2021 ASSESSMENT MATERIALS

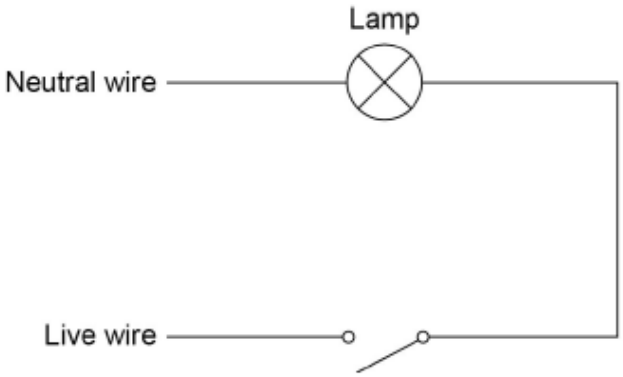
GCSE
PHYSICS

Physics Test 2: Electricity and Magnetism and Electromagnetism (Foundation)

Total number of marks: 33

0 3 **Figure 5** shows part of a lighting circuit in a house.

Figure 5



0 3 . 1 What is the frequency of the ac mains electricity supply in the UK?

[1 mark]

Tick (✓) **one** box.

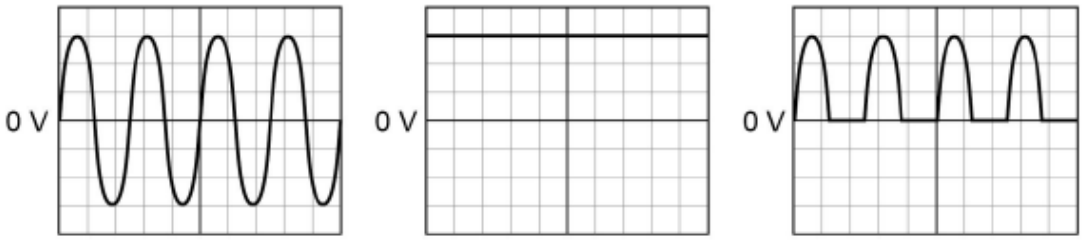
20 Hz ☐ 50 Hz ☐ 60 Hz ☐ 100 Hz ☐

0 3 . 2 The mains electricity supply has an alternating potential difference.

Which diagram shows an alternating potential difference?

[1 mark]

Tick (✓) **one** box.



☐ ☐ ☐

0 3 . 3 The potential difference across the lamp is 230 V.

The current in the lamp is 0.020 A.

Calculate the power output of the lamp.

Use the equation:

power = potential difference × current

[2 marks]

Power = _____ W

0 3 . 4 The potential difference across the lamp is 230 V.

Calculate the energy transferred by the lamp when 180 C of charge flows through the lamp.

Use the equation:

energy transferred = charge flow × potential difference

[2 marks]

Energy transferred = _____ J

0 3 . 5 An electrician needs to replace the light switch in **Figure 5**.

Describe the possible hazard and the risk to the electrician of changing the light switch.

[2 marks]

Hazard _____

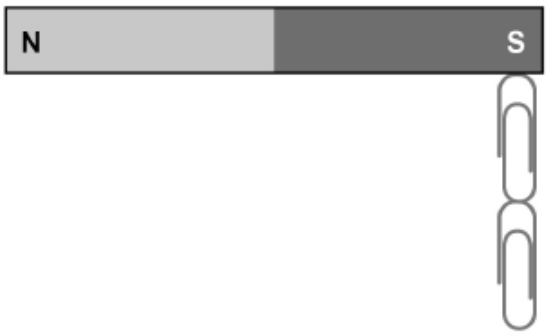
_____

Risk _____

_____

0 4 **Figure 3** shows two paper clips hanging from a bar magnet.

Figure 3



The paper clips have become magnetised.

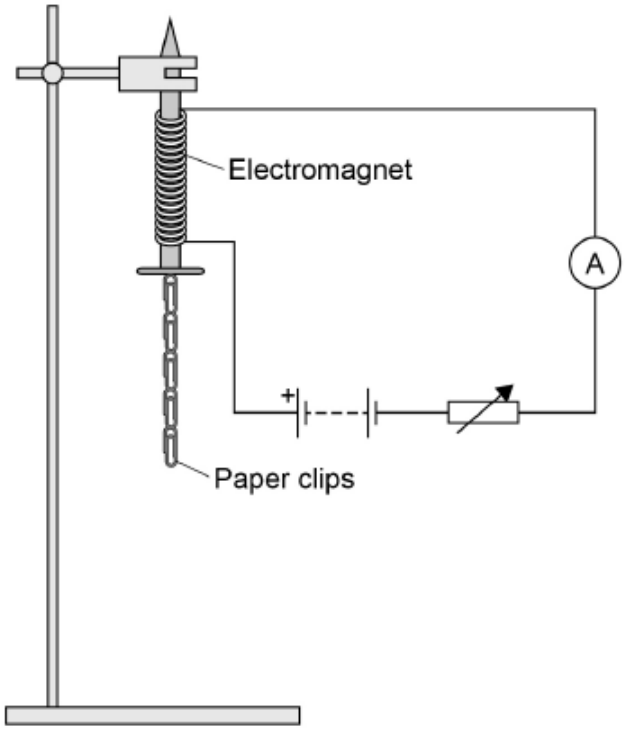
0 4 . 1 Label the north and south poles of both paper clips.

[1 mark]

A student investigated how the number of turns of wire on an electromagnet affects the strength of the electromagnet.

Figure 4 shows the equipment used by the student. Throughout the investigation the student kept the current through the wire constant.

Figure 4



0 4 . 2 The student measured the strength of the electromagnet by counting the number of paper clips the electromagnet could hold.

Explain why it was important that the paper clips were all the same size.

[2 marks]

Table 2 shows the student's results.

Table 2

Number of turns of wire on the electromagnet	Number of paper clips held
10	3
20	6
30	9
40	12

0 4 . 3 Describe the pattern shown in **Table 2**.

[2 marks]

0 4 . 4 The student then used 50 turns of wire on the electromagnet.

The electromagnet picked up 18 paper clips. This was more paper clips than the student had expected.

Which **one** is the most likely cause of this result?

Tick **one** box.

[1 mark]

The paper clips used with 50 turns were larger than the others. ☐

There were less than 50 turns of wire on the electromagnet. ☐

Some of the paper clips were already magnetised. ☐

0 4 . 5 The student repeated the measurement for 50 turns of wire three more times.

This gave her the following set of results.

18 16 14 15

Explain what the student should now do with the **four** results for 50 turns of wire.

[3 marks]

0 4 . 6 The student wrote the hypothesis:

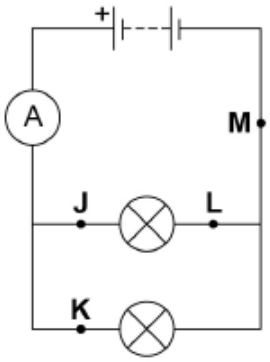
'Increasing the current through the wire will make the electromagnet stronger.'

Describe how the student should change the investigation to test this hypothesis.

[3 marks]

0 7 **Figure 9** shows a circuit diagram.

Figure 9



0 7 . 1 In which position could a switch be placed so that both lamps can be switched on or off at the same time?

[1 mark]

Tick (✓) **one** box.

J ☐ **K** ☐ **L** ☐ **M** ☐

0 7 . 2 Draw the circuit symbol for a switch in the box below.

[1 mark]

0 7 . 3 In 30 seconds, 24 coulombs of charge flow through the battery.

Calculate the current in the battery.

Use the equation:

$$\text{current} = \frac{\text{charge flow}}{\text{time}}$$

[2 marks]

Current = _____ A

0 7 . 4 There is a potential difference of 3.6 V across the battery.

Calculate the energy transferred by the battery when 60 coulombs of charge flows through the battery.

Use the equation:

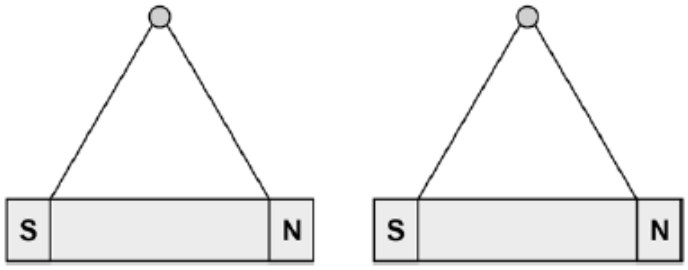
energy transferred = charge flow × potential difference

[2 marks]

Energy transferred = _____ J

0 8 **Figure 14** shows two bar magnets suspended close to each other.

Figure 14



0 8 . 2 Describe how to plot the magnetic field pattern of a bar magnet.

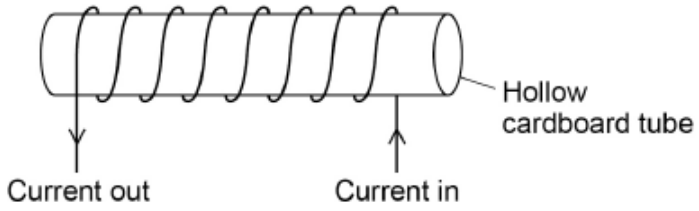
[3 marks]

0 4 . 1 **Figure 5** shows a solenoid.

Draw the magnetic field of the solenoid on **Figure 5**.

[2 marks]

Figure 5

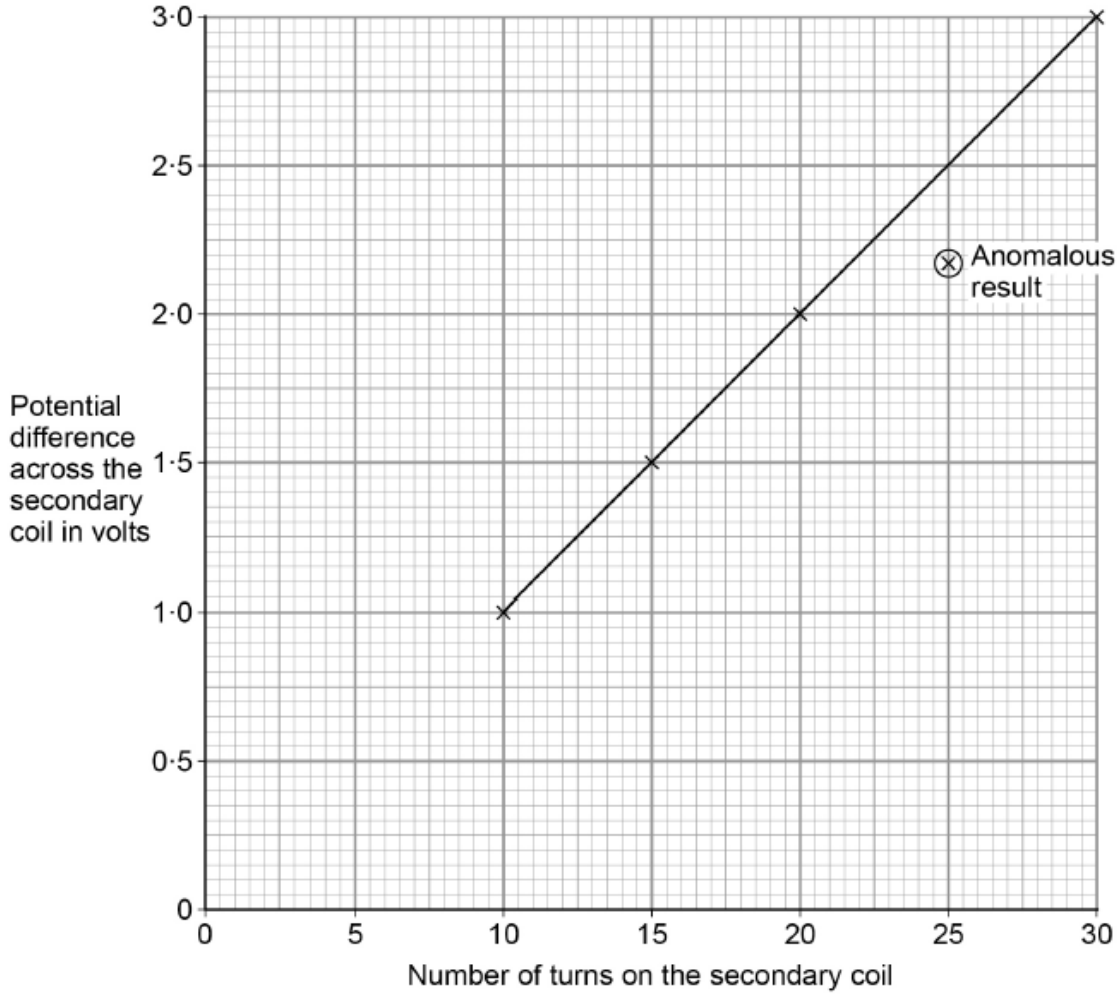


0 7 A student used a simple transformer to investigate how the number of turns on the secondary coil affects the potential difference (p.d.) across the secondary coil.

The student kept the p.d. across the primary coil fixed at 2V.

Figure 12 shows the results collected by the student.

Figure 12



0 7 . 1 **Figure 12** contains one anomalous result.

Suggest **one** possible reason why this anomalous result occurred.

[1 mark]

0 7 . 2 The transformer changes from being a step-down to a step-up transformer.

How can you tell from **Figure 12** that this happens?

[1 mark]