



Please write clearly in block capitals.

Centre Number

Candidate Number

Surname

Forename(s)

Candidate signature

GCSE PHYSICS

Predicted Paper (based on AQA)

Higher Tier Paper 2

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- a ruler
- a scientific calculator
- a protractor
- the Physics Equations Sheet (enclosed).

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- In all calculations, show clearly how you work out your answer.

Information

- The maximum mark for this paper is 100.
- The marks for the questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



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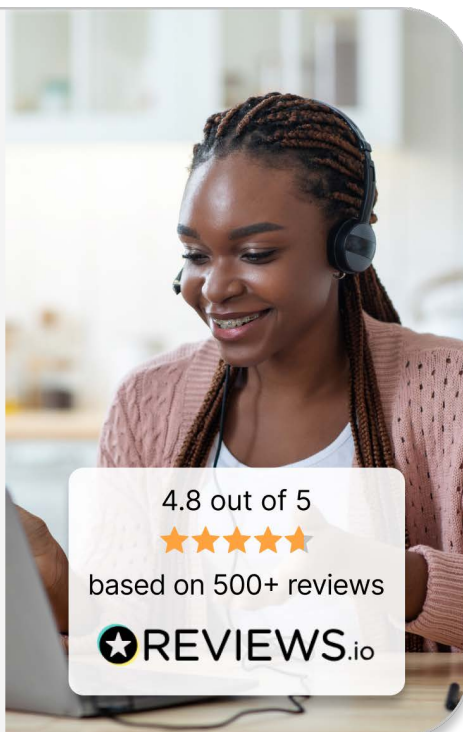
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A student is investigating the effect of a magnetic field on a current-carrying wire.

Figure 1 shows a hand used to apply Fleming's Left Hand Rule, which helps determine the direction of force acting on the wire.

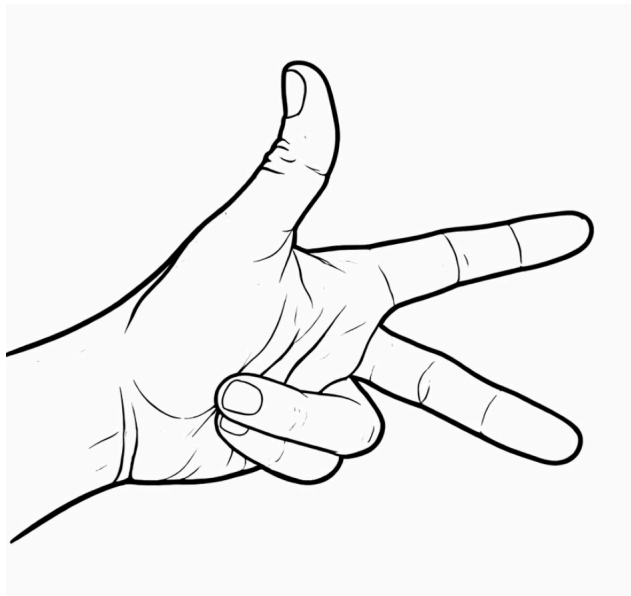


Figure 1

1.1

Explain what each finger represents in **Figure 1**.

[3 marks]

Question 1 continues on the next page



1.2 Define the term *magnetic flux density*.

[2 marks]

1.3 The student moves a straight wire through the magnetic field.
State what is meant by the term *electromagnetic induction*.

[2 marks]

Question 1 continues on the next page



1.4 Figure 2 shows parts of a moving-coil microphone.

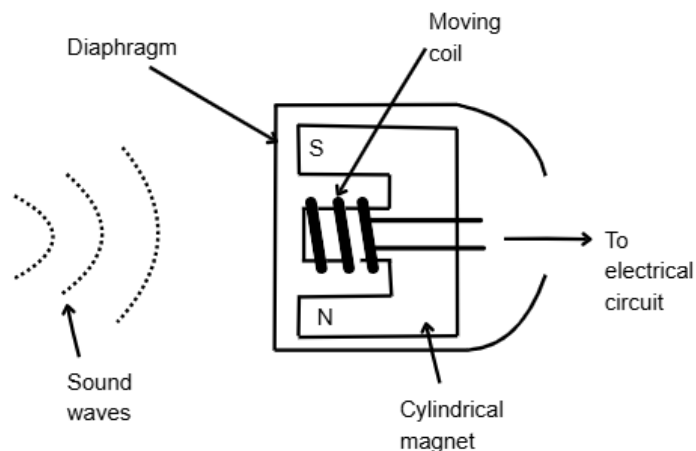


Figure 2

Explain how a moving-coil microphone works.

[4 marks]



A student is investigating the interaction between two bar magnets.

The magnets are placed close together as shown in **Figure 3**.

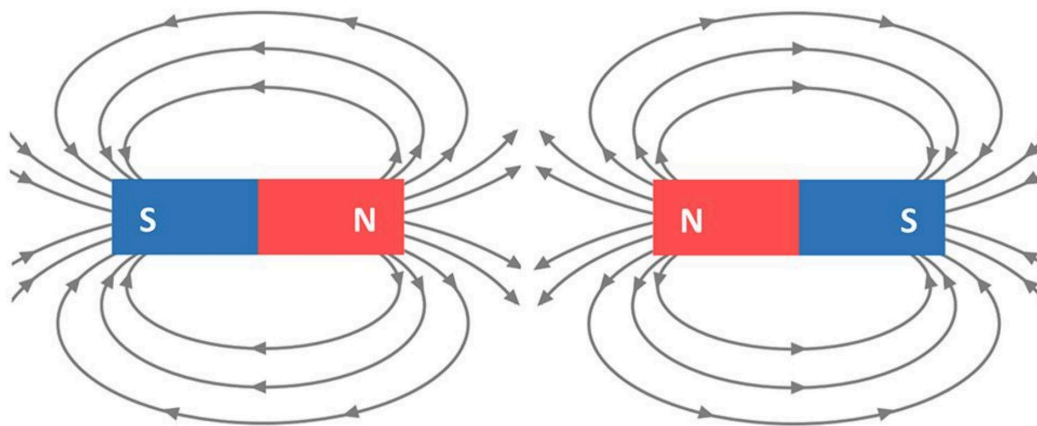


Figure 3

2.1

Name the force that acts between the two magnets in **Figure 3** and describe its effect.

[2 marks]

2.2

A bar magnet is cut in half.

Describe what happens to the magnetic poles of each half.

[2 marks]

Question 2 continues on the next page



2.3

A student has three metal blocks.

- One is a permanent magnet.
- One is made of aluminium.
- One is made of iron.

Describe how another permanent magnet can be used to identify the blocks.

[3 marks]

2.4

Describe the magnetic field pattern both inside and outside of a solenoid when a current is flowing.

[4 marks]



2.5

A straight wire has a length of 20 cm. It is placed in a uniform magnetic field with a current of 1.5 A flowing through it.

The wire is at right angles to the magnetic field. The wire experiences a force of 0.045 N.

Calculate the magnetic flux density.

Include appropriate unit in your answer.

[4 marks]

magnetic flux density = _____ unit _____





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3.2

An artificial satellite is in a stable circular orbit around the Earth.

The satellite is moving at a constant speed.

Explain why the satellite is accelerating even though it is travelling with a constant speed.

[3 marks]

3.3

The Big Bang Theory is one idea on how the universe began.

Red-shift and Cosmic Microwave Background (CMB) Radiation both act as evidence for the Big Bang Theory.

Describe what is meant by the term *red-shift*.

[3 marks]

Question 3 continues on the next page



3.4

Explain how the presence of CMB radiation provides evidence for the Big Bang Theory.

[2 marks]

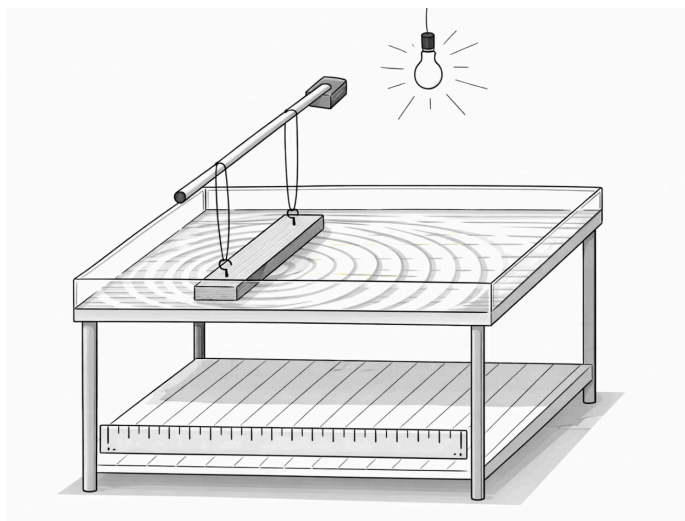


A student performs an experiment to investigate the properties of waves.

A shallow ripple tank is filled with water to a depth of 5 mm.

A wooden rod attached to a motor vibrates on the water surface, producing straight wavefronts.

A lamp above the tank projects the wave pattern onto a white paper beneath the tank, making the wavefronts visible.



4.1

The distance across 8 wavefronts is measured as 140 mm.

The time taken for 25 waves to pass a single point is 500 ms.

Calculate the speed of the wave.

[5 marks]

wave speed = _____ ms^{-1}



After completing the experiment, the student notices that the tank has been leaking via a hole in the bottom of the tank.

The student observes that the water leaves the tank much faster when the tank is full compared to when the tank is nearly empty.

4.2

Explain why the pressure in a liquid, like the water in the ripple tank, increases with depth.

[3 marks]

4.3

The water used to fill the ripple tank was collected from a deep storage tank.

Calculate the total pressure exerted on a sensor located 150 cm below the surface of the water.

Give your answer in Pa.

Density of the water = 1000 kg / m^3

Gravitational field strength = 9.8 N / kg

Atmospheric pressure = $101\,000 \text{ Pa}$

[4 marks]

pressure = _____ Pa

12



Figure 4 shows a bottle being supported by a wall.

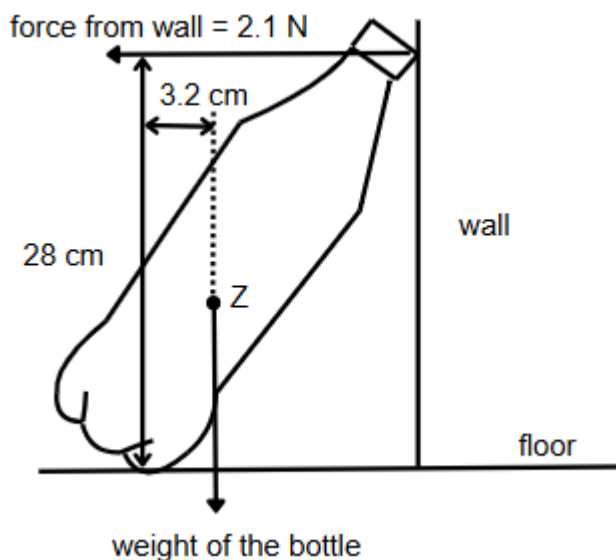


Figure 4

5.1 State the name of Point Z in Figure 4.

[1 mark]

5.2 Write down the equation which links distance (d), force (F) and moment of a force (M).

[1 mark]

Question 5 continues on the next page



5.3 The bottle shown in **Figure 4** is balanced.

Calculate the weight of the bottle.

[4 marks]

weight = _____ N

A student stands the bottle upright.

A cricket ball is then thrown at the bottle.

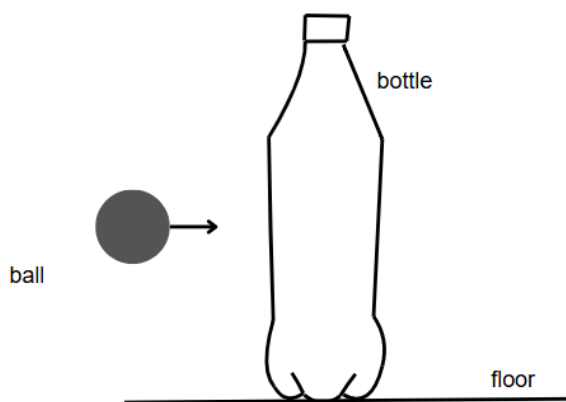


Figure 5

Question 5 continues on the next page



5.4

The ball and the bottle collide and then move forward together.

The mass of the ball is 160 g.

The mass of the bottle is 300g.

The velocity of the ball before the collision is 38 ms^{-1} .

Calculate the velocity of the bottle and the ball after the collision.

[4 marks]

velocity = _____ ms^{-1}

5.5

The collision lasts for 12 ms.

Calculate the force on the bottle during the collision.

Use your answer from Question **5.4**.

[3 marks]

force = _____ N



5.6

Cricket players wear protective padding.

Explain how the padding reduces the force exerted on the players when they are hit with cricket balls.

[3 marks]

Turn over for next question





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A skydiver jumps from a plane.



6.1

The skydiver accelerates downwards. Explain why.

[1 mark]

6.2

The skydiver stops accelerating and reaches a terminal velocity.

Explain why the skydiver reaches a terminal velocity.

[3 marks]



The skydiver has a mass of 80 kg and is falling with a terminal velocity of 55 ms^{-1} .

They open the parachute as they decelerate. There are 20 identical chords connecting the parachute to the skydiver.

6.3

When the skydiver opens the parachute, the skydiver experiences an initial upward deceleration of 15 ms^{-2} .

Show that the total upwards force exerted on the skydiver by the parachute is approximately 2000 N.

Use $g = 9.8 \text{ N / kg}$

[5 marks]**6.4**

Each individual chord has a spring constant of 3000 N/m.

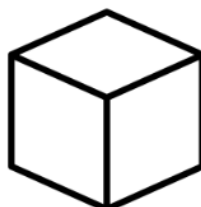
Assuming the total upward force is shared equally between the 20 chords, calculate the elastic potential energy stored by each chord.

[4 marks]

elastic potential energy = _____ J

13

A student investigates how the temperature of a metal cube changes when it is placed in direct sunlight.



7.1

All objects emit and absorb infrared radiation.

State **two** factors that affect the intensity and wavelength of the radiation emitted by the cube.

[2 marks]

7.2

The cube is painted matte black. After 20 minutes in the sun, the temperature of the cube stops increasing.

Explain why the temperature of the cube remains constant, even though it is still absorbing the same amount of radiation.

[2 marks]



8.2

The student carried out the method to find the critical angle.

The student noticed that the beam of light used was quite wide.

Explain why using a wide beam of light makes the measurement of the critical angle less accurate.

[1 mark]

8.3

State **one** hazard associated with using a ray box for an extended period of time and describe **one** precaution the student could take to reduce this risk.

[2 marks]

END OF QUESTIONS

