)

- (c) The figure below shows the parts of a moving-coil loudspeaker.

A coil of wire is positioned in the gap between the north and south poles of the cylindrical magnet.



Explain how the loudspeaker converts current in an electrical circuit to a sound wave.

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(6)

(Total 9 marks)