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Examiners' Report
June 2025

Int GCSE Physics 4PH1 1P

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Introduction

The examination was written to assess the full range of grades from 1 to 9. Consequently, some questions were written to be challenging whilst others were designed to be more straightforward and accessible. A range of different question types were included in the examination such as objective and multiple choice calculations, and both short and long written responses. Approximately 20% of the marks available in the examination were for candidates' demonstrations of experimental skills and understanding. Candidates were provided with a full list of the formulae to be used in this examination. Successful candidates were well-acquainted with the content of the specification and could recall facts whilst applying their understanding to new and complex situations. They were competent in performing quantitative work and could rearrange and substitute data into given formulae to obtain the correct answer. Successful candidates also showed evidence of undertaking all the required practicals themselves and could produce detailed, coherent methods whilst recalling the relevant results of these experiments. Less successful candidates showed gaps in their knowledge of topics and either had limited experience or could not recall information from the required practical tasks. These candidates often did not address the demands of the question and overlooked the importance of the command words being used.

Question 1(a)

This question was answered to a high standard by most candidates. The correct formula was selected from the formulae booklet in almost all cases and most candidates went on to score full marks in the calculation. Only the weakest candidates experienced difficulties, usually associated with rearranging the formula.

(i) State the formula linking average speed, distance moved and time taken.
(1)

$$\text{Speed} = \frac{\text{distance}}{\text{time taken}}$$

(ii) The puck travels at a constant speed of 2.8 m/s.

Calculate the distance moved by the puck in a time of 3.5 s.
(3)

$$2.8 = \frac{\text{distance}}{3.5}$$

$$\text{distance} = \frac{2.8}{3.5}$$

$$= 0.8$$

distance moved = 0.8 m

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Examiner Comments

This candidate has selected the correct formula but made a mistake in the calculation. However, their clear working has allowed them to score one mark for a correct substitution into the formula. They then make a mistake when rearranging, which prevents further marks from being awarded.

ResultsPlus
Examiner Tip

Candidates who find calculations challenging should be advised to substitute data before attempting a rearrangement. Once a mistake has been made, no marks can be given and substitution into an incorrectly rearranged formula is not permitted.

Question 1(b)i

Diagrams were generally drawn clearly and showed the correct direction for the friction arrow. Some candidates drew their arrows freehand, but most of these were clearly pointing to the left.

(b) Diagram 2 shows a puck travelling across some rough ice.

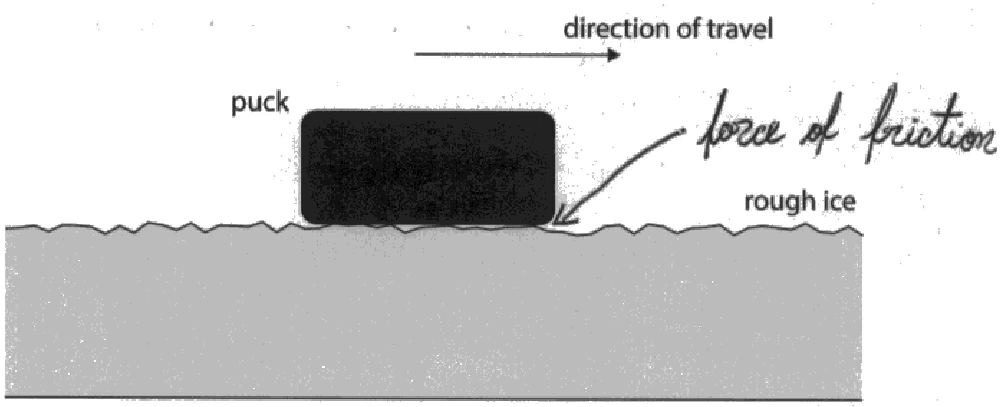


Diagram 2

The rough ice exerts a frictional force on the puck.

(i) Draw a labelled arrow on diagram 2 to show the force of friction acting on the puck.

(1)

ResultsPlus
Examiner Comments

This response scored 0 marks. It is not clear that the force of friction is acting to the left.

ResultsPlus
Examiner Tip

Candidates should draw force arrows using a ruler, to add clarity when judging their direction.

Question 1(b)ii

Most candidates recognised that the speed would decrease. However, fewer candidates gained the second marking point. When answering questions involving velocity, candidates should consider both the magnitude and the direction of the vector quantity.

(ii) Explain how the force of friction changes the velocity of the puck.

(2)

The friction helps the puck to slow down by having a rough surface.

(Total for Question 1 = 7 marks)

ResultsPlus
Examiner Comments

This response scored 1 mark. The first marking point has clearly been met, but the explanation given is insufficient.

(ii) Explain how the force of friction changes the velocity of the puck.

(2)

The force of friction decreases the velocity which causes the puck to slow down. This is because friction travels in the opposing direction in which the puck is travelling. If the forces of friction is high the ~~amount~~ velocity will decrease by a larger amount.

(Total for Question 1 = 7 marks)

ResultsPlus
Examiner Comments

This response scored 2 marks. The candidate clearly recognises that it is due to friction acting in the opposite direction to velocity that causes the puck to slow down.

Question 2(a)i

Most candidates scored at least one mark in this question. The most common mistake was selecting the correct diagram for the orbit of the Earth around the Sun. Some candidates ticked multiple boxes in a row, which prevented the mark from being awarded for that row.

Question 2(a)ii

Most candidates answered this question correctly by simply writing "gravity". Some candidates incorrectly gave gravitational field strength, gravitational potential or centripetal force (which was not accepted as it is the effect of a force, not the force itself), indicating an incomplete understanding of the differences between these and gravitational force.

Question 2(b)i

Most candidates knew the answer to this question. "Universe" was a common incorrect response.

Question 2(b)ii

Although the question referred specifically to the stars in Table 2, many candidates gave generalised responses, usually linking colour to temperature but sometimes including unrelated properties of stars. Several candidates mistakenly believed that white stars are hotter than blue-white stars, often citing Sirius B as the hottest.

Other candidates frequently related colour to other quantities such as mass or luminosity or incorrectly associated it with a particular stage in the star's life cycle.

(ii) Explain how the stars in table 2 can be classified according to their colour.

(3)

By the temperature. Red means it has the highest surface temperature. As you go down the surface temperature decreases. From the table we know Antares ~~the~~ is the hottest, ~~cool~~ and Vega is the coolest.

ResultsPlus
Examiner Comments

This response scored 1 mark. The candidate has recognised that the colour of the stars represents their (surface) temperature. However, their understanding of which colour is hottest/coolest is incorrect.

ResultsPlus
Examiner Tip

It is a common misconception that red is hot and blue is cold.

(ii) Explain how the stars in table 2 can be classified according to their colour.

(3)

Antares would be Coolest Start due to it having a red Colour, then Capella is hotter than antares since it has a yellow. Sirius B would be the Second hottest and brightess hence it has a white Colour and Vega the hottest and brightess due to it blue-white Colour.

ResultsPlus
Examiner Comments

This is an excellent response that scored full marks. The candidate has clearly communicated their understanding of the link between colour and temperature and has given a comprehensive order of the stars from the table.

Question 2(b)iii

Most candidates were able to identify the stages correctly. However, some included extra stages, which were either irrelevant or wrong. Some candidates misunderstood what was being asked and gave detailed explanations of the stages rather than naming them.

(iii) Describe the likely future evolution of Antares.

(3)

The Antares would change to a Supernova due to the Star's temperature Cooling off, then from a Super nova, it would evolve to a black hole.

ResultsPlus
Examiner Comments

This response scored 2 marks. The candidate has not included the neutron star evolutionary stage despite it being more likely than a black hole.

Question 2(b)iv

Many responses focused on Vega's size rather than its mass, which was the relevant physical property, often not stating that the mass should be in relation to the Sun. Some candidates misunderstood the question and discussed Vega's current evolutionary stage.

Some candidates missed the instruction to consider what additional information would be useful beyond the colour and evolutionary stage that had already been provided in the table.

(iv) Describe what additional information is needed to predict the next evolutionary stage for Vega.

(2)

In order to predict the next evolutionary stage for Vega, we need to know its size. For example if it is larger or smaller than the sun.
~~for order~~

(Total for Question 2 = 13 marks)

ResultsPlus
Examiner Comments

This response scored 1 mark. The candidate knows that a property of the star should be compared to the Sun but has not given the correct property.

(iv) Describe what additional information is needed to predict the next evolutionary stage for Vega.

(2)

The mass of vega should be given because if it is a larger mass star it would turn to a red supergiant but ~~it~~ if it does not have a large mass it would turn to a red giant.

(Total for Question 2 = 13 marks)

ResultsPlus
Examiner Comments

This response also scored 1 mark. This candidate has selected the correct property of the star, but does not know that the mass should be compared to the mass of the Sun.

Question 3(a)i

Many explanations mentioned that the voltages must sum to the supply voltage but did not clearly link this to the fact that they were looking at a series circuit and did not state this. Numerical justifications of the 2.1V were also a commonly accepted response.

Question 3(a)ii-iv

Mistakes were seen frequently in these linked calculations. Many candidates chose an incorrect voltage in Q03(a)(ii) but were still able to score full marks for an otherwise correct calculation. Most candidates knew that the current in Q03(a)(iii) was the same as previously calculated and scored this mark. In Q03(a)(iv) incorrect voltages were, again, seen frequently, which carried a greater penalty due to the voltage being given explicitly in the question.

(ii) The resistor in the circuit has a resistance of 290 Ω.

Calculate the current in the resistor.

Use the formula

voltage = current × resistance

(3)

$I = \frac{V}{R}$ $\frac{6}{290} =$

current = 0.0206 A

(iii) State the reading on the ammeter.

(1)

ammeter reading = 0.0206 A

(iv) Calculate the resistance of the thermistor.

(3)

$R = \frac{V}{I} = \frac{3.9}{0.02}$

resistance = 195 Ω

ResultsPlus
Examiner Comments

This candidate chose an incorrect voltage in Q03(a)(ii) but still scored 2 marks as their clear working enabled the examiner to see where the mistake was made. In Q03(a)(iii) the mark was given for error carried forward (ecf). The candidate scored full marks in Q03(a)(iv). This time, they have selected the correct voltage and used their value of the current correctly.

ResultsPlus
Examiner Tip

Candidates should show all the steps in their working so that marks can be awarded in the event that the candidate makes a mistake.

(ii) The resistor in the circuit has a resistance of 290 Ω.

Calculate the current in the resistor.

Use the formula

voltage = current × resistance

(3)

Soln

$$\text{Current} = \frac{\text{Voltage}}{\text{resistance}}$$

$$\text{Current} = \frac{2.1}{290}$$

Current = 0.0072 A

current = 0.0072 A

(iii) State the reading on the ammeter.

(1)

ammeter reading = 0.0072 A

(iv) Calculate the resistance of the thermistor.

(3)

Soln

$$\text{resistance} = \frac{\text{Voltage}}{\text{Current}}$$

$$\text{resistance} = \frac{3.9}{0.0072}$$

resistance = 541.7 Ω

resistance = 541.7 Ω

ResultsPlus
Examiner Comments

This response scored full marks. The candidate has completed all the calculations correctly.

Question 3(b)i

This question proved challenging to some candidates, as was the intention. Many candidates scored MP1, however MP3 in both routes was seen the least and was the discriminator. Some candidates got the scenario the wrong way round and suggested that the thermistor resistance increased. The second marking point on the left side of the Mark Scheme was seen quite often, establishing the link with lower resistance and a higher current.

(b) The student observes that the voltmeter reading increases as the temperature of the room increases.

(i) Explain this observation.

(3)

~~As the Flow has to pass thro~~ when the temperature increases, the resistance of the thermistor decreases allowing for a higher voltage to go through the voltmeter. less resistance from the thermistor allows more voltage to the voltmeter thus increasing the reading.

ResultsPlus
Examiner Comments

This response scored 1 mark. The candidate correctly states that the resistance of the thermistor will decrease but fails to make any links to why this will lead to a higher voltmeter reading.

OHMS LAW

(b) The student observes that the voltmeter reading increases as the temperature of the room increases.

(i) Explain this observation.

(3)

This is because as temperature increases, the resistance of the thermistor decreases. This will cause more current the flow through the circuit. This will increase the current in the fixed resistor as well. Because V = IR and R is constant and current and voltage are directly proportional due to ohm's law, the voltage reading will increase.

ResultsPlus
Examiner Comments

This response scored full marks. In addition to stating that the resistance of the thermistor will decrease, the candidate then recognises that the current in the circuit will increase, which leads to a higher voltmeter reading for the resistor since voltage = current x resistance and the resistance of the resistor will not change.

Question 3(b)ii

This question was answered well by most candidates. Many used the diagram to show, even if not stated, that the thermistor was in the water. Most candidates scored from the first 3 marking points. The last two were rarely seen.

Some candidates added unnecessary equipment or failed to explain how temperature could be interpreted from the results.

Question 4(a)

The question stem already covered the production of neutrons, so candidates were expected to identify a different useful product. Responses that mentioned radiation or radioactive particles did not address the actual question, which was looking for energy as the useful output.

Question 4(d)i

Many responses gave examples of ionising radiation rather than explaining the term. Others were too vague, referring to the removal of electrons from objects or substances rather than atoms or molecules. Some candidates mistakenly stated that electrons could be gained during ionisation, which was not credited.

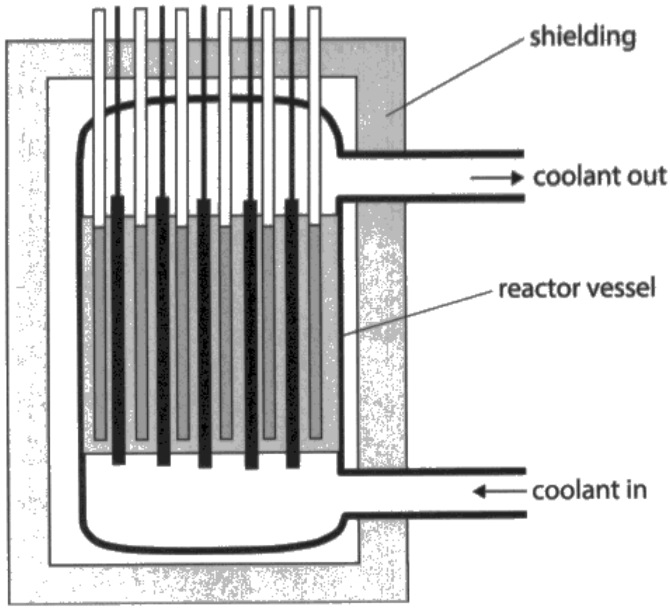
Question 4(d)ii

Some candidates mixed up spontaneously with not being predictable. Many candidates simply re-worded the stem of the question.

Question 4(d)iii

This three-mark question required candidates to explain why shielding is necessary, how it works, and what it prevents. Some responses were too general, referring to danger which is less specific than the harm caused by radiation escaping from the reactor vessel.

(iii) The diagram shows some parts of a nuclear reactor.



Explain the role of shielding in a nuclear reactor.

(3)

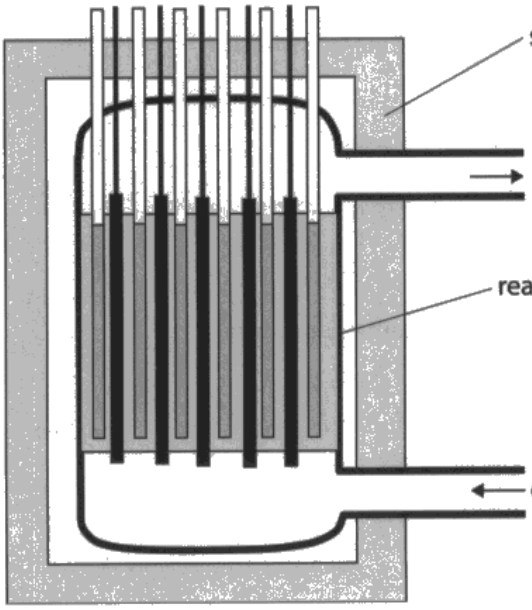
The shielding in a nuclear reactor prevents Nuclear radiation which is ~~from escaping~~ ~~from~~ very harmful to humans from escaping the nuclear reactor

(Total for Question 4 = 8 marks)

Examiner Comments

This response scored 2 marks. The candidate has identified that the shielding prevents radiation from escaping and also that the radiation is harmful. However, they have not explained how the shielding stops the radiation escaping.

(iii) The diagram shows some parts of a nuclear reactor.



Explain the role of shielding in a nuclear reactor.

(3)

the Shielding absorb the radiation so no radiation can escape and effect human? and it mostly made of lead as it good absorber of radiation. Keep the heat inside so it can be used to produce a steam.

example cancer

(Total for Question 4 = 8 marks)

ResultsPlus
Examiner Comments

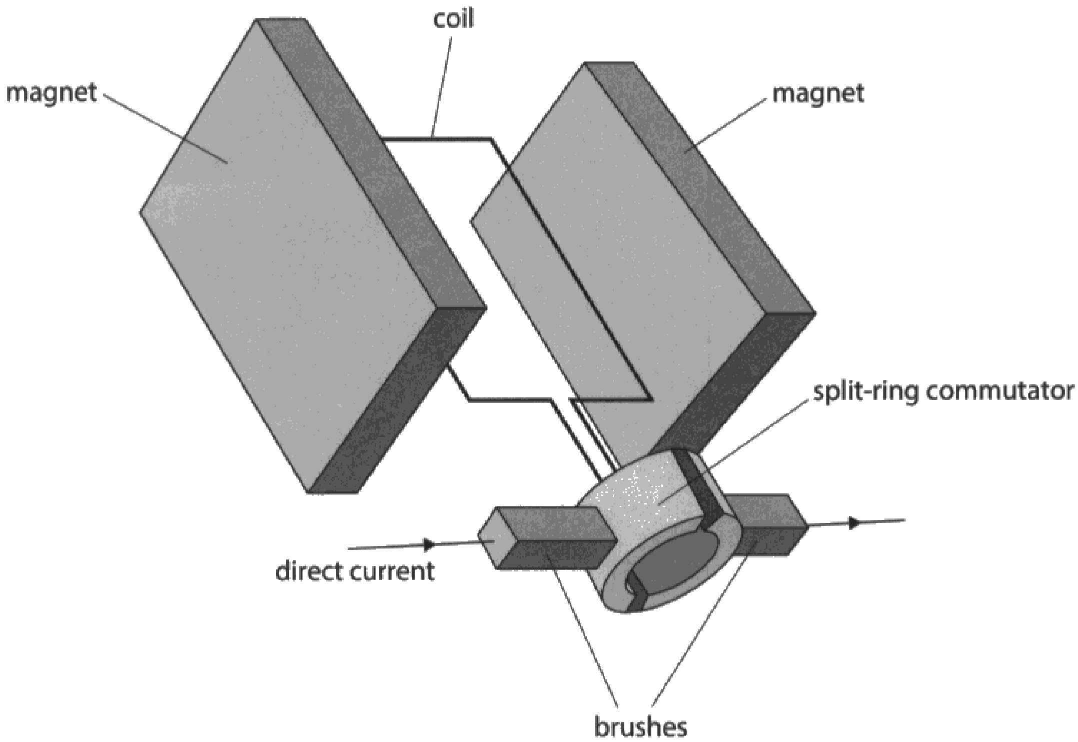
This response scored 3 marks. The candidate correctly states that the shielding absorbs the radiation, so the radiation cannot escape. The reference to the radiation causing cancer is sufficient for communicating that it is harmful.

Question 5

Many candidates showed a good understanding of how an electric motor operates. However, not all clearly stated that the current is reversed, not just changed, and that this results in a reversal of the direction of the force. The explanation of the roles of the split ring commutator and the brushes were often vague. Some responses also confused the principles of a DC electric motor with electromagnetic induction, particularly when discussing the coil and the magnets.

Candidates often described induction as “cutting field lines” or confused the production of magnetic fields with the generation of current.

5 The diagram shows a simple direct current (d.c.) electric motor.



Explain why the coil turns continuously when the motor is connected to a direct current supply.

You should refer to the brushes and the split-ring commutator in your answer.

The coil turns continuously in a DC motor because the split ring commutator reverses the direction of the current in the coil always acting in the same rotational direction.

The brushes maintain electrical contact with the rotating split ring commutator, allowing current to flow into the coil while it spins. As the commutator reverses the current, the coil keeps turning in one direction instead of stopping or reversing

(Total for Question 5 = 6 marks)

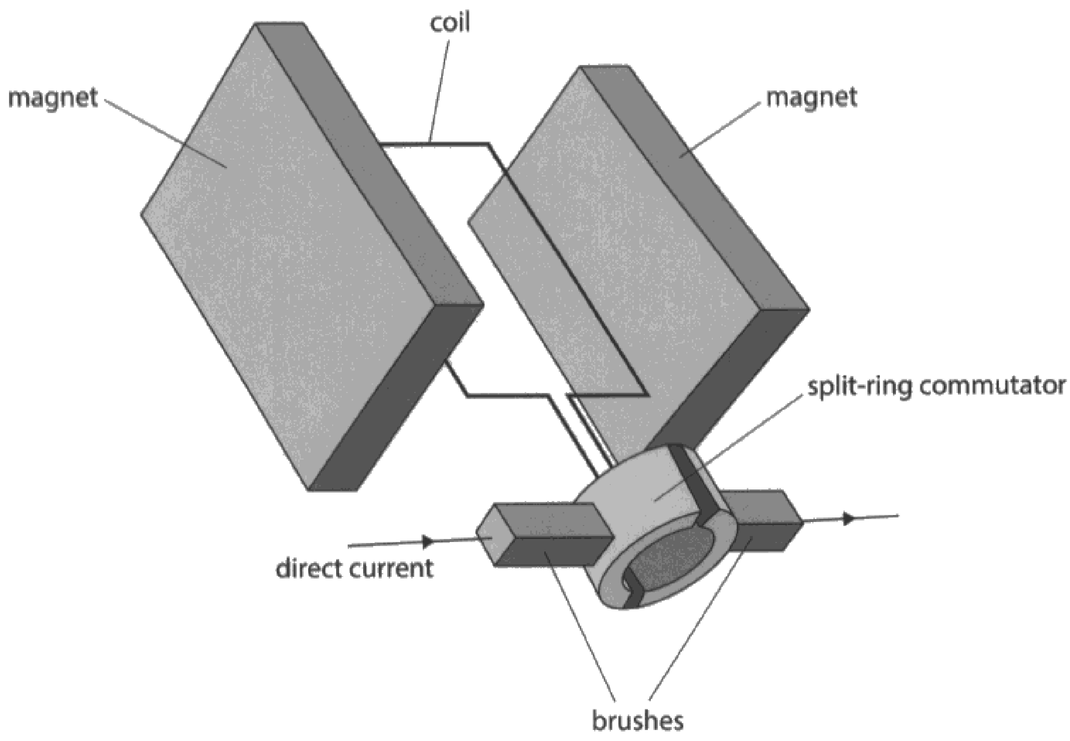
ResultsPlus
Examiner Comments

This response scored 2 marks. The candidate scores MP5 for recognising the role of the commutator and also MP4 for the role of the brushes. There is no overall explanation as to how the motor works, so the candidate has not fully answered the question.

ResultsPlus
Examiner Tip

Candidates should read questions carefully to ensure their answers fulfil all the demands of the question.

5 The diagram shows a simple direct current (d.c.) electric motor.



Explain why the coil turns continuously when the motor is connected to a direct current supply.

You should refer to the brushes and the split-ring commutator in your answer.

The current forms a magnetic field around the coil so there will be interaction between magnetic field of the magnet and magnetic field of the coil and this exert a force on the coil. Since the current is direct so the force will not change the direction But the commutator cause the force to change the direction, as the coil turns and cause it to return to its original continously direction so it can still work

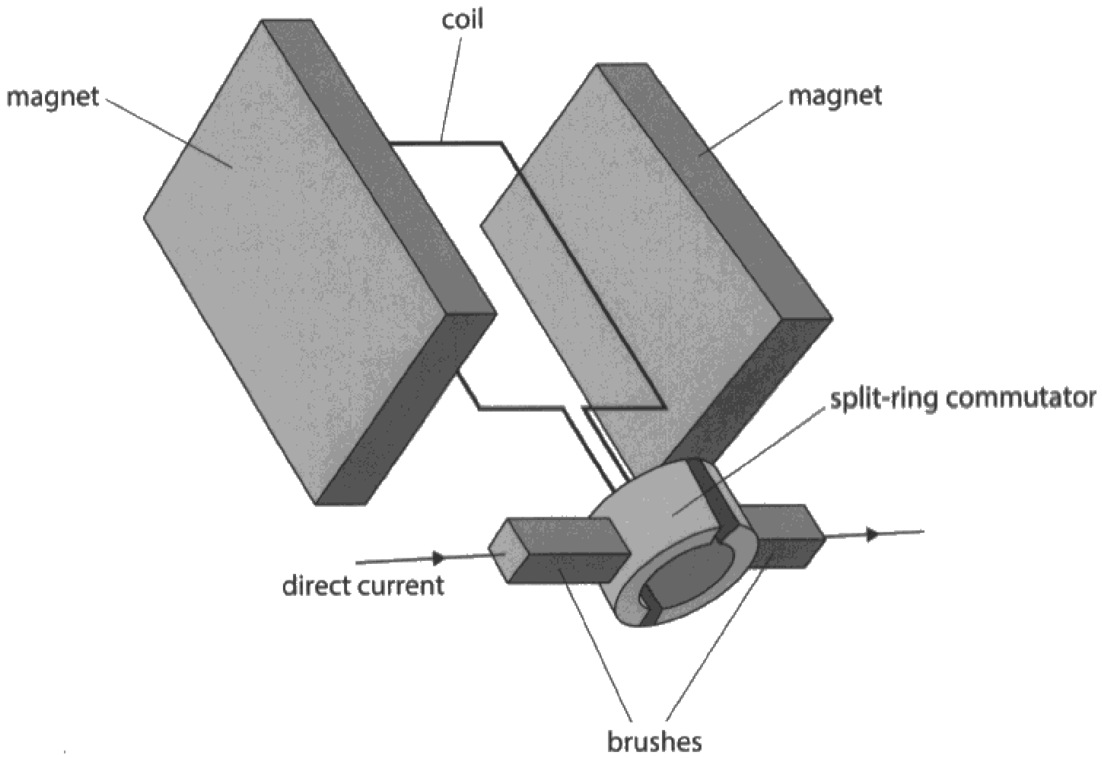
In addition, the brushes keep the split-ring commutator rotate and work so the force keep changing the direction.

(Total for Question 5 = 6 marks)

ResultsPlus
Examiner Comments

This response scored 4 marks. The candidate scores MP1, MP2 and MP3 for their basic explanation as to how the motor turns. The candidate also scores MP6 for their knowledge of the purpose of the commutator. Their explanation of the brushes is insufficient to score any further marks.

5 The diagram shows a simple direct current (d.c.) electric motor.



Explain why the coil turns continuously when the motor is connected to a direct current supply.

You should refer to the brushes and the split-ring commutator in your answer.

The electric current ~~[illegible]~~ sets up a magnetic field around the coil, ~~[illegible]~~ which interacts with the magnetic field of the permanent magnet, producing a force. The current on each side of the coil flows in opposite directions, hence the forces produced on both sides are also opposite, causing the coil to turn/rotate. The split ring commutator reverses the direction of current every half turn allowing continuous rotation of the coil, as without it the coil would vibrate ~~and~~ since direction of force on each side keeps changing. The carbon brushes connect the split ring commutator and coil ~~and~~ allowing the coil to connect back to the circuit and direct current to continue flowing through it after every rotation. Hence alternating current is not required (because of split ring commutator).

(Total for Question 5 = 6 marks)

ResultsPlus
Examiner Comments

This excellent response scored 6 marks. The candidate gives a full and comprehensive explanation of how the motor works including understanding of the roles of the commutator and brushes.

Question 6(a)

Many candidates gave the correct answer or an alternative from the notes column. Some weaker candidates thought that the delay was caused by the time taken for sound to travel from one student to the other.

Question 6(b)

Some candidates failed to convert centimetres to metres, which meant that the calculation of energy in Q06(b)(i) was incorrect as it could not result in joules. However, many responses were otherwise correct and most candidates knew to give their final answer to more significant figures than the 3000J stated in the question. The mean calculation in Q06(b)(ii) proved accessible for most candidates. Mistakes were only seen in incorrect rounding or, occasionally, misusing a calculator when adding the values together and dividing the total by 3.

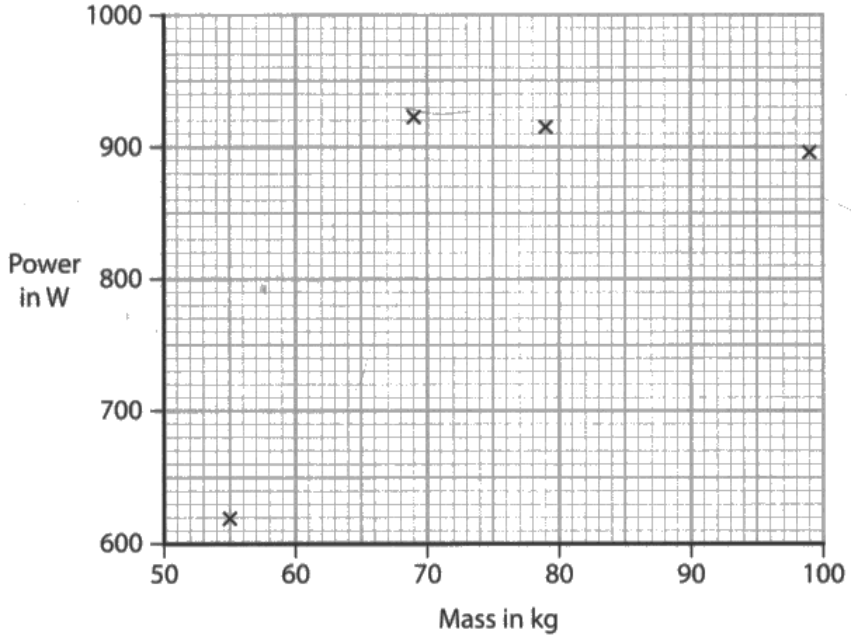
Question 6(c)

The intention of this question was missed by most candidates. Candidates were expected to assess the graph and the conclusion on the basis of the quality of the data eg the small number of data points, poor range etc. Many candidates did not link their answer to the data provided in this question. For example, they wrote about why power should be greater with more mass and used formulae. Others stated the test is not fair as you do not know the age / height / fitness / diet of the subjects, all scoring zero marks. The most common ideas were the anomalous result and MP8.

The strongest answers referred directly to the data points and suggested specific additional measurements.

(c) The students extend their investigation by calculating the power for students of different masses running up the steps.

The graph shows their results.



The students conclude that the greater the mass of the person, the greater the power of the person when running up the steps.

Comment on the students' conclusion.

(4)

This is incorrect because when the persons mass is 70kg its ~~above~~ higher in power than when the person is 80kg. So the greater mass of the person doesn't depend on the power

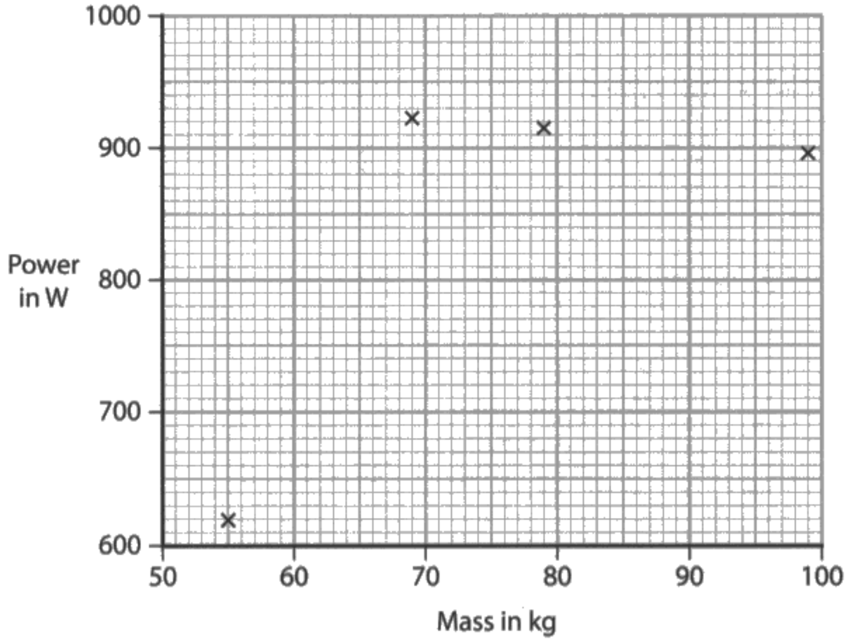
(Total for Question 6 = 12 marks)

ResultsPlus
Examiner Comments

This response scored 1 mark for MP8. The candidate is correct but has failed to explore this question in depth.

(c) The students extend their investigation by calculating the power for students of different masses running up the steps.

The graph shows their results.



The students conclude that the greater the mass of the person, the greater the power of the person when running up the steps.

Comment on the students' conclusion.

(4)

- As mass increase from 55kg to 69kg, the power increases drastically.
- As mass increas from 69kg onwards, the power decreases gradually. • This may be due to variation of time taken to climb stairs
- Students claim is inaccurate
- First result may be anomaly, it doesn't fit the trend
- Unreliable, only repeated two times, human errors may cause the anomaly.

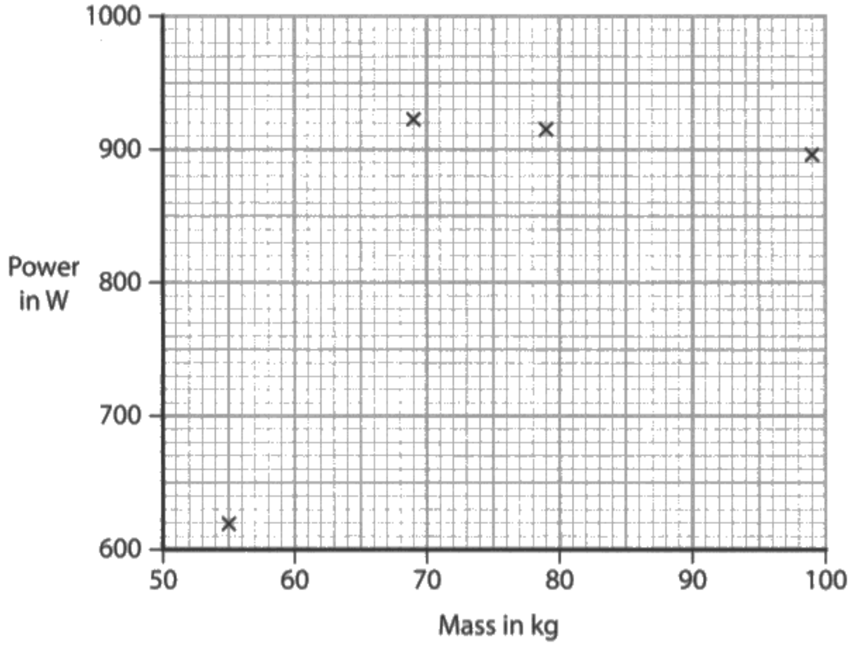
(Total for Question 6 = 12 marks)

ResultsPlus
Examiner Comments

This response scored 3 marks. The candidate has given a more detailed conclusion (gaining MP4 and MP6) in addition to suggesting that one of the points may be anomalous (MP5).

(c) The students extend their investigation by calculating the power for students of different masses running up the steps.

The graph shows their results.



The students conclude that the greater the mass of the person, the greater the power of the person when running up the steps.

Comment on the students' conclusion.

(4)

the conclusion is not a very reliable one as they have factored in an anomolous result. additionally, they have not repeated the experiment many times, only with 4 different people, there should be a wider range of masses. also their results ~~...~~ (ignoring the anomoly) actually appear to demonstrate that power decreases as mass increases so I disagree with the conclusion. furthermore there is also no line of best fit on the graph.

(Total for Question 6 = 12 marks)

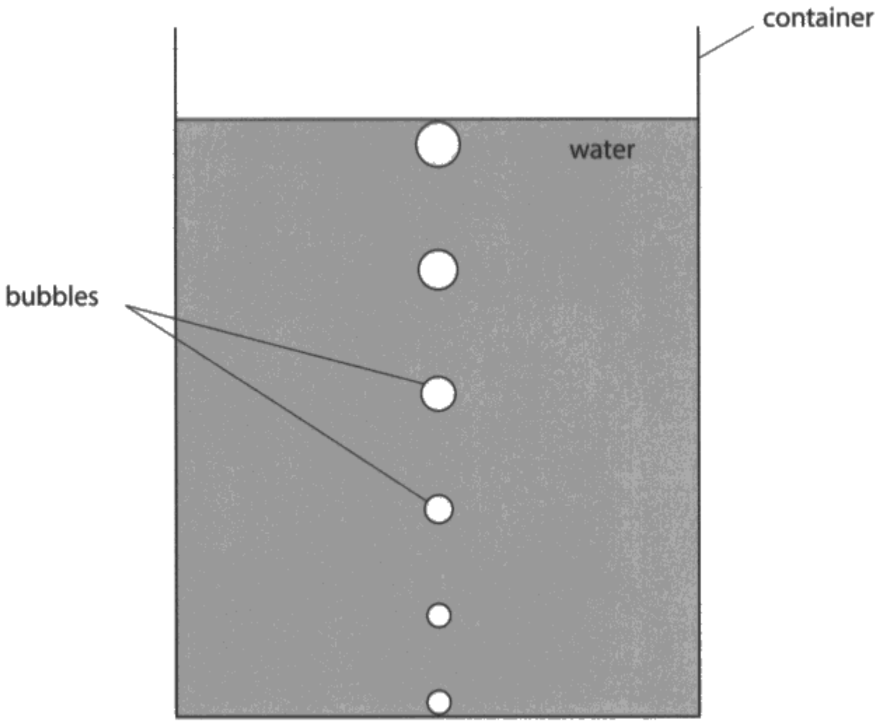
ResultsPlus
Examiner Comments

This candidate has critiqued the conclusion in great detail on the basis of the data presented in the graph. They score MP1, MP2, MP5 and MP6 for a total of 4 marks in this response.

Question 7(a)ii

Most responses correctly stated the link between pressure and depth, though fewer gave full explanations. Some candidates referred to the formula involving density, gravitational field strength and height, but did not define height or explain how it related to the water in the container. A few responses wrongly suggested that water density varied throughout the container.

(ii) The diagram shows the air bubbles rising to the surface of the water in a container.



Explain why the bubbles increase in volume as they get nearer to the surface of the water.

Assume that the temperature of the water is the same throughout the container.

(3)

As the distance between bubble and the water surface increase, the amount of water that is above a bubble will increase, causing more pressure to be exerted on the bubbles from all sides, making its volume smaller. As the bubble moves upwards, less pressure will be exerted on it by the water so it will increase in size. ($P_1V_1 = P_2V_2$) (Pressure is inversly proportional to the volume).

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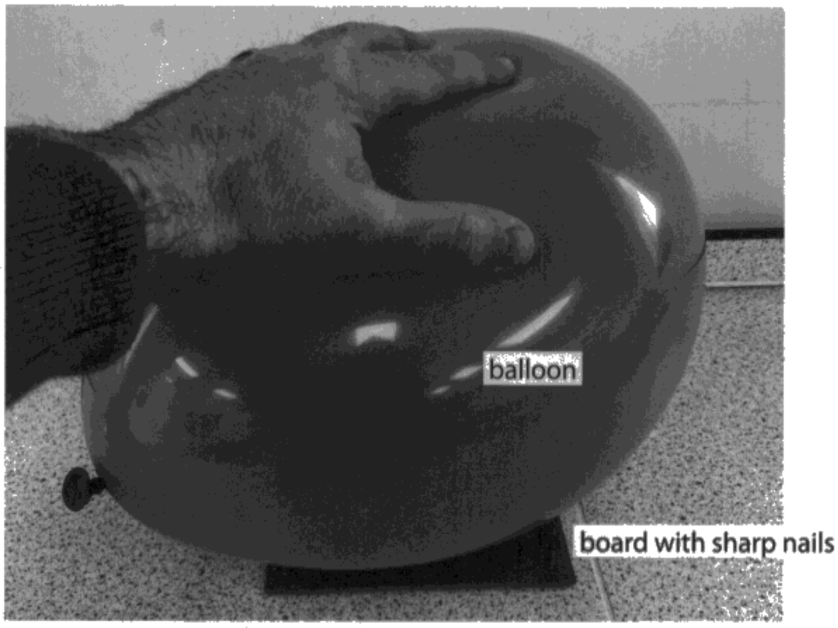
Examiner Comments

This response scored full marks. The candidate has demonstrated a full understanding of the link between depth and pressure and the further link to the volume of the bubbles.

Question 7(b)

The best answers to this question began with the relevant formula and used it to structure their explanations. Some responses lacked clarity, with repeated or vague statements such as the pressure being spread out over the nails. There was some confusion between two approaches: one considering force as constant and changing area, and the other changing force for a given area. Some responses mixed these ideas and lost marks as a result.

(b) A teacher does a demonstration using an inflated balloon and a board with many sharp nails.



The teacher pushes the balloon onto the board of nails. The balloon does not pop.

The teacher then pops the balloon using a single nail.

Explain why the balloon does not pop when pushed onto the board of nails.

(3)

The force of the balloon is distributed on a larger surface area of nails, which decreases the pressure on the balloon as pressure = $\frac{\text{force}}{\text{area}}$, leading to it not popping. The smaller surface area of the single nail causes pressure to increase which is why the balloon popped.

(Total for Question 7 = 7 marks)

ResultsPlus
Examiner Comments

This response scored 3 marks from the first alternative on the mark scheme. The candidate has presented their ideas clearly to give a comprehensive explanation of the observations described in the question.

Question 8(a)

This was answered well in most cases with just a few candidates getting confused between longitudinal and transverse waves. Lots of candidates added a diagram of a transverse wave but many were not labelled correctly so could not be used to support their answer. There were often poorly expressed ideas about what the oscillations/vibrations were perpendicular to. Vague expressions such as "perpendicular to motion" were not credited.

8 A student uses a ripple tank to investigate water waves.

Diagram 1 shows the ripple tank when viewed from the side.

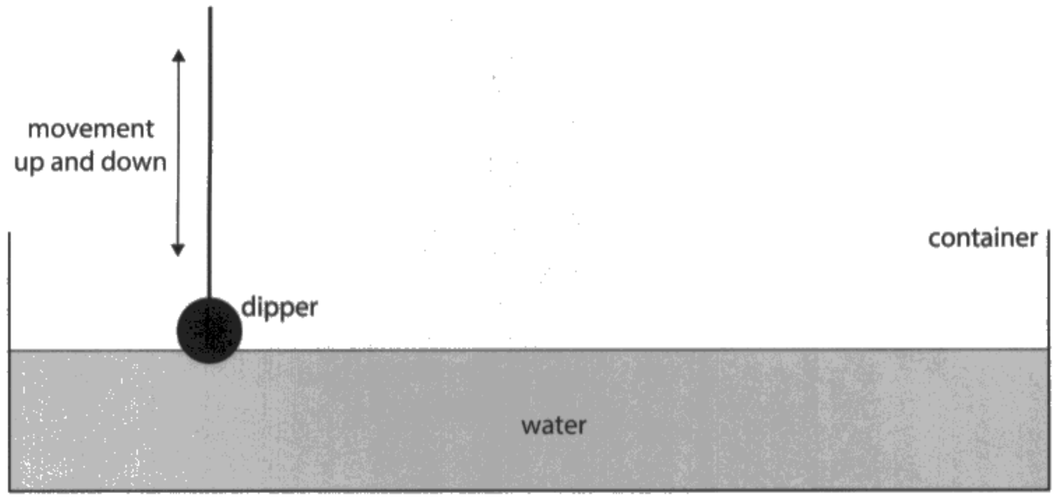


Diagram 1

A dipper moves up and down to produce waves on the surface of the water in the container.

(a) The waves on the surface of the water are transverse.

State what is meant by a **transverse wave**.

You may draw a diagram to help your answer.

(2)

a wave that travels at right angles to the directio of travel

ResultsPlus
Examiner Comments

This response was awarded 1 mark for the idea that something is perpendicular to the direction of travel (of the wave).

ResultsPlus
Examiner Tip

Candidates should be familiar with definitions and be able to recall them when asked.

8 A student uses a ripple tank to investigate water waves.

Diagram 1 shows the ripple tank when viewed from the side.

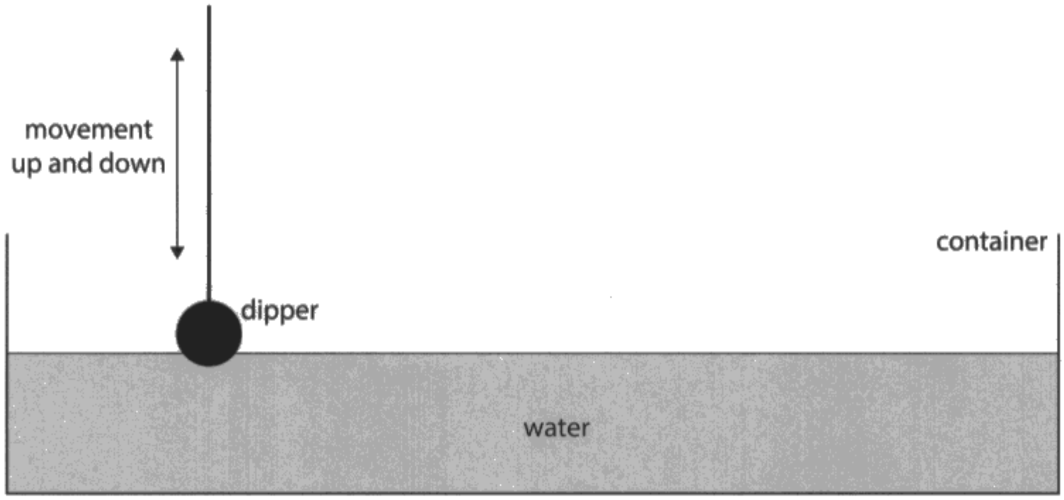


Diagram 1

A dipper moves up and down to produce waves on the surface of the water in the container.

(a) The waves on the surface of the water are transverse.

State what is meant by a **transverse wave**.

You may draw a diagram to help your answer.

(2)

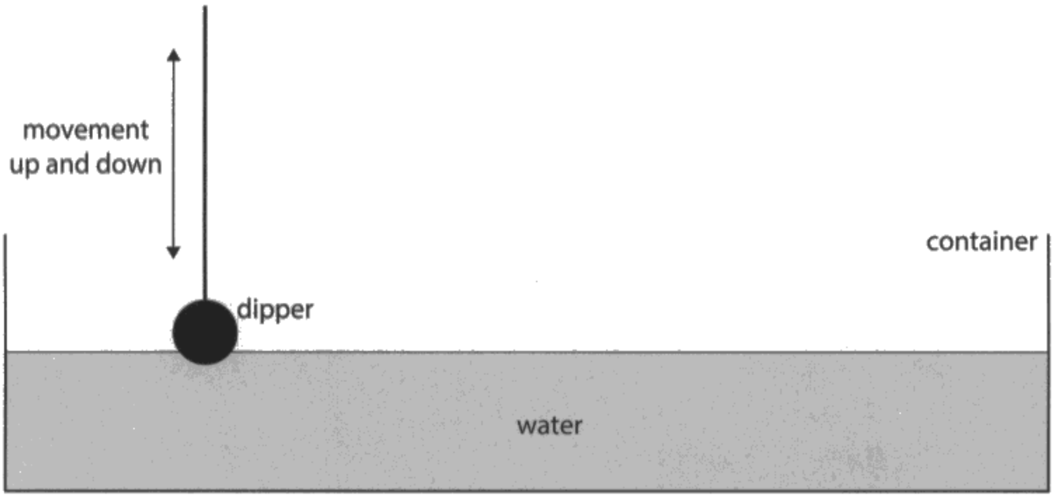
transverse waves vibrate perpindecular to motion

ResultsPlus
Examiner Comments

This response also scored 1 mark. The idea of vibrations was credited, but the link to them being perpendicular to motion was too vague to be awarded the second mark.

8 A student uses a ripple tank to investigate water waves.

Diagram 1 shows the ripple tank when viewed from the side.



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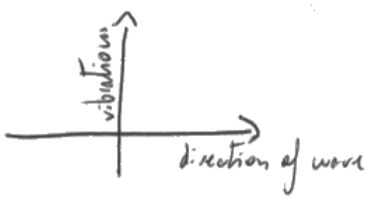

the vibrations are at a 90° angle with the direction of the wave (perpendicular)

ResultsPlus
Examiner Comments

This response scored 2 marks. The writing and the diagram are clear enough to get both marks on their own merits.

Question 8(b)

The scale factor was well understood in Q08(b)(i) even if the measurements were incorrect. Most candidates also scored well in the subsequent calculation, although many did not do the unit conversion of cm to m. This was a very accessible question and with the ecf's the majority were able to get marks and show skills even if not fully correct.

(b) Diagram 2 shows the surface of the ripple tank, at an instant in time, when viewed from above.

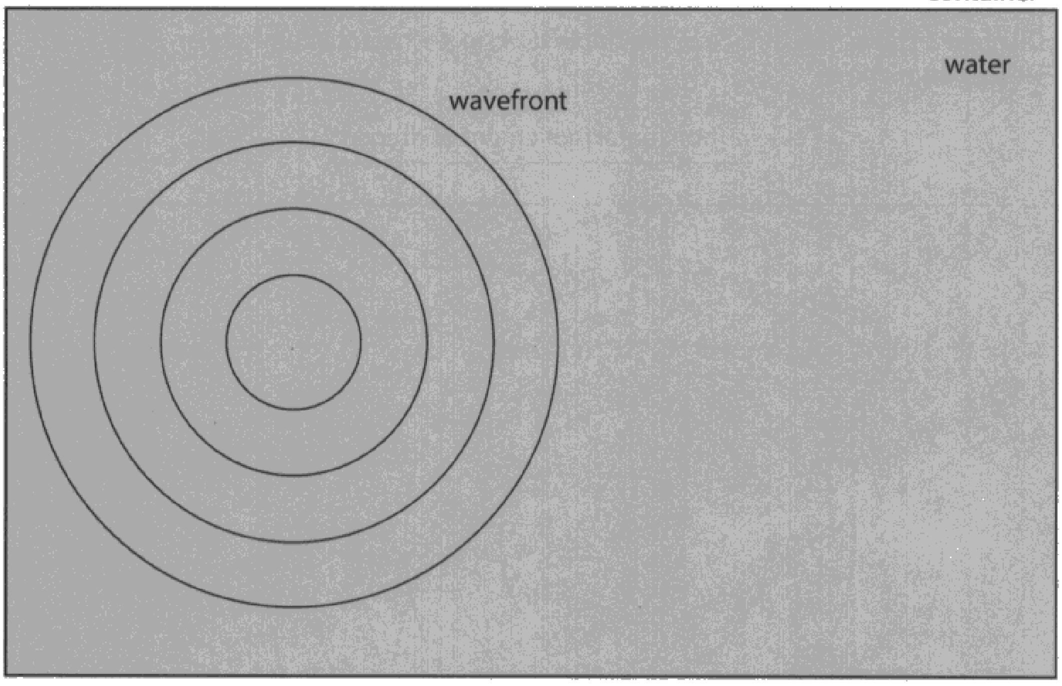

Diagram 2

The dipper produces circular waves on the surface of the water.

(i) 1 cm in diagram 2 is equal to 2 cm in the laboratory.

Use the diagram to measure the wavelength of the water waves.

(2)

$8 \times 2 = 16$

wavelength = 16 cm

(ii) The dipper moves up and down with a frequency of 15 Hz.

Calculate the speed of the waves.

(3)

wave speed = frequency x wavelength

wave speed = 16 x 15 = 240

wave speed = 240 m/s

ResultsPlus
Examiner Comments

This candidate does not know how to measure wavelength from the diagram but has used the scale factor correctly. The following calculation scores 2 marks out of 3 since the units of wavelength have not been converted from cm to m.

ResultsPlus
Examiner Tip

Candidates should know that the distance between adjacent wavefronts is equal to the wavelength of the wave.

(b) Diagram 2 shows the surface of the ripple tank, at an instant in time, when viewed from above.

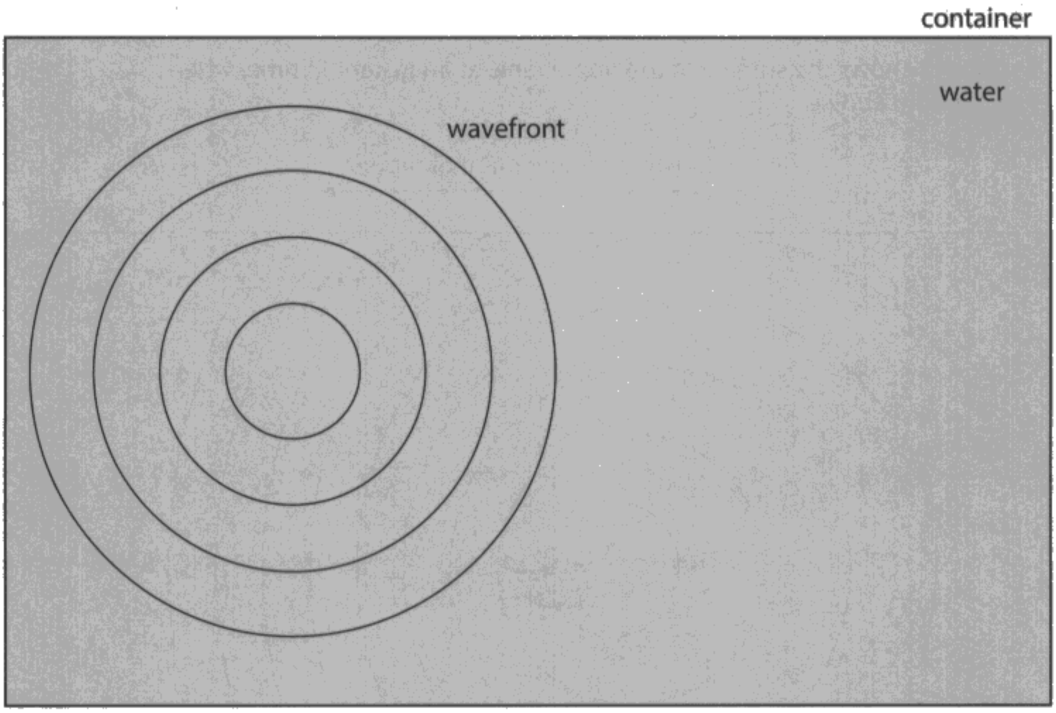

Diagram 2

The dipper produces circular waves on the surface of the water.

(i) 1 cm in diagram 2 is equal to 2 cm in the laboratory.

Use the diagram to measure the wavelength of the water waves.

(2)

wavelength = 2 cm

(ii) The dipper moves up and down with a frequency of 15 Hz.

Calculate the speed of the waves.

(3)

~~frequency =~~

~~wavelength~~ speed = frequency x wave length

wavespeed = 15 x 2

wavespeed = 30

wave speed = 30 m/s

ResultsPlus
Examiner Comments

This candidate has correctly determined the wavelength from the diagram. However, they do not convert this into metres when performing the subsequent calculation.

ResultsPlus
Examiner Tip

When performing calculations, work in standard units. The standard unit of distance (and wavelength) is the metre, m.

(b) Diagram 2 shows the surface of the ripple tank, at an instant in time, when viewed from above.

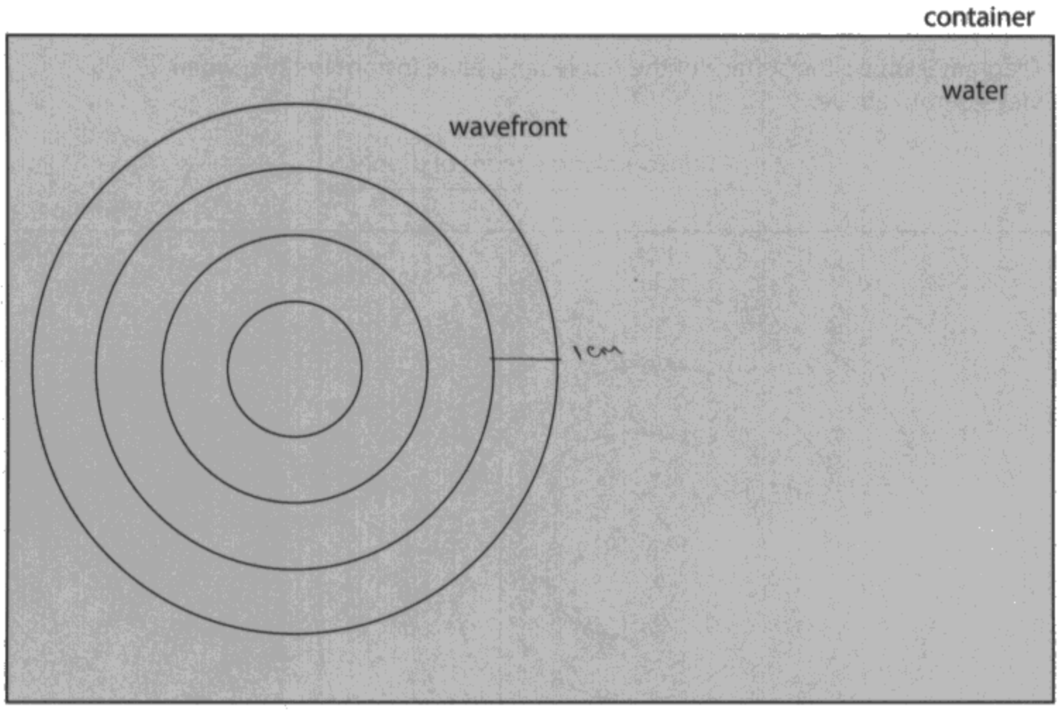

Diagram 2

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Use the diagram to measure the wavelength of the water waves.

(2)

1cm × 2 = 2cm

wavelength = 2 cm

(ii) The dipper moves up and down with a frequency of 15 Hz.

Calculate the speed of the waves.

(3)

wave speed = frequency × wavelength

v = 15 × ~~2~~ 0.02

2cm

↓

0.02m

~~v = 30~~

wave speed = ~~30~~ 0.3 m/s

ResultsPlus
Examiner Comments

This candidate scored full marks. Their working is clear and easy to follow.

Question 8(c)

Most candidates knew that the frequency at point X would be greater than the source frequency. However, the quality of explanations supporting this statement varied significantly between candidates. The least commonly awarded marking point was the clear observation that wavefronts were closer together, followed by a recognition that the wave speed was constant. Some candidates did not clearly distinguish between wavefronts, wavelength and waves, leading to confusion.

(c) The student then makes the dipper move horizontally to the right at constant speed.

The dipper continues to move up and down with a frequency of 15 Hz.

Diagram 3 shows the surface of the ripple tank, at an instant in time, when viewed from above.

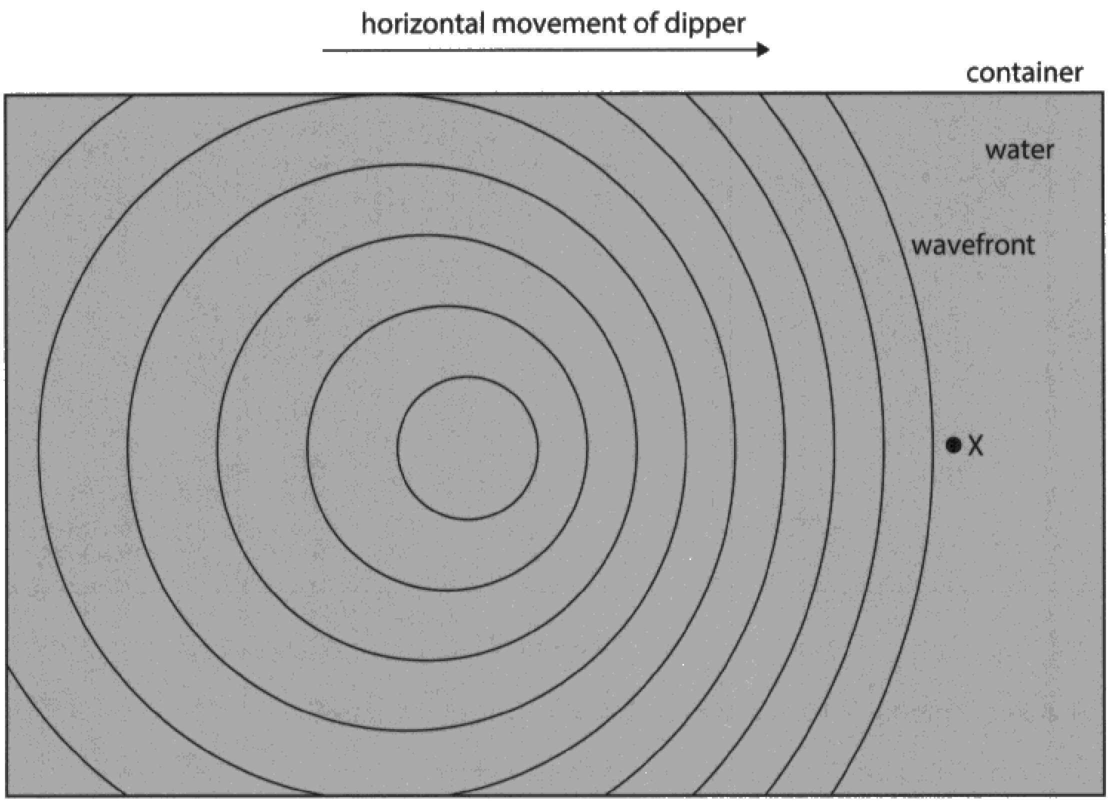


Diagram 3

Explain how the frequency of the waves arriving at point X compares with the frequency at which the dipper moves up and down.

(4)

The frequency of the wave arriving at point X is greater than ~~the~~ when the dipper moves up and down. This is because when the dipper moves horizontally, its wavelength decrease, ~~a~~ because of doppler effect causing the frequency to increase.

(Total for Question 8 = 11 marks)

ResultsPlus
Examiner Comments

This mid-level response scored 2 marks. The candidate knows that the frequency is greater and also that wavelength decreases. To improve their answer, they could use ideas about wavefronts to support the statement about wavelength and also provide a link between wavelength and frequency in the form of an equation.

(c) The student then makes the dipper move horizontally to the right at constant speed.

The dipper continues to move up and down with a frequency of 15 Hz.

Diagram 3 shows the surface of the ripple tank, at an instant in time, when viewed from above.

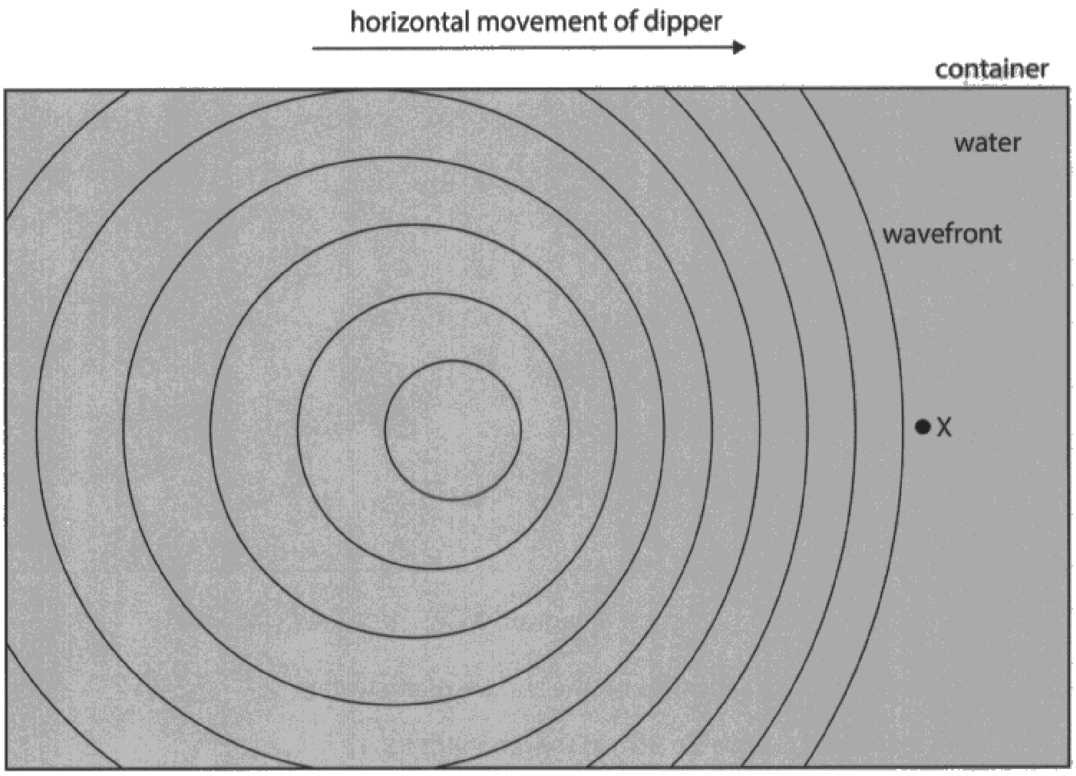


Diagram 3

Explain how the frequency of the waves arriving at point X compares with the frequency at which the dipper moves up and down.

(4)

At point x, the wave fronts are compressed which causes the frequency to Increase, compared to when the dipper moves up and down, the wave fronts are spread out, this cause an Increase in the wave length and a decrease in the frequency. Point x has shorter wavelength

(Total for Question 8 = 11 marks)

ResultsPlus
Examiner Comments

This high-level response scored 3 marks. The candidate has recognised that the wavefronts in front of X become compressed, which explains the decreasing wavelength. The response only lacks a link between wavelength and frequency.

(c) The student then makes the dipper move horizontally to the right at constant speed.

The dipper continues to move up and down with a frequency of 15 Hz.

Diagram 3 shows the surface of the ripple tank, at an instant in time, when viewed from above.

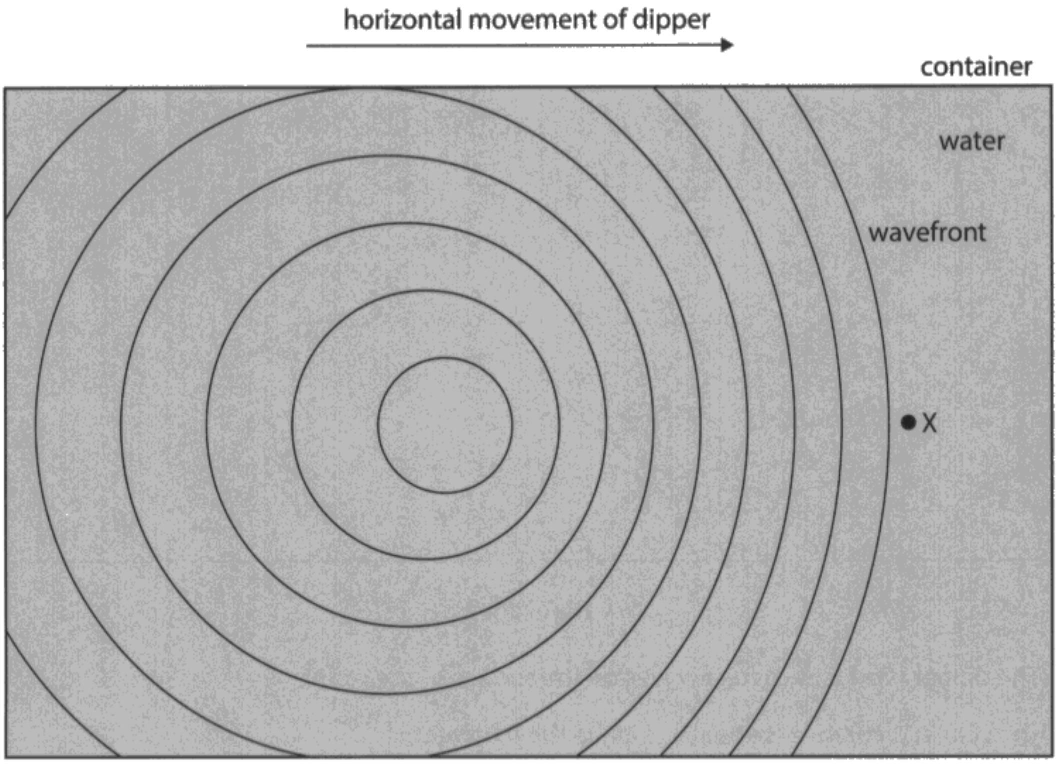


Diagram 3

Explain how the frequency of the waves arriving at point X compares with the frequency at which the dipper moves up and down.

(4)

The frequency at point X is greater than the frequency at which the dipper moves up and down. This is because the waves are moving towards or into point X which causes a shorter distance between the wavefronts and so the wavelength is reduces. As the waves are moving at constant velocity, then as the wavelength decreases the frequency will increase. " $v = \lambda \times f$ " (inversly proportional). This process is called the Doppler Effect.

(Total for Question 8 = 11 marks)

ResultsPlus
Examiner Comments

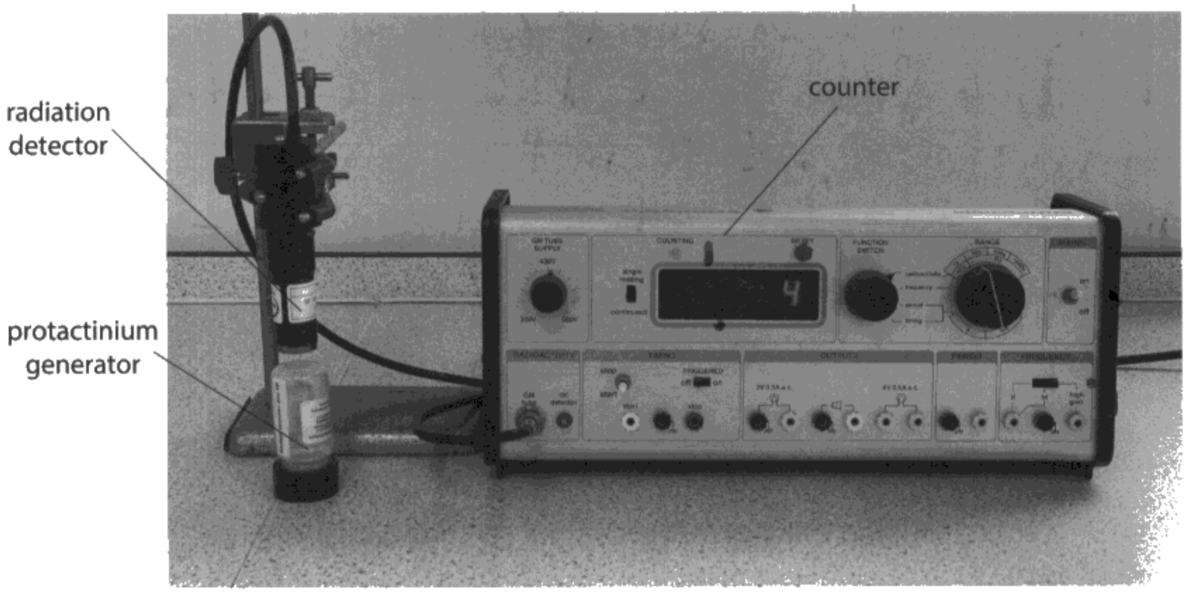
This highest-level response scores all 4 marks and shows a comprehensive understanding of the Doppler effect.

Question 9(a)

Most candidates scored the mark in this question, despite a wide variance in spellings.

9 A protactinium generator is a device that can produce samples of an isotope called protactinium-234m.

A teacher investigates the activity of protactinium-234m using the apparatus shown in the photograph.



(a) The teacher uses a radiation detector to detect the radiation emitted from the protactinium-234m.

Give the name of a suitable radiation detector.

(1)

Photography films

ResultsPlus
Examiner Comments

Despite photography film being a detector of radiation, it would not work in this context and so was not credited.

9 A protactinium generator is a device that can produce samples of an isotope called protactinium-234m.

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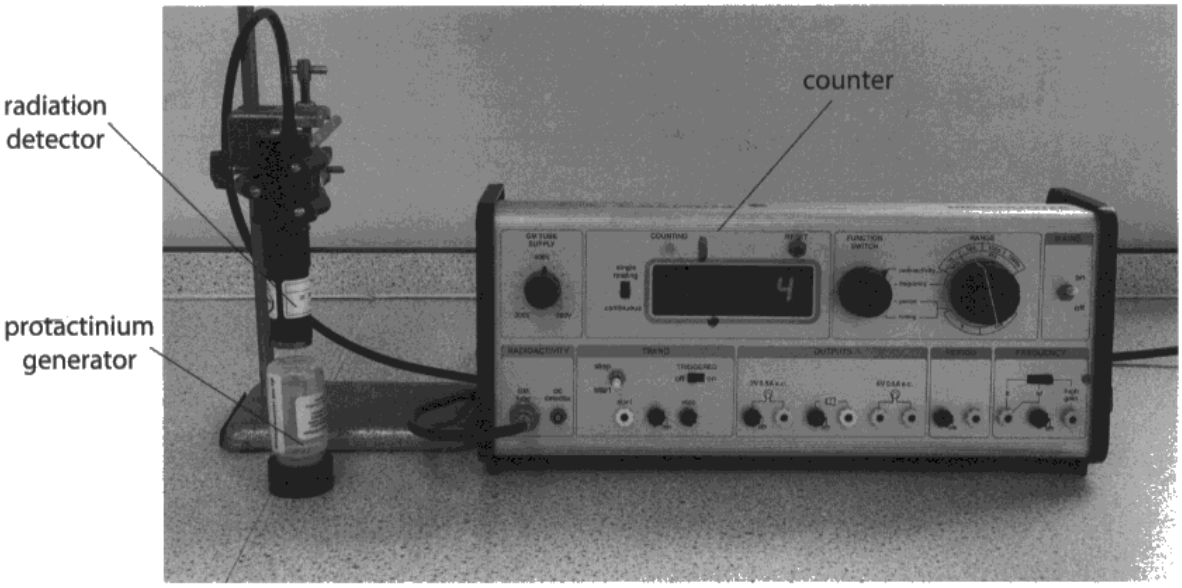


(a) The teacher uses a radiation detector to detect the radiation emitted from the protactinium-234m.

Give the name of a suitable radiation detector.

(1)

Geiger muller tube

ResultsPlus Examiner Comments

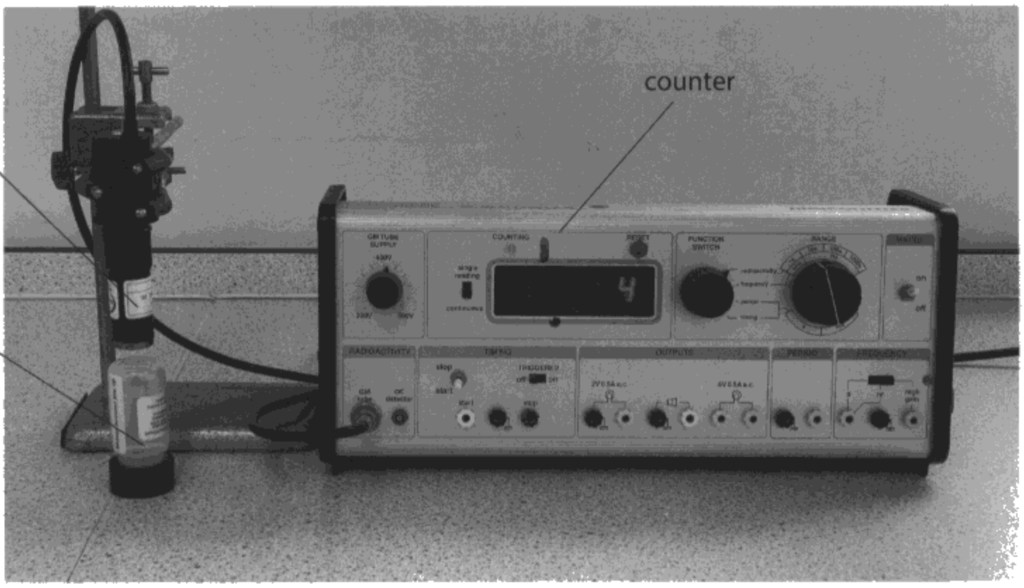
A correct answer.

9 A protactinium generator is a device that can produce samples of an isotope called protactinium-234m.

A teacher investigates the activity of protactinium-234m using the apparatus shown in the photograph.

radiation detector

protactinium generator



(a) The teacher uses a radiation detector to detect the radiation emitted from the protactinium-234m.

Give the name of a suitable radiation detector.

(1)

GM tube

ResultsPlus
Examiner Comments

Another correct, albeit abbreviated, answer.

Question 9(b)

This was answered well with marking points 1, 2 and 4 being the most popular correct responses. Many candidates wrote about using lead clothing, which was ignored.

(b) Give two safety precautions to minimise the risk of harm to the teacher from the radiation emitted by the protactinium generator.

(2)

1 Wear gloves

2 ~~the~~ Wear lead aprom

ResultsPlus
Examiner Comments

This response scored one mark (MP4). Lead apron was ignored.

(b) Give two safety precautions to minimise the risk of harm to the teacher from the radiation emitted by the protactinium generator.

(2)

1 Wear gloves

2 Wear a lab coat

ResultsPlus
Examiner Comments

This response also scored one mark (MP4). Wearing a lab coat is too generic and would offer no more protection from radiation than any other clothing.

(b) Give two safety precautions to minimise the risk of harm to the teacher from the radiation emitted by the protactinium generator.

(2)

1 Minimize the time spent with the radioactive isotope.

2 Use tongs when handling the isotopes.

ResultsPlus
Examiner Comments

This response scored two marks (MP2 and MP4).

(b) Give two safety precautions to minimise the risk of harm to the teacher from the radiation emitted by the protactinium generator.

(2)

1 leave Source 5m away from the ~~dector and~~ himself and use thongs to collect.

2 keep Source in a lead box

ResultsPlus
Examiner Comments

This response also scored two marks (MP1, MP2 and MP4). The unusual spelling of tongs was easy enough to understand to still be credited.

Question 9(c)i

Most candidates scored two marks in this calculation. Some candidates still scored a single mark for clearly presenting the idea that the time was equivalent to two half-lives. However, in most cases, when the final answer was incorrect there were no marks awarded.

(c) Protactinium-234m decays with a half-life of 70 seconds.

(i) The initial count rate is 840 counts per second.

Calculate the expected count rate after 140 seconds.

(2)

$140 \div 70 = 2$ half lives

$\therefore 840 \div 2^2 = 210$

count rate = 210 counts per second

ResultsPlus
Examiner Comments

This correct calculation was awarded two marks. Had the answer been incorrect, the first mark could still have been awarded from the very clear working.

(c) Protactinium-234m decays with a half-life of 70 seconds.

(i) The initial count rate is 840 counts per second.

Calculate the expected count rate after 140 seconds.

(2)

2 half lives

0 70 140

1 2

840 ÷ 2

= 420

count rate = 420 counts per second

ResultsPlus
Examiner Comments

This candidate has arrived at an incorrect final answer. However, their working clearly shows the idea that this time period represents two half-lives, so the first mark was awarded.

Question 9(c)ii

Many candidates calculated 5 % of 840 when attempting this question, which suggested that the question had not been fully understood. Others used the unit of counts per second from part (i) rather than becquerels as required for the mark.

(ii) The activity of an isotope is the total amount of radiation emitted each second.

The teacher estimates that only 5% of the total radiation emitted is detected by the radiation detector.

Estimate the activity of the isotope when the count rate is 840 counts per second.

Give the unit.

(3)

$$\frac{5}{100} \times 840$$

$$= 42$$

activity = 42. unit = Bq

(Total for Question 9 = 8 marks)

ResultsPlus
Examiner Comments

This candidate has incorrectly calculated 5% of 840. However, they scored a single mark for giving the correct unit of activity.

(ii) The activity of an isotope is the total amount of radiation emitted each second.

The teacher estimates that only 5% of the total radiation emitted is detected by the radiation detector.

Estimate the activity of the isotope when the count rate is 840 counts per second.

Give the unit.

(3)

$840 = \frac{5}{100} \times \text{Activity}$

$\text{Activity} = 840 \times \frac{100}{5}$

$= 16800$

activity = 16800 unit = Becquerel

(Total for Question 9 = 8 marks)

ResultsPlus
Examiner Comments

This candidate has performed the calculation correctly and also given the correct unit of activity. Full marks were awarded.

Question 10(a)

The context of this question led some candidates to focus on magnetic fields and forces rather than the heating effect of the current. Among those who did refer to heating, the explanation was often vague, using imprecise terms such as 'dangerous'. Only a minority of responses referred to the effect of increased current on the resistance of the rod.

(a) The student can increase the current in the metal rod up to a maximum of 5.0 A.

Suggest why the student should only have the power supply switched on for short periods of time.

(2)

Student Should Only have the Power Supply switched on for a short periods of time because the metal rod should not be over heated.

ResultsPlus
Examiner Comments

This candidate has correctly recognised that the rod may heat up but has not linked this to any experimental error or safety risk.

(a) The student can increase the current in the metal rod up to a maximum of 5.0 A.

Suggest why the student should only have the power supply switched on for short periods of time.

(2)

- prevention of electrical surge
- prevention of getting electrouted
- So wire doesn't get too hot
- If wire gets too hot, resistance increases and current decreases

ResultsPlus Examiner Comments

This candidate has attempted to give as many suggestions as they can think of. However, the correct idea of the wire heating up and increasing in resistance scored both marks.

Question 10(b)

Most candidates correctly identified that a change in mass was required and some then converted grams to kilograms. This conversion often earned two marks, even when candidates could not proceed beyond that point. It is helpful to remember that derived units such as Newtons require inputs in SI units, so making such conversions at the start is a good strategy for gaining marks, even if they cannot complete the solution.

(b) Before the power supply is switched on, the reading of the balance is 194.95 g.

After the power supply is switched on, the reading of the balance is 193.80 g.

Calculate the force exerted on the current-carrying rod by the magnet.

(4)

194.95 - 193.80 = 1.15g

F =

force = ... N

ResultsPlus
Examiner Comments

This candidate scored the first mark only for calculating the difference in mass. The candidate does not know how to use this to determine the force.

(b) Before the power supply is switched on, the reading of the balance is 194.95 g.

After the power supply is switched on, the reading of the balance is 193.80 g.

Calculate the force exerted on the current-carrying rod by the magnet.

(4)

194.95 − 193.80 = 1.15

1.15 is the mass the force acted on

W = m×g

1.15×10 = 11·5N

force = 11·5 N

ResultsPlus
Examiner Comments

This candidate scored 3 marks. The calculation is correct, but the lack of converting the units of mass from grams to kilograms resulted in a one-mark penalty.

ResultsPlus
Examiner Tip

Candidates should know that the standard unit of mass is the kilogram, kg, and to convert non-standard units when attempting calculations.

(b) Before the power supply is switched on, the reading of the balance is 194.95 g.

After the power supply is switched on, the reading of the balance is 193.80 g.

Calculate the force exerted on the current-carrying rod by the magnet.

(4)

$\Delta m = 1.15g = 1.15 \times 10^{-3}$ kg

$F = \Delta m \times g$

where $g = 9.8 m/s^2$

$F = 1.15 \times 10^{-3} \times 9.8 = 0.01127N$

$= 0.0113N$

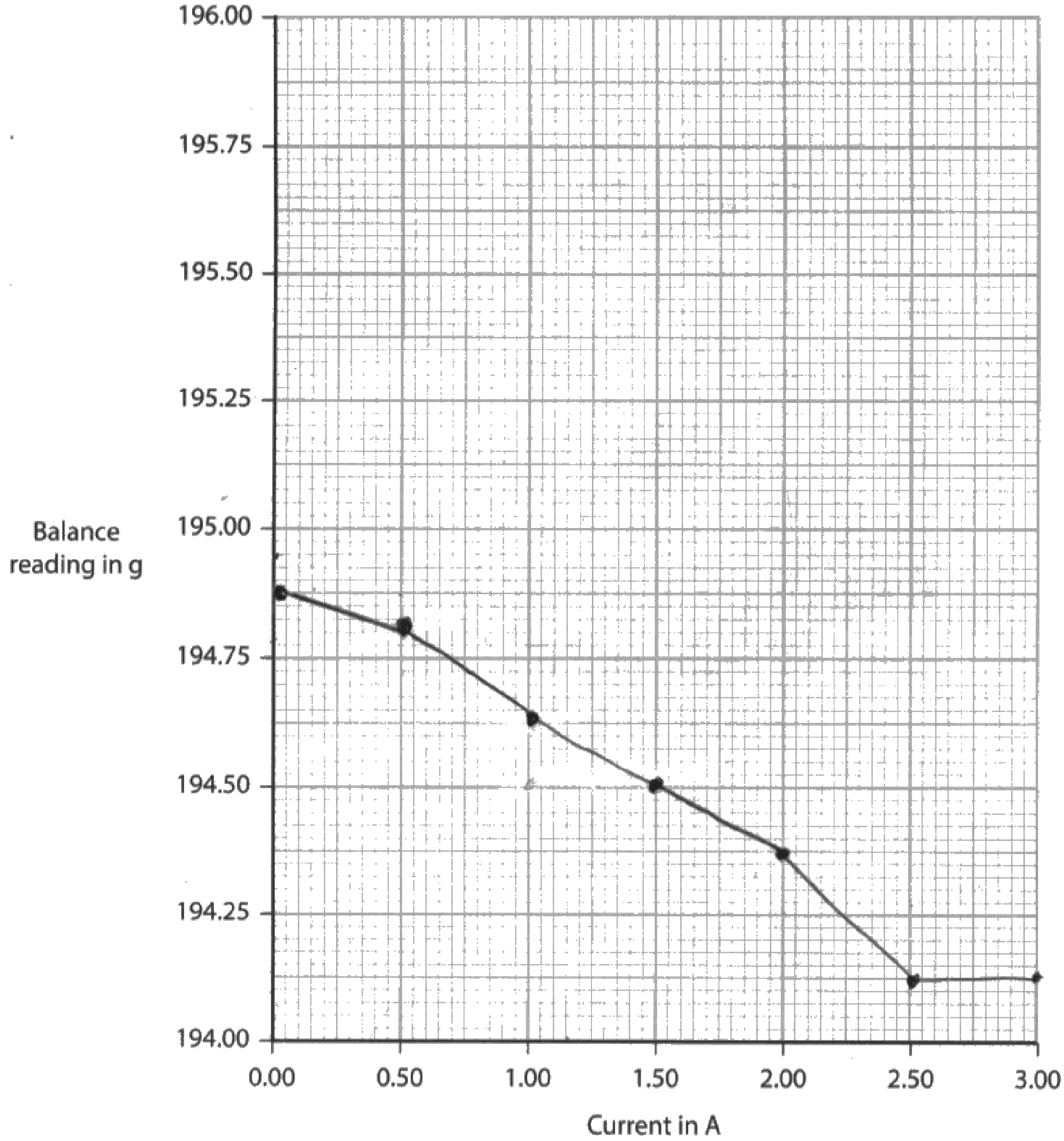
force = 0.0113 N

ResultsPlus
Examiner Comments

This response scores full marks. Using the value of 9.8N/kg for g is acceptable.

Question 10(c)

Where points were inaccurately plotted, the mark for the line of best fit was rarely awarded. The second line, intended to show the effect of reversing the current, should have started from the same point as the first. Most candidates incorrectly began this line from the origin, which meant only one of the three marks could be awarded.



(iii) The student changes the connections between the metal rod and the power supply to reverse the direction of the current.

Draw another line on the graph to show how the balance reading will vary with current after this change has been made.

(3)

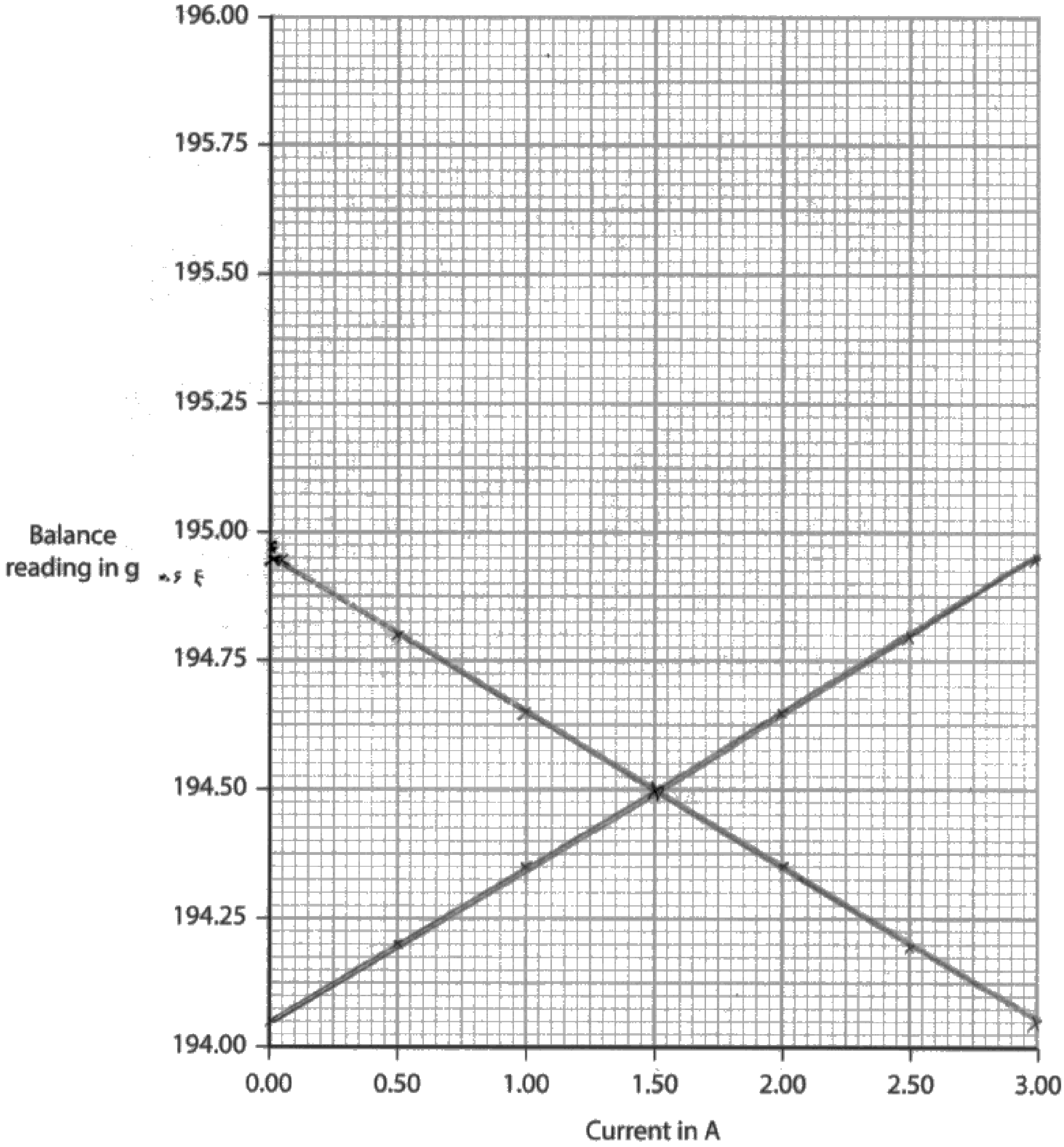
(Total for Question 10 = 11 marks)

ResultsPlus
Examiner Comments

No marks were awarded here. There is a plotting error, but the mark for Q10(c)(ii) could still have been awarded for an appropriate line of best fit.

ResultsPlus
Examiner Tip

Candidates should not join the points together when plotting graphs in physics. A single line of best fit should be drawn with an equal distribution of points about the line.



(iii) The student changes the connections between the metal rod and the power supply to reverse the direction of the current.

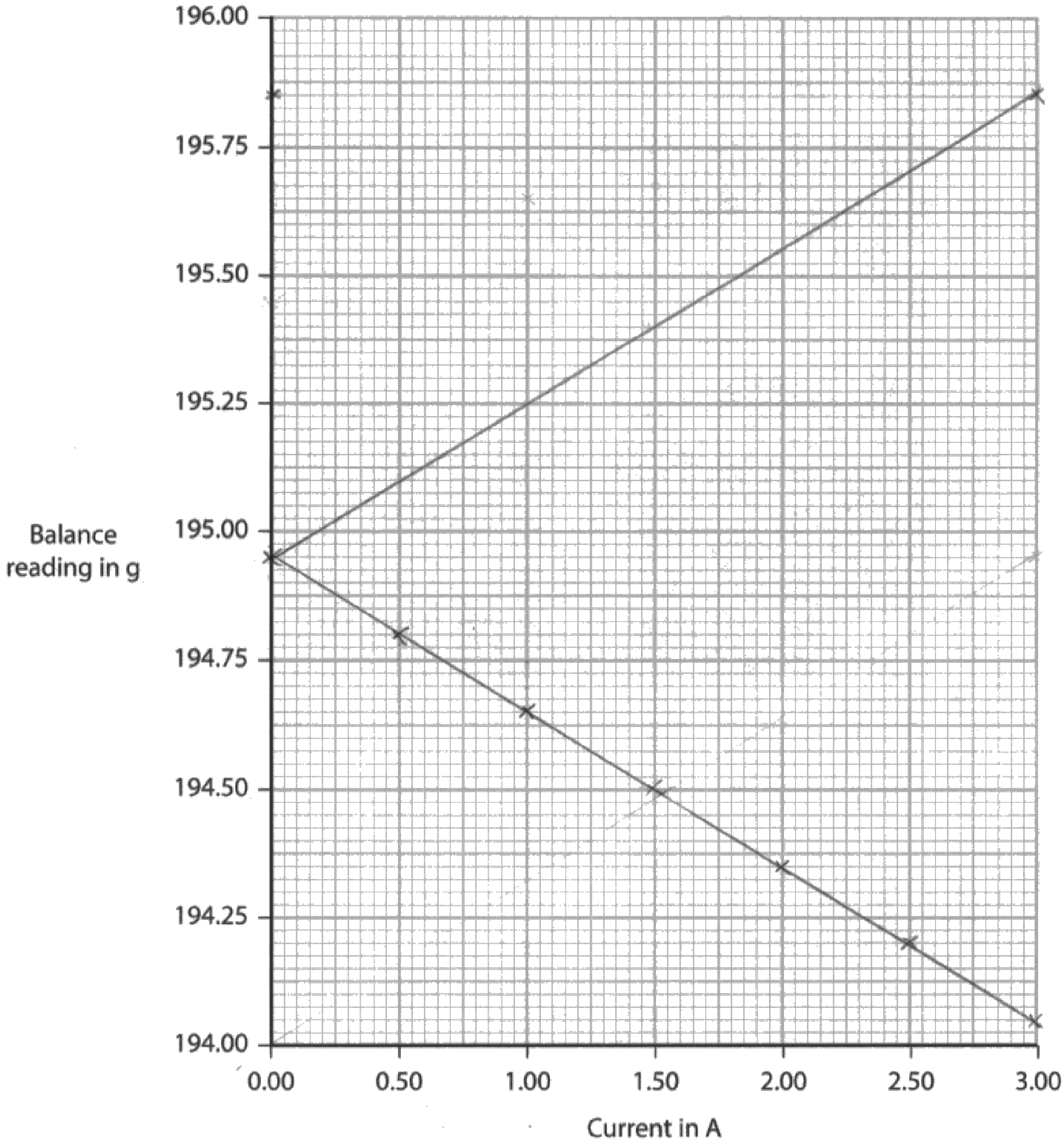
Draw another line on the graph to show how the balance reading will vary with current after this change has been made.

(3)

(Total for Question 10 = 11 marks)

ResultsPlus
Examiner Comments

This was the most commonly seen response. The plotting and line of best fit is correct. The candidate has not fully understood the context so was only awarded one mark for their second line.



(iii) The student changes the connections between the metal rod and the power supply to reverse the direction of the current.

Draw another line on the graph to show how the balance reading will vary with current after this change has been made.

(3)

(Total for Question 10 = 11 marks)

ResultsPlus
Examiner Comments

A perfect graph. This candidate clearly has an excellent understanding of the context and has shown that they can apply their knowledge correctly.

Question 11(a)i

A surprising number of candidates did not gain this mark. Some candidates simply cited potential difference, whilst others tried to use V = IR as a basis for the definition. As seen earlier with transverse waves, it is important that candidates learn and accurately recall core definitions.

11 Fluorescent tube lamps can be used in schools and office buildings for lighting.

The photograph shows an engineer installing a fluorescent tube lamp.

(Source: © Naparat / Shutterstock)

Diagram 1 shows a simplified view of the components of a fluorescent tube lamp.

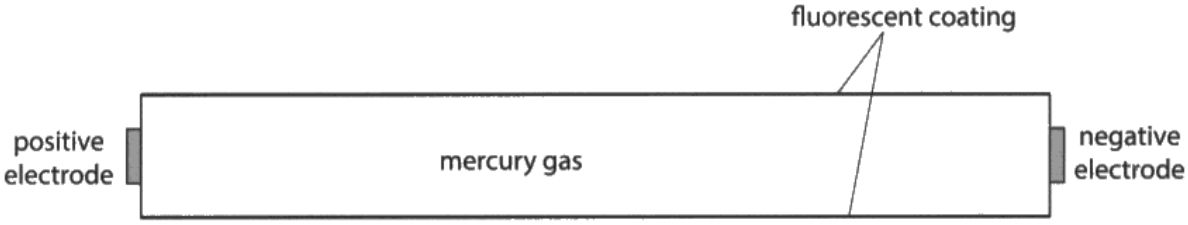


Diagram 1

(a) When the lamp is on, a large voltage is applied between the positive electrode and the negative electrode.

(i) State what is meant by the term **voltage**.

(1)

Voltage is the product of current and resistance

ResultsPlus
Examiner Comments

A weak and common response that defines voltage as the product of current and resistance.

11 Fluorescent tube lamps can be used in schools and office buildings for lighting.

The photograph shows an engineer installing a fluorescent tube lamp.

(Source: © Naparat / Shutterstock)

Diagram 1 shows a simplified view of the components of a fluorescent tube lamp.

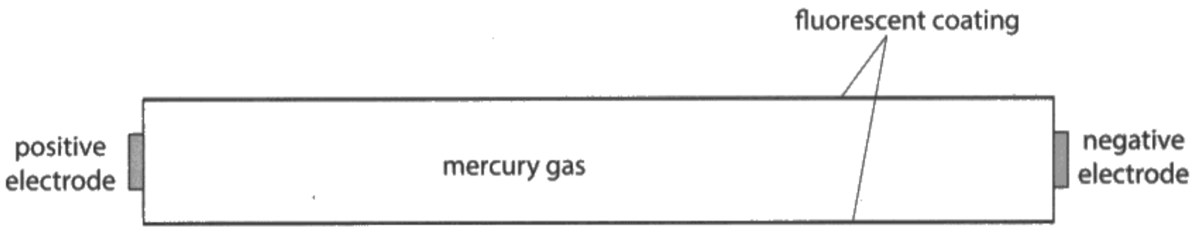


Diagram 1

(a) When the lamp is on, a large voltage is applied between the positive electrode and the negative electrode.

(i) State what is meant by the term **voltage**.

(1)

It is the amount of energy transfered by unit change.

ResultsPlus
Examiner Comments

A correct definition.

Question 11(a)ii-iii

Q11(a)(ii) was well-answered with occasional power of ten (POT) errors. Weaker candidates made mistakes when dividing with numbers in standard form and arrived at irrationally high values of voltage for their final answer.

In Q11(a)(iii), many candidates gained 3 or 4 marks, POT dependent. Weaker responses showed a lack of mathematical skills for rearranging or choosing the wrong formula.

(ii) The large voltage causes electrons to accelerate from the negative electrode towards the positive electrode.

An electron gains 1.0×10^{-16} J of energy when it accelerates between the electrodes.

Show that the voltage between the electrodes is about 600 V.

[magnitude of electron charge = 1.6×10^{-19} C]

(3)

$E = Q \cdot V$

$1 \times 10^{-16} = 1.6 \times 10^{19} \times V$

$V \simeq 600$

(iii) The electron gains 1.0×10^{-16} J of energy in its kinetic store when it accelerates from the negative electrode to the positive electrode.

Calculate the speed of an electron when it reaches the positive electrode.

Assume the electron is initially at rest.

[electron mass = 9.1×10^{-31} kg]

(4)

$Ke = \frac{1}{2}mv^2$

$1 \times 10^{-16} = \frac{1}{2} \cdot 9.1 \times 10^{-31} \times V^2$

$2 \times 10^{-16} = 9.10 \times 10^{-31}$

$\frac{2 \times 10^{-16}}{9.1 \times 10^{-31}} = V^2$

$\sqrt{\frac{2}{9.1 \times 10^{15}}} = V$

speed = 1.48×10^{-8} m/s

ResultsPlus
Examiner Comments

This candidate scored 1 mark in Q11(a)(ii). The initial substitution is correct, but nothing further of credit is seen. The work in Q11(a)(iii) was awarded 3 marks. The calculation should have resulted in the correct answer, but POT errors have arisen due to the candidate not knowing how to process numbers in standard form.

(ii) The large voltage causes electrons to accelerate from the negative electrode towards the positive electrode.

An electron gains 1.0×10^{-16} J of energy when it accelerates between the electrodes.

Show that the voltage between the electrodes is about 600 V.

[magnitude of electron charge = 1.6×10^{-19} C]

(3)

$E = q \times V$

$V = \frac{E}{q}$

$V = \frac{1.0 \times 10^{-16}}{1.6 \times 10^{-19}} = \frac{1.0}{1.6} \times 10^{3} = 0.625 \times 10^{3}$

$= 625 V$

$= 600 V$

(iii) The electron gains 1.0×10^{-16} J of energy in its kinetic store when it accelerates from the negative electrode to the positive electrode.

Calculate the speed of an electron when it reaches the positive electrode.

Assume the electron is initially at rest.

[electron mass = 9.1×10^{-31} kg]

(4)

$E_k = \frac{1}{2} m v^2$

Solve for v:

$v = \sqrt{\frac{2 E_k}{m}}$

$v = \sqrt{\frac{2 \cdot 1.0 \times 10^{-6}}{9.1 \times 10^{-13}}}$

$= \sqrt{\frac{2.0 \times 10^{-16}}{9.1 \times 10^{-13}}}$

$= \sqrt{2.198 \times 10^{-4}}$

$= 0.0148 m/s$

speed = 0.0148 m/s

ResultsPlus
Examiner Comments

This candidate scored 3 marks in Q11(a)(ii) for the clear working leading to a value of 625V. The work in Q11(a)(iii) was awarded 3 marks. A POT error has arisen due to the candidate writing down the value for the mass of the electron incorrectly.

ResultsPlus
Examiner Tip

Candidates should check their work at the end of the examination (time permitting) to avoid careless errors such as that seen in this response.

(ii) The large voltage causes electrons to accelerate from the negative electrode towards the positive electrode.

An electron gains 1.0×10^{-16} J of energy when it accelerates between the electrodes.

E

Show that the voltage between the electrodes is about 600 V.

[magnitude of electron charge = 1.6×10^{-19} C]

Q

(3)

$E = Q \times V$

$1.0 \times 10^{-16} = 1.6 \times 10^{-19} \times 600$

$0.625 \times 10^{7} = 600$

$\frac{1.0 \times 10^{-16}}{1.6 \times 10^{-19}} = 600$

(iii) The electron gains 1.0×10^{-16} J of energy in its kinetic store when it accelerates from the negative electrode to the positive electrode.

Calculate the speed of an electron when it reaches the positive electrode.

v

Assume the electron is initially at rest.

[electron mass = 9.1×10^{-31} kg]

M

(4)

$KE = \frac{1}{2} \times m \times v^2$

$1.0 \times 10^{-16} = \frac{1}{2} \times 9.1 \times 10^{-31} \times V^2$

$1.0 \times 10^{-16} = 4.55 \times 10^{-31} \times v^2$

$\frac{1.0 \times 10^{-16}}{4.55 \times 10^{-31}} = v^2$

$\sqrt{2.219 \times 10^{15}} = \sqrt{v^2}$

14798649.59

speed = 14798649.59 m/s

This candidate scored 2 marks in Q11(a)(ii). The value of 600V is given in the question so the expectation is to evaluate to more significant figures than this. The work in Q11(a)(iii) was awarded 4 marks and is wholly correct.

(ii) The large voltage causes electrons to accelerate from the negative electrode towards the positive electrode.

An electron gains 1.0×10^{-16} J of energy when it accelerates between the electrodes.

Show that the voltage between the electrodes is about 600V.

[magnitude of electron charge = 1.6×10^{-19} C]

(3)

Energy transferred = Charge x voltage

~~0.0000000000000001 = 0.0000000000000000016 x V~~

~~0.0000000000000000016 = V~~

$1.0 \times 10^{-16} = 1.6 \times 10^{-19} \times V$

$V = \frac{1.0 \times 10^{-16}}{1.6 \times 10^{-19}}$

V = 625V

V = 600V shown,,

(iii) The electron gains 1.0×10^{-16} J of energy in its kinetic store when it accelerates from the negative electrode to the positive electrode.

Calculate the speed of an electron when it reaches the positive electrode.

Assume the electron is initially at rest.

[electron mass = 9.1×10^{-31} kg]

(4)

Kinetic energy = $\frac{1}{2}$ x mass x speed^2

$K.E = \frac{1}{2} mv^2$

$1.10^{-16} = \frac{1}{2} \times (9.1 \times 10^{-31}) \times speed^2$

$v^2 = \frac{1.10^{-16}}{\frac{1}{2}(9.1 \times 10^{-31})}$

~~$V = \sqrt{1.10}$~~

$v^2 = \frac{1 \times 10^{-16}}{4.55 \times 10^{-31}}$

~~$v^2 =$~~

$v^2 = 2.197802198 \times 10^{14}$

~~$v^2 =$~~

~~$V = \sqrt{2.19}$~~

$V^2 = 219780219800000$

$V = \sqrt{219780219800000}$

V = 14824986.33

$V = 1.482498633 \times 10^7$

speed = 1.482498633×10^7 m/s

ResultsPlus
Examiner Comments

This response is correct for both parts and scored full marks.

Question 11(b)i

Many candidates repeated the idea in the question that UV light was converted into electromagnetic waves, but did not identify these as visible light rays. The question intentionally avoided stating the specific part of the spectrum to allow candidates to do so. Some candidates missed the point that UV light is invisible to humans and that a lamp emitting no visible light could not be classed as operating effectively. Instead, they discussed dangers of UV or gave explanations involving refraction or scattering.

(b) When the electrons accelerate between the electrodes, they collide with mercury atoms.

Energy is transferred to the mercury atoms during the collisions. This causes the mercury atoms to emit ultraviolet light.

Atoms in the fluorescent coating absorb this ultraviolet light, which is then re-emitted as light from a different part of the electromagnetic spectrum.

Diagram 2 shows this process.

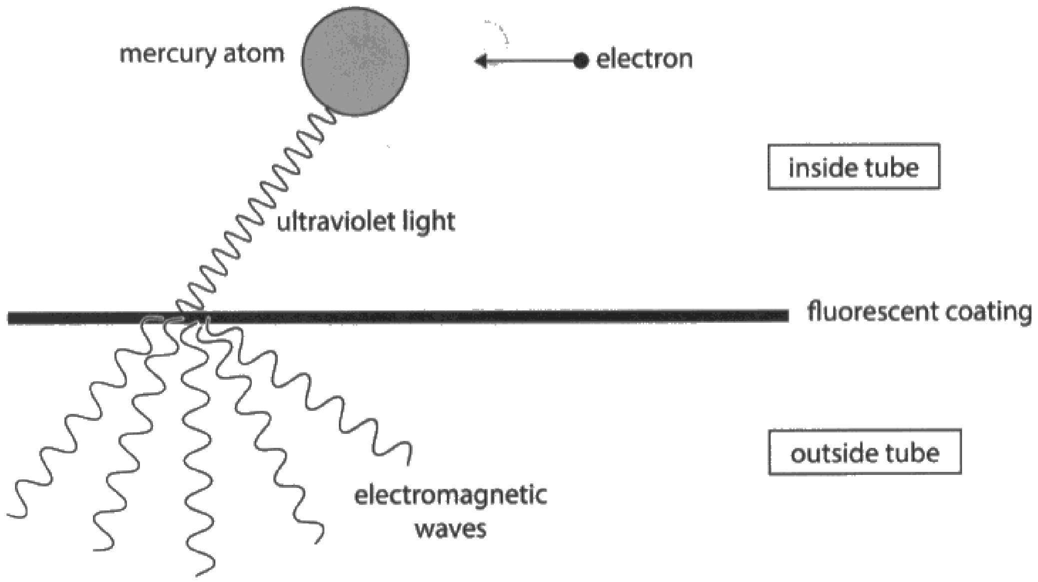


Diagram 2

(i) Suggest why the tube must have a fluorescent coating for the lamp to operate effectively.

(2)

the flourescent coating absorbs the UV light and makes into visible light, as that the UV light would not been anyone underneath.

ResultsPlus
Examiner Comments

This response scored 1 mark. The candidate states that visible light is emitted but does not recognise the importance of UV light being invisible.

(b) When the electrons accelerate between the electrodes, they collide with mercury atoms.

Energy is transferred to the mercury atoms during the collisions. This causes the mercury atoms to emit ultraviolet light.

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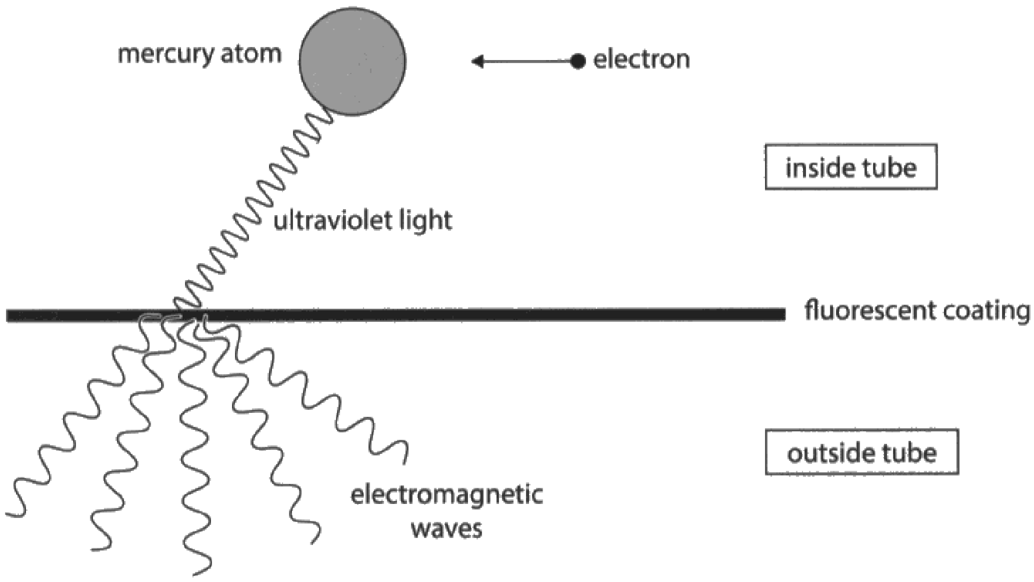

Diagram 2

(i) Suggest why the tube must have a fluorescent coating for the lamp to operate effectively.

(2)

Because it converts invisible UV light into visible light so the lamp can shine brightly.

ResultsPlus Examiner Comments

Both marks are clearly seen in this response.

Question 11(b)ii

The idea that UV light would escape directly from the lamp, rather than being emitted from the coating, was not always clearly expressed. Many candidates did, however, provide specific harmful effects of UV radiation rather than vague terms such as cancer. Few recognised that UV is ionising radiation, which had not been mentioned in the question stem but was relevant. References to the harmful effects of mercury were less common.

(ii) Explain why the fluorescent tube lamp is dangerous if the fluorescent coating becomes damaged.

(2)

Because ultraviolet light will then be able to pass through the lamp and onto the people in the room which may result in skin burns.

(Total for Question 11 = 12 marks)

TOTAL FOR PAPER = 110 MARKS

ResultsPlus
Examiner Comments

This response scored 2 marks for MP1 and MP3.

(ii) Explain why the fluorescent tube lamp is dangerous if the fluorescent coating becomes damaged.

(2)

Mercury could escape the tube and contaminate people as it is poisonous.

(Total for Question 11 = 12 marks)

TOTAL FOR PAPER = 110 MARKS

ResultsPlus Examiner Comments

This response scored 2 marks for MP1 and MP4. Suggestions involving mercury were less common than those involving UV.

Paper Summary

Based on their performance on this paper, candidates should:

- Take note of the number of marks available for each question and use this as a guide for the amount of detail expected in the answer.
- Take note of the command word used in each question to determine how the examiner expects the question to be answered, for example whether to give a description or an explanation.
- Be able to use the formulae listed in the specification confidently in terms of substitution, rearrangement and evaluation.
- Know the SI units for physical quantities and be able to convert from non-SI units to SI units when required.
- Show all working so that some credit can still be given for answers that are only partly correct.
- Take advantage of opportunities to draw labelled diagrams as well as, or instead of, written answers.

Grade boundaries

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