Qualification Accredited

OCR
Oxford Cambridge and RSA

Examiners' report

GCSE

TWENTY FIRST CENTURY SCIENCE PHYSICS B

OCR Level 1/Level 2 GCSE (9-1) in Physics B (Twenty First Century Science)

J259

For first teaching in 2016

J259/01 Summer 2025 series

Version 1

Contents

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate responses is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from Teach Cambridge.

Paper 1 series overview

This is the first of two papers taken by Foundation tier candidates studying GCSE Physics of the Twenty First Century science suite. This paper tests across the breadth of the whole specification using short answer questions. The style of the questions enables candidates to put their physics knowledge and understanding into some novel situations.

The paper starts off with more straightforward questions including cloze and MCQ style questions which aim to give candidates confidence before they move on to the more difficult questions, concepts and contexts. The final two questions overlap with the Higher tier paper (J259/03) and these questions tend to challenge some candidates taking this paper.

Candidates did well with some of the calculation questions where they are either given the equation to use or they are told to use the Equation Sheet. Many candidates really engaged with Question 9 relating ideas about science to the development of the understanding of nuclear physics.

Candidates tended to do less well in questions where they had to explain their answer, including Questions 3 (b) about investigating reflection of light, 6 (a) about radioactive decay and 7 (b) on Newton's third law.

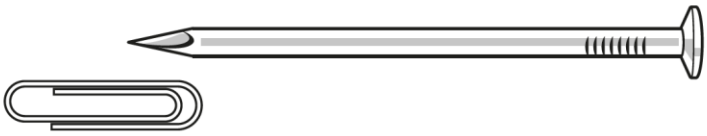
Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• engaged with the context of the question, such as Question 9 about the development of ideas about the nucleus • showed familiarity with practical apparatus and techniques in activities such as reflection of light rays (Question 3) and electrical circuits (Question 4) • showed better comprehension of the physical concepts behind the equations used in calculations.	• wrote vague explanations • confused physical quantities such as energy and force • substituted values into equations without demonstrating understanding of the physics.

Question 1 (a) (i), (ii) and (iii)

1 A student is experimenting with an iron nail and a bar magnet.

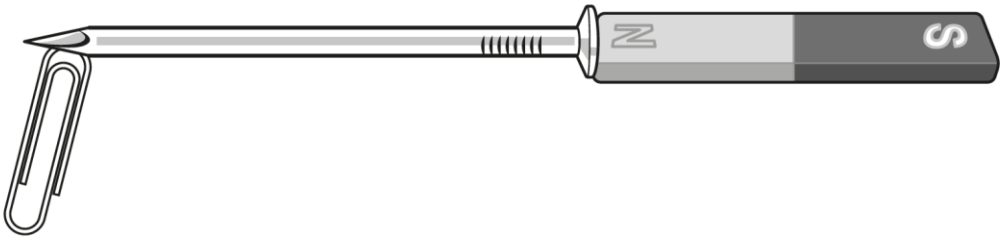
(a) First, they place a paper clip close to the iron nail.

The nail does **not** attract the paper clip.



Then they place a bar magnet touching the end of the nail.

The nail now attracts the paper clip, so the paper clip is attached to the nail.



(i) Which of these is a correct description of the **nail**?

Tick (✓) **one** box.

Electromagnet ☐

Induced magnet ☐

Permanent magnet ☐

[1]

(ii) What happens to the **paper clip** when the bar magnet is taken away?

Tick (✓) **one** box.

It becomes a permanent magnet. ☐

It falls off the nail. ☐

It stays permanently attached to the nail. ☐

[1]

(iii) Paperclips can be made from different metals.

Which **two** of these metals could the paperclip in this experiment be made from?

Tick (✓) **two** boxes.

Copper ☐

Nickel ☐

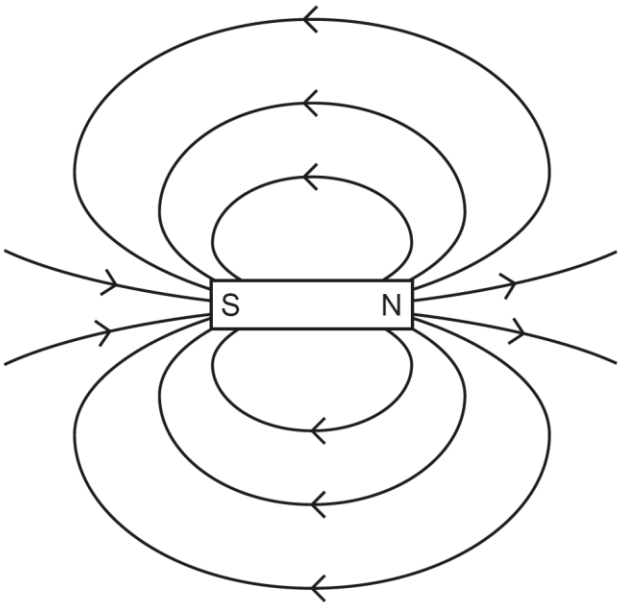
Steel ☐

[1]

Although magnetism can be considered a difficult topic, most candidates showed some familiarity with this demonstration and were able to identify the nail as an induced magnet and that the paper clip would fall off once the bar magnet was removed. Fewer candidates were able to identify the two magnetic metals as nickel and steel in part (iii).

Question 1 (b)

(b) The diagram shows the magnetic field around a bar magnet.



Complete the table to show the property of a magnetic field that is shown by each feature of the diagram.

Tick (✓) **one** box in each row.

Feature of the diagram	Direction of magnetic field	Poles of the magnet	Type of magnet	Strength of magnetic field
Arrows				
Distance between lines				
S and N				

[3]

Most candidates were able to correctly identify the three features of the magnetic field diagram. Some candidates did not follow the instructions and put one tick into each column instead of each row of the table.

Question 1 (c)

(c) Explain why a magnetic compass can be used to support the idea that the Earth's core is magnetic.

.....

.....

.....

..... **[2]**

Some candidates were able to correctly explain that the needle in the compass pointed north or was attracted to the Earth's core. Most did not state that this happened wherever the compass was or at all times.

Question 2 (b) (i) and (ii)

(b) The table shows some electrical information about a mains electric kettle used at home and a travel kettle.

Mains electric kettle	Travel kettle
10 A	8 A
230 V	12 V
2000 W	100 W

(i) Which piece of information gives the power rating of the mains electric kettle?

Tick (✓) **one** box.

10 A ☐

230 V ☐

2000 W ☐

[1]

(ii) Both kettles are used to boil the same volume of water.

Complete the sentence to explain the time taken for each kettle.

Use words from the list.

energy	**frequency**	**less**
more	**temperature**	**the same**

The travel kettle will take ..... time to boil the water because it transfers

less ..... per second.

[2]

Most candidates showed some understanding of the power of electrical appliances in this question. Many identified that the power output of the mains electric kettle was 2000 W. The most common incorrect response here was 240 V. Nearly all candidates answered part (ii) correctly.

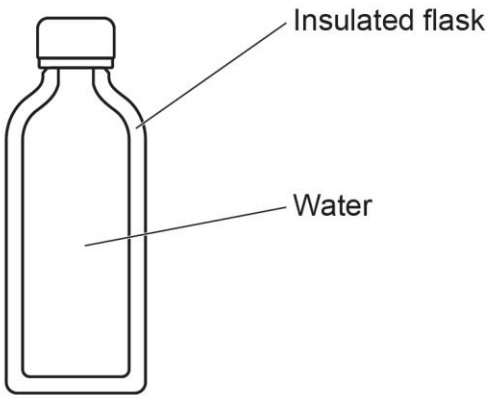
Question 2 (c)

(c) Hot water is poured from a kettle into an insulated flask.

The water fills the flask.

The lid is screwed on.

The diagram shows a cross-section through the flask.



The water stays hot in the flask.

Complete the sentences to describe this flask system.

Use words from the list.

closed	**changing**	**constant**
decreased	**increased**	**open**

The flask system stays at the same temperature because the total energy

is ..... .

This means the flask system can be referred to as ..... .

[2]

Many candidates answered this question correctly. Some selected the correct words but then wrote them in the incorrect order.

Question 2 (d)

(d) Some household appliances are operated for a longer time than a kettle.

Which of these is the correct calculation to find the energy transferred, in **kWh**, when a 1500 W appliance is used for 2 hours?

Use the equation: energy transferred = power × time

Tick (✓) **one** box.

3.0 kWh = 1.5 kW × 2 h ☐

3000 kWh = 1500 W × 2 h ☐

180 000 kWh = 1500 W × 120 min ☐

[1]

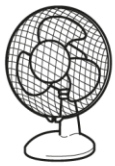
Each of these answers show a calculation of power multiplied by time. Many candidates incorrectly selected the second box which does not convert the power of 1500 W to 1.5 kW. Some candidates incorrectly selected the third response which converts the time from hours to minutes.

Assessment for learning

Candidates should look at the units required for the correct answer here - **kWh**, which has been printed in bold in the question stem. This should help them to identify that the power should be in **kW** and it is multiplied by a time in hours, **h**.

Question 2 (e) (i)

(e) The table shows data about four household appliances.

Appliance	Rating	Average time used per day
 Desk fan	500 W	1 hour
 Kettle	2000 W	15 minutes
 Lamp	50 W	
 Television	100 W	5 hours

(i) Complete the sentences to describe the energy transfer of the appliances.

Put a (ring) around each correct option.

The wasted energy store of the desk fan is **electrical / kinetic / thermal** energy.

The lamp transfers energy to the surroundings by **electrical work / mechanical work / radiation**.

[2]

Most candidates selected at least one of the correct words to complete these sentences. The most commonly used incorrect response for the first sentences was 'electrical', which would be the input energy store for the fan. More candidates correctly identified radiation as the method of energy transfer from the lamp.

Question 2 (e) (ii)

(ii) All the appliances in the table are used for different amounts of time per day, but they each transfer 0.5 kWh of energy per day.

Calculate the average time used per day for the **lamp**.

Give your answer in hours.

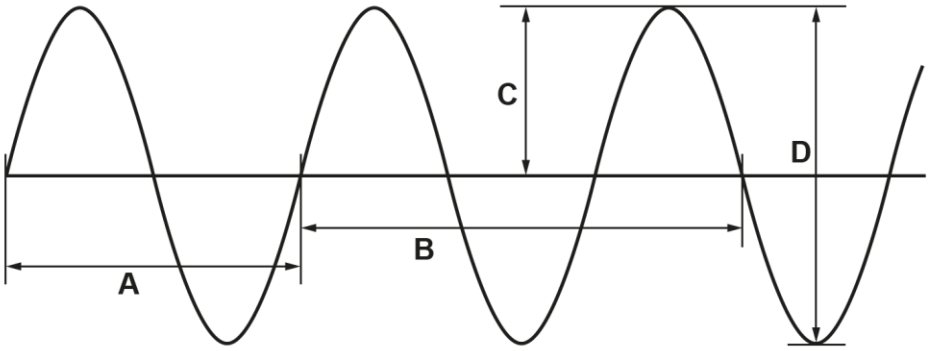
Average time used per day = ... hours **[2]**

Most candidates were unable to calculate this. Most candidates did not take the simplest approach which was to compare the data in the table. The fan has a rating of 500 W and was used for 1 hour so for the lamp, which was 50 W, it would take 10 hours to use the same amount of energy. Some candidates attempted to calculate the time by rearranging the equation which was used in part (d) but most of these then did not convert the power in Watt to kW.

Question 3 (a) (i), (ii) and (iii)

3 Lasers are very intense light waves.

(a) The diagram shows a light wave.



(i) Which letter, **A**, **B**, **C** or **D**, shows the wavelength of the wave?

..... **[1]**

(ii) Which letter, **A**, **B**, **C** or **D**, shows the amplitude of the wave?

..... **[1]**

(iii) Which property of a wave gives the time it takes to complete one full cycle?

Tick (✓) **one** box.

- Frequency ☐
- Period ☐
- Speed ☐
- Wavelength ☐

[1]

Most candidates were unable to correctly identify all the features of the wave. A common misunderstanding was to identify D as the wavelength in part (i). D was also a common incorrect response to part (ii). More candidates answered part (i) correctly than part (ii). But both parts (i) and (ii) were better answered than part (iii), where most candidates incorrectly selected frequency instead of period.

Question 3 (b) (i)

(b) A student uses a laser to investigate how light reflects from a mirror.

(i) State **one** risk of using a laser.

.....

..... **[1]**

Many candidates correctly stated that the laser could harm the eye. Some candidates somewhat vaguely just said that the laser might reflect into someone's eye without explaining that this could damage the eye.

Question 3 (b) (ii)

(ii) The laser is directed towards the mirror at different angles of incidence and the student measures the angle of reflection.

The table shows the student's results.

	Angle of Reflection (°)			
Angle of incidence (°)	**Repeat 1**	**Repeat 2**	**Repeat 3**	**Mean Angle of Reflection (°)**
20	18	21	18	19
30	29	30	31	30
40	39	40	38	
50	52	48	50	50

Calculate the mean angle of reflection when the angle of incidence is 40°.

Mean angle of reflection = ... ° **[2]**

Most candidates were able to correctly calculate the mean angle of reflection using the three values in the row of the table. Some candidates calculated the mean angle of the three values in the last column of the table.

Question 3 (b) (iii)

(iii) The laser is now directed at the mirror so that the angle of incidence is 60°.

Predict the angle of reflection.

Explain how the data in the table supports your answer.

Angle of reflection = ... °

Explanation .....

.....

.....

[2]

Most candidates did correctly predict an angle close to 60° but were unable to explain why this was their prediction.

Exemplar 1

Angle of reflection = 61 °

Explanation the difference between 19 and 30 is eleven the same with 39 and so therefore you add eleven to so.

[2]

This candidate correctly predicts 61° as the angle of reflection when the angle of incidence is 60°. Their explanation just describes the pattern of numbers in the final column of the table and does not relate to the angle of incidence at all. They should have suggested that when the angle of incidence goes up by 10°, the angle of reflection goes up by either 9° or 11°.

Question 3 (c)

(c) A laser produces a beam of red light.

The wave speed of the red light is 3.0×10^{8} m/s.

The wavelength of the red light is 750×10^{-9} m.

Calculate the frequency of the red light.

Use the equation: $\text{frequency} = \frac{\text{wave speed}}{\text{wavelength}}$

Give your answer in **standard form**.

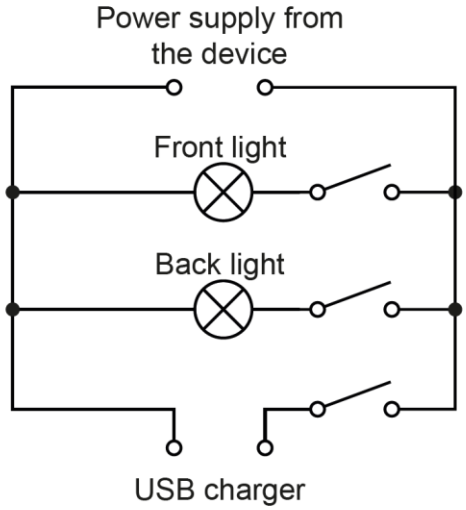
Frequency = ... Hz **[3]**

Most candidates correctly calculated the frequency and gave the answer in standard form. Some candidates may have incorrectly typed the numbers into the calculator and ended up the incorrect power of ten.Some candidates attempted to convert the values for wave speed and wavelength into ordinary form before performing the calculation. This possibly led to making a mistake when they converted it back to standard form.

Question 4 (b) (i)

(b) The circuit diagram shows how the lights and the USB charger are connected to the device.

The switches shown are all open.



(i) A component can be added to the circuit to measure current.

Draw the symbol for the component that measures current.

[1]

Many candidates correctly drew an ammeter in the space provided. Common errors were to draw a voltmeter, or to put an I or a C in the circle instead of A. Some candidates attempted to draw another component or branch of a circuit onto the diagram.

Question 4 (b) (ii)

(ii) When the bike lights and USB charger are each operating at 5 V, what is the potential difference across the power supply from the device?

Potential difference = ... V **[1]**

Most candidates did not appreciate that the potential difference across all the branches of the circuit was the same and all they had to do was to write down 5 V. Many tried multiplying 5 by different numbers and some added up.

Question 4 (b) (iii)

(iii) Complete the sentences to describe the energy transfers in the circuit.

Use words from the list.

closed	**current**	**open**	**potential difference**	**power**

When a ..... flows in the circuit, energy is transferred from the power supply to each component.

A component will get no energy if the switch in that loop is ..... .

[2]

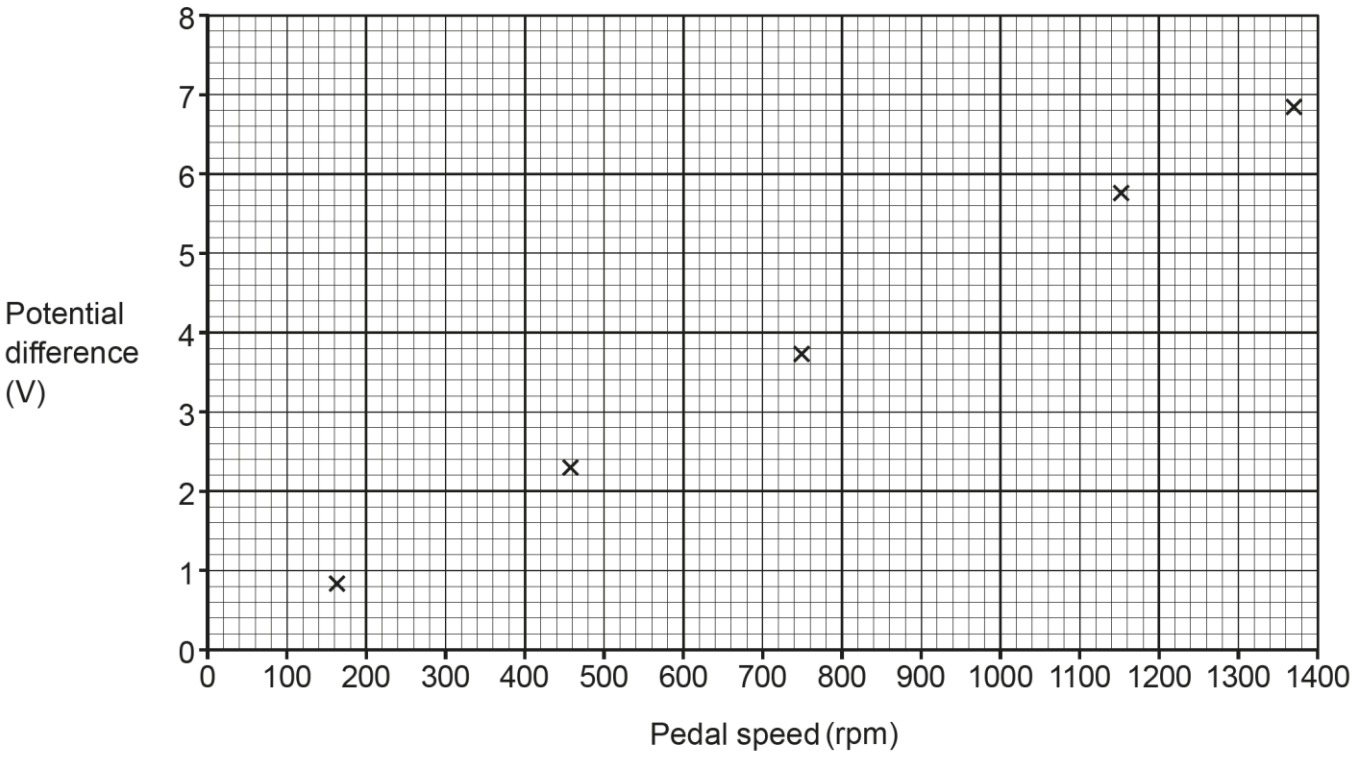
Most candidates correctly selected 'current' as the first word. The most common incorrect word in the second space was closed as opposed to open.

Question 4 (c) (i) and (ii)

(c) When the bike is pedalled faster, the potential difference increases.

The graph shows the potential difference at different pedal speeds.

The pedal speed is measured in revolutions per minute (rpm).



(i) Draw a line of best fit on the graph. **[1]**

(ii) Find the pedal speed for a potential difference of 5V.

Use your line of best fit.

Pedal speed = ... rpm **[1]**

Most candidates were able to draw a straight line through the plotted points on the graph grid (in part (i)) and were able to then read off the value of pedal speed when the potential difference is 5 V (in part (ii)). Some candidates did not draw straight lines (perhaps they did not use a ruler) and some drew lines which missed some of the plotted points.

Question 4 (d) (i)

(d) A mobile phone is plugged into the USB charger.

(i) Calculate the charge that flows through the USB charger when:

- the current through the USB charger is 0.5 A.
- the phone is charged for 1200 s.

Use the equation: charge = current × time

Charge = ... C **[2]**

Most candidates were able to correctly substitute the given values for current and time to calculate the charge. A few candidates attempted to convert the time into minutes or hours.

Question 4 (d) (iii)

(iii) Calculate the energy output of the USB charger.

- The charge passing through the USB charger is 2000 C.
- The potential difference across the USB charger is 5 V.

Use the Equation Sheet.

Give your answer in kJ.

Energy = ... kJ **[4]**

Most candidates correctly selected the correct equation from the Equation Sheet and substitute the correct values into the question to get a value for energy output in joules. Only a few candidates then converted the value of 10,000 J into 10 kJ.

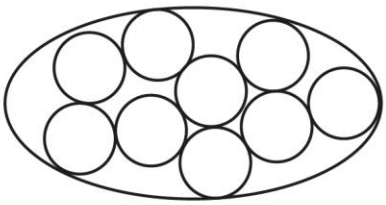
Question 5 (a) (i)

5 A bag containing fluid is used in a remote-control fish.

The bag is stretchy so its size can change.

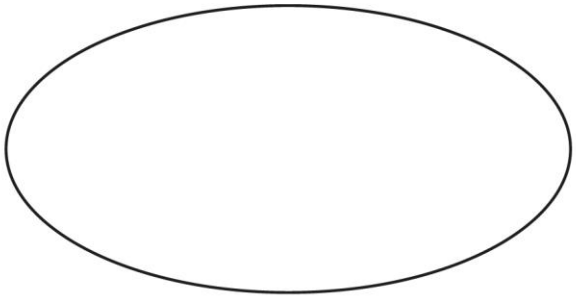
The fluid in the bag changes between liquid and gas to control the depth of the fish in the water.

(a) The diagram shows nine particles inside the bag when the fluid is a **liquid**.



(i) The bag becomes larger when the fluid becomes a gas.

Complete the diagram below to show how the same particles are arranged in the bag when the fluid is a **gas**.



[2]

Most candidates correctly drew nine atoms of a similar size which were randomly arranged but more widely spaced than the particles in the liquid. Common errors were to draw smaller atoms or to draw either too few or too many atoms.

Question 5 (a) (ii)

(ii) Calculate the density of the fluid in the bag when it is a liquid.

- There is 0.45 g of fluid in each bag.
- The volume of the fluid when liquid is 0.3 cm^3.

Use the Equation Sheet.

Density = ... g/cm^3 **[3]**

Most candidates correctly selected the correct equation to find density and substitute the values correctly to give the correct answer. Some candidates decided incorrectly to cube the volume of 0.3 cm^3.

Misconception

When the unit contains a power, this does not mean that the value has to be raised to the power. Candidates should just use the numerical value for volume, which is 0.3 cm^3.

Question 5 (a) (iii)

(iii) When the fluid in the bag is a gas it has a volume of $4\,cm^3$.

Explain why the fluid has a higher density as a liquid than as a gas.

You can include a calculation in your answer.

.....

.....

.....

..... **[2]**

Type your commentary here

Exemplar 2

Because the volume is higher as liquid particles are closer together than gas and liquid particles have a higher density as they are heavier than gas. **[2]**

This response starts off well by clearly stating that the particles are closer together as a liquid. It then goes on to say that they are heavier than gas. It is assumed that 'they' refers to the particles in a liquid. But the particles are the same in both states, so what they needed to say was that the same volume of a liquid will be heavier than that volume of gas.

Question 5 (b)

(b) Calculate the energy needed to change the state of the fluid from liquid into gas.

- The mass of the fluid is 0.00045 kg.
- The specific latent heat is 200 000 J / kg.

Use the Equation Sheet.

Energy to change from liquid to gas = ... J **[3]**

Most candidates were able to suggest that the particles were more spaced out as a gas compared to a liquid, and many repeated the calculation to find the density of the gas as 0.1125 g/cm^3. There were several vague responses where candidates had just referred to fluids rather than specify whether they were referring to liquids or gases. Some candidates incorrectly stated that there were more particles in the liquid or that it had a greater mass, without specifying that it was more particles or more mass in the same volume.

Question 5 (c)

(c) Which statements about the fluid in the bag are **true** and which are **false**?

Tick (✓) **one** box in each row.

	True	False
The change of state is a chemical change.		
The liquid and the gas are two different substances.		
The mass of the liquid is the same as the mass of the gas.		

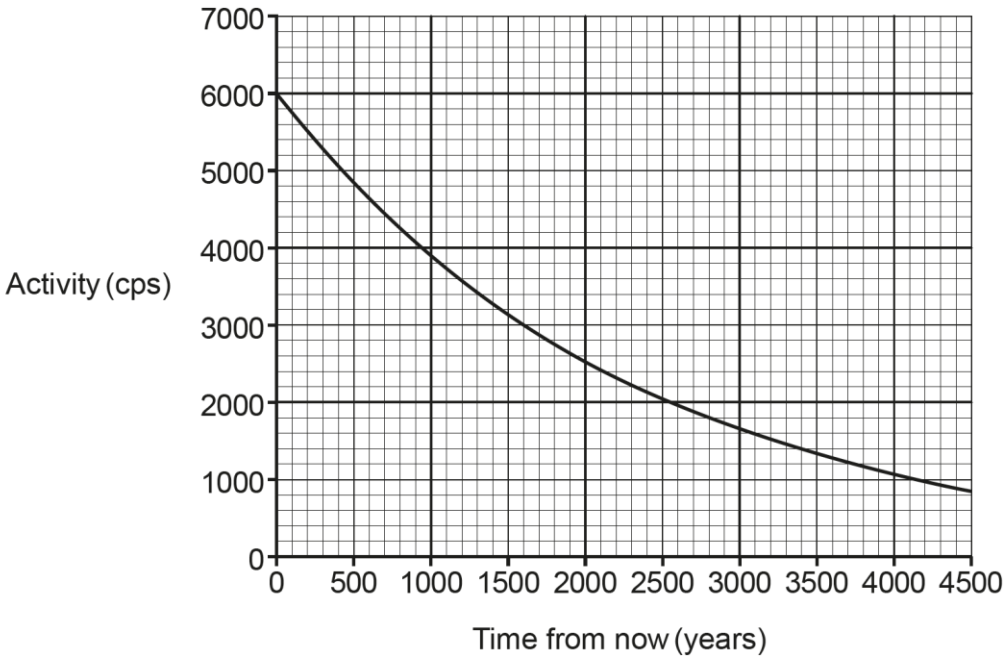
[2]

This question less succesfully answered. Many candidates incorrectly thought that a change of state is a chemical change and many did not think that the mass remains the same when a liquid changes to a gas.

Question 6 (a) (i), (ii) and (iii)

6 Marie Curie discovered the radioactive element, radium. Her notebook from 1920 is still radioactive today.

(a) The graph shows the change in activity of the radium on the notebook over the next 4500 years.



(i) Why does the activity of a radioactive source decrease?

Tick (✓) **one** box.

Half-life decreases. ☐

Half-life increases. ☐

The number of undecayed nuclei decreases. ☐

The number of undecayed nuclei increases. ☐

[1]

(ii) What will the activity of the radium on the notebook be 2500 years from now?

Use the graph.

Activity = ... cps **[1]**

(iii) Find the half-life of radium.

Use the graph.

Half-life = ... years **[2]**

Most candidates were able to read off the value of activity from the graph 2500 years from now in part (ii) but many did not show understanding of the decay graph. A common error in part (i) was to think that the half-life is decreasing rather than the number of decayed nuclei. In part (iii) many candidates halved the maximum values on the scales of the graph rather than using the line showing the decay. Some candidates, for example, just halved 4500 years and gave a half-life of 2250, others did use the activity axis but found the time when the activity was 3500 cps (half of the maximum number on the axis) rather than the time when the activity had halved from 6000 to 3000 cps.

Question 6 (a) (iv)

(iv) Explain why the statement below is **not** correct.

The radium on the notebook will be **much** less radioactive in 100 years' time.

.....

.....

.....

..... **[2]**

Many candidates did say that the activity would only have dropped by a small amount but many did not compare the activity, the original activity or make a comparison between the 100 years and the value for half-life.

Exemplar 3

No, because it most likely will decrease but most likely only by 200 because the activity is measured in a thousands and the data shows the radium will decrease out in 100 years probably 200 cps **[2]**

This response begins well with the statement that the activity will only decrease by about 200 cps, which has been read off from the graph. They then needed to make a comparison for example, 200 cps is very small compared to the original activity of 6000 cps, or they could have said that it only drops to 5800 cps which is still very close to 6000 cps.

Question 6 (b) (ii)

(ii) The radium emits alpha and gamma radiation.

Suggest **one** safety precaution that can be taken for **each** type of radiation.

Safety precaution to lower the risk from **alpha** radiation: .....

.....

Safety precaution to lower the risk from **gamma** radiation: .....

.....

[2]

There were several vague answers here which did not gain any credit. Many candidates only suggested either wearing protective gear or goggles which did not show full understanding of the dangers involved with each type of radiation. Some candidates gave the same answer for both parts of the question.

Question 7 (a)

7 Satellites contain thrusters which change the height of a satellite orbiting the Earth.

(a) What force keeps satellites orbiting the Earth?

..... **[1]**

Many candidates correctly stated that the gravitational force keeps satellites in orbit. Incorrect responses included magnetic forces or some form of energy.

Assessment for learning

Many candidates interchange the words 'energy' and 'force'.

These are two distinct physical quantities. A satellite can store gravitational energy due to its position in a gravitational field. A gravitational force acts on the satellite because there is an attraction between any two objects.

Question 7 (b) (i) and (ii)

(i) Newton's third law explains the interaction between the ejected gas and the satellite.

Select Newton's third law.

Tick (✓) **one** box.

Energy cannot be created or destroyed. ☐

Every force has a reaction force equal in size and opposite in direction. ☐

Force is directly proportional to mass and to acceleration. ☐

Unless a net force acts on an object, it continues at a steady speed. ☐

[1]

(ii) Explain how the thruster ejecting a gas causes the satellite to change speed.

Use ideas about forces.

.....

.....

.....

..... **[2]**

Newton's third law is difficult to explain, so although many candidates did select the correct answer in part (i) they are not able to explain that as the thruster exerts a force on the gas (to eject it), there is an equal and opposite force from the ejected gas on to the thruster accelerating it forwards.

Question 7 (c)

(c) The computer on the satellite reports data about the gas molecules leaving the thruster.

The table shows the data.

Initial speed (m/s)	Final speed (m/s)	Time (s)
0	40 000	2×10^{-16}

Explain why it is possible to calculate the acceleration of the gas molecules from this data but **not** the force acting on them.

It is possible to calculate acceleration because .....

.....

.....

It is **not** possible to calculate force because .....

.....

.....

[2]

Many candidates correctly suggested that acceleration could be calculated from the data, as it was possible to work out the change in speed and the time was included. Some candidates just referred to final speed rather than change in speed. Then they often suggested that it was not possible to calculate the force because the initial speed was zero. More candidates gave a correct response to the first part than the second. There were some vague answers to the second part relating to forces changing or the force being too small.

Question 8 (a) (i)

8 A boat makes a journey along a canal.

Fig. 8.1 shows part of the canal **drawn to scale**.

The boat travels from **A** to **C** via **B**.

Fig. 8.1

(a) The distance travelled from **A** to **C** is 5000 m.

(i) Find the distance from **A** to **B**.

Use:
- **Fig. 8.1**
- a ruler.

Distance from **A** to **B** = ... m **[2]**

Many candidates correctly worked out the ratio of the lengths on the diagram and then calculated the actual distance from A to B. Some candidates only measured the length of the line between A and B and then multiplied by 100 or 1000.

Question 8 (a) (ii)

(ii) When the boat leaves **A**, the time is 09:23.
When the boat reaches **B**, the time is 09:53.

Calculate the average speed of the boat for its journey from **A** to **B**.

Use the Equation Sheet.

Give your answer in **m/s**.

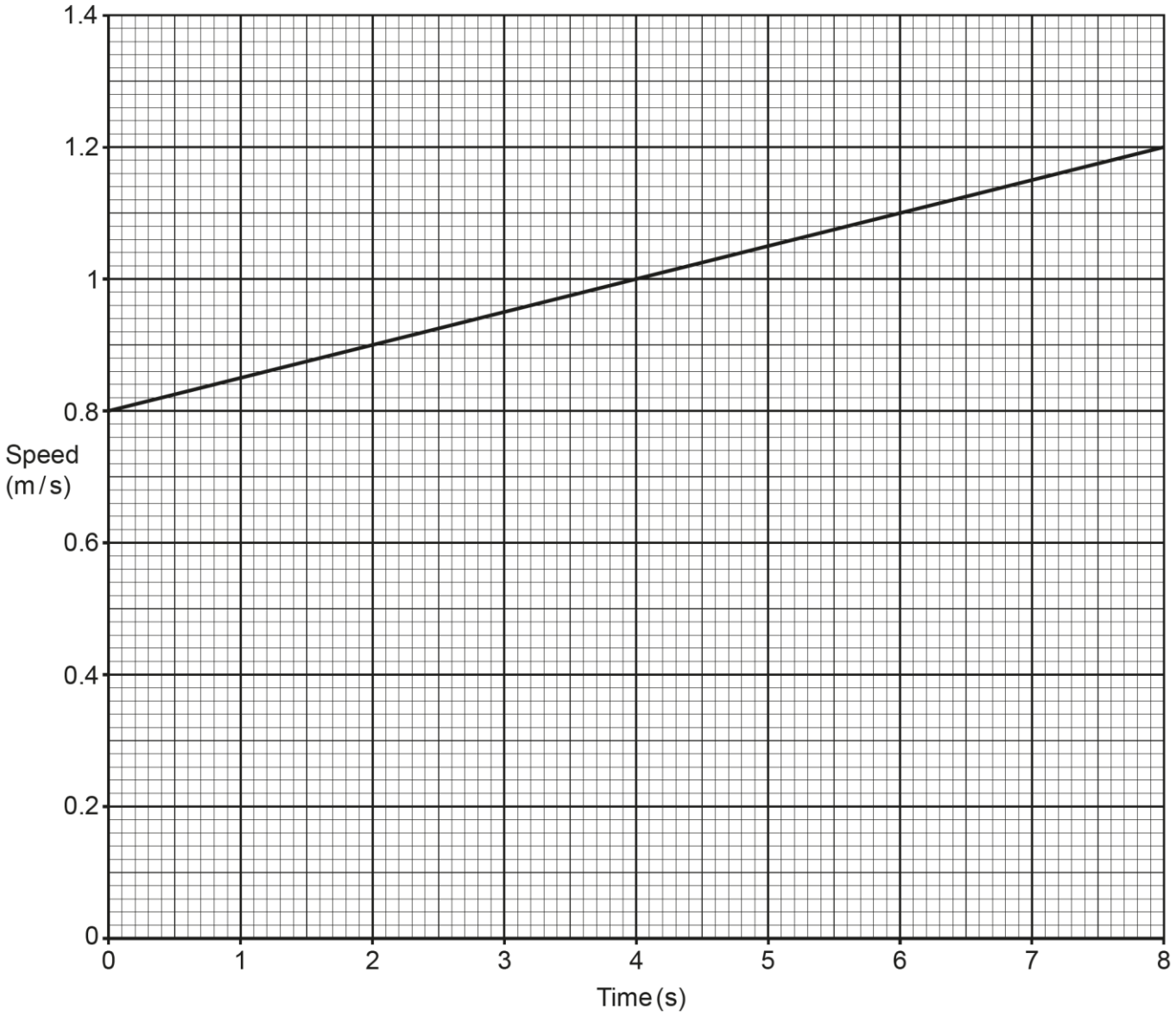
Average speed = ... m/s **[3]**

Most candidates used the correct equation to calculate speed and then worked out that the time taken for the boat to travel from A to B is 30 minutes. A common error was failing to convert the 30 minutes to 1800 seconds before substituting into the equation.

Question 8 (c)

(c) **Fig. 8.2** shows the speed–time graph for the boat for a short period.

Fig. 8.2



Calculate the acceleration of the boat.

Use **Fig. 8.2**.

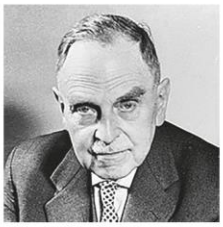
Acceleration = ... m/s^2 **[3]**

Most candidates correctly worked out the acceleration as the change in speed divided by the time taken. Some candidates misread the coordinates from the graph and some just used one data point and speed ÷ time.

Question 9 (b) (i) and (ii)

(b) The discovery that nuclei could be split developed over several years in the 1930s.

The table shows a timeline of some of the scientists involved and what they did.

Year	Scientist	What they did
1934	Enrico Fermi 	Fired neutrons at uranium nuclei which were captured by the uranium nuclei and made different elements. Fermi thought he created elements **heavier** than uranium.
1934	Ida Noddack Image of Ida Noddack © shethoughtit.ilcml.com, She Thought It. Item removed due to third party copyright restrictions. Link to material - shethoughtit.ilcml.com/biography/ida-tacke-noddack/	Published a paper suggesting that Fermi's elements might be **lighter** than uranium. Her paper was ignored as she had no experimental data or theory.
1939	Otto Hahn 	Repeated Fermi's experiment and identified one of the elements that was made as the lighter element **barium**.
1939	Lise Meitner 	Calculated the energy changes for Hahn's data and confirmed that energy is **conserved** when splitting a uranium nucleus into a barium nucleus and another nucleus.

(i) Suggest why Enrico Fermi's hypothesis was believed in 1934.

.....

..... **[1]**

(ii) Explain why, by 1940, more scientists had confidence in the theory that nuclei can be split.

Use information from the table to support your answer.

.....

.....

.....

..... **[2]**

There was a more challenging level of comprehension required for this question but those candidates who engaged with the concept gave some good responses. Many took on board the idea that Fermi had some experimental data but Ida Noddack did not to be the reason that Fermi was believed in part (i). Others appreciated the idea that if the nucleus absorbs extra mass in the form of neutrons it is likely to increase in mass. In part (ii) most candidates were able to pick the relevant information given in the table to suggest that as more scientist repeated the experiments getting similar results, confidence in the theory would increase, and some candidates understood the significance of Lise Meitner's calculations.

Copyright information

Question 9 (b) (i): Image of Lise Meitner; © Lise Meitner12crop2.JPG, Wikimedia Commons, from https://commons.wikimedia.org/w/index.php?title=File:Lise_Meitner12crop2.JPG&oldid=1028948603.

Question 9 (b) (i): Image of Enrico Fermi; © Enrico Fermi ID badge.png, Wikimedia Commons, from https://commons.wikimedia.org/w/index.php?title=File:Enrico_Fermi_ID_badge.png&oldid=912600274.

Question 9 (b) (i): Image of Otto Hahn; © en.wikipedia.org, Wikipedia. Published under the terms of CC BY-SA 3.0 NL.

Supporting you

Teach Cambridge

Make sure you visit our secure website **Teach Cambridge** to find the full range of resources and support for the subjects you teach. This includes secure materials such as set assignments and exemplars, online and on-demand training.

Don't have access? If your school or college teaches any OCR qualifications, please contact your exams officer. You can forward them this link to help get you started.

Reviews of marking

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the OCR website.

Access to Scripts

We've made it easier for Exams Officers to download copies of your candidates' completed papers or 'scripts'. Your centre can use these scripts to decide whether to request a review of marking and to support teaching and learning.

Our free, on-demand service, Access to Scripts is available via our single sign-on service, My Cambridge. Step-by-step instructions are on our website.

Keep up-to-date

We send a monthly bulletin to tell you about important updates. You can also sign up for your subject specific updates. If you haven't already, sign up here.

OCR Professional Development

Attend one of our popular professional development courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses for your subject on **Teach Cambridge**. You'll also find links to our online courses on NEA marking and support.

Signed up for ExamBuilder?

ExamBuilder is the exam paper builder platform for a range of our qualifications. Find out more.

Free for all OCR centres with an Interchange account, it allows unlimited users per centre. We require an Interchange username to verify your centre's users for ExamBuilder.

If you do not have an Interchange account, please contact your centre administrator (usually the Exams Officer) to request a username.

Once you have an Interchange username, use the form on this page to sign up for ExamBuilder, or ask an existing user at your centre to create an ExamBuilder account for you.

Active Results

Review students' exam performance with our free online results analysis tool. It is available for all GCSEs, AS and A Levels and Cambridge Nationals (examined units only).

Find out more.

Online courses

Enhance your skills and confidence in internal assessment

What are our online courses?

Our online courses are self-paced eLearning courses designed to help you deliver, mark and administer internal assessment for our qualifications. They are suitable for both new and experienced teachers who want to refresh their knowledge and practice.

Why should you use our online courses?

With these online courses you will:

- learn about the key principles and processes of internal assessment and standardisation
- gain a deeper understanding of the marking criteria and how to apply them consistently and accurately
- see examples of student work with commentary and feedback from OCR moderators
- have the opportunity to practise marking and compare your judgements with those of OCR moderators
- receive instant feedback and guidance on your marking and standardisation skills
- be able to track your progress and achievements through the courses.

How can you access our online courses?

Access courses from Teach Cambridge. Teach Cambridge is our secure teacher website, where you'll find all teacher support for your subject.

If you already have a Teach Cambridge account, you'll find the link to the **Online courses** under the **Assessment** or **Training** tab – hover over **Assessment** or **Training** on the horizontal menu and select **Online courses** from the dropdown.

If you don't have a Teach Cambridge account yet, ask your exams officer to set you up – just send them this link and ask them to add you as a Teacher.

Access the courses **anytime, anywhere and at your own pace**. You can also revisit the courses as many times as you need.

Which courses are available?

We recommend all teachers complete the module on Online courses – NEA for their subject. These courses provide subject-specific information about course content; how to prepare for planning, marking and submitting; and support with understanding the marking criteria.

The subject-specific courses are tailored for each qualification that has non-exam assessment (NEA) units, except for AS Level and Entry Level. They cover the following topics:

- the structure and content of the NEA units
- the assessment objectives and marking criteria for the NEA units
- examples of student work with commentary and feedback for the NEA units
- interactive marking practice and feedback for the NEA units.

We are also developing courses for some of the examined units, which will be available soon.

How can you get support and feedback?

If you have any queries, please contact our Customer Support Centre on 01223 553998 or email support@ocr.org.uk.

We welcome your feedback and suggestions on how to improve the online courses and make them more useful and relevant for you. You can share your views by completing the evaluation form at the end of each course.

Tell us what you think

Your feedback plays an important role in how we develop, market, support and resource qualifications now and into the future. We want you and your students to enjoy and get the best out of our qualifications and resources, but to do that we need your honest opinions to tell us whether we're on the right track or not.

You can email your thoughts to resources.feedback@ocr.org.uk or visit our feedback page to learn more about how you can help us improve our resources.

Designing and testing in collaboration with you and your students

Helping young people develop an ethical view of the world

Equality, diversity, inclusion and belonging (EDIB) are part of everything we do

---

Contact the team at:

01223 553998

ocr.org.uk

To stay up to date with all the relevant news about our qualifications, register for email updates at ocr.org.uk/updates

Visit our Online Support Centre at support.ocr.org.uk

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT