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# Examiners' Report
# June 2025

## GCSE Combined Science 1SC0 1PF

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June 2025

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# Introduction

The questions were set to test knowledge, application and the candidates' ability to analyse information and ideas having been taught the topics which make up the specification.

The topics covered by the specification are:

Topic 1 – Key concepts of physics.

Topic 2 – Motion and forces.

Topic 3 – Conservation of energy.

Topic 4 – Waves.

Topic 5 – Light and the electromagnetic spectrum.

Topic 6 – Radioactivity.

The assessment is through multiple choice questions, short answers, extended writing, calculations and analysis.

The paper also tested the skills acquired by candidates when completing practical work. The specification includes core practicals which should be included in the scheme of work and a number of suggested practicals which exemplify points in the specification to help candidates' understanding.

Most candidates managed the calculation questions in this paper where the equation was given. However, many did not show full substitution of numbers, or where working was shown it was unclear. This often led to candidates scoring zero marks on the calculation question where some working may have scored them partial credit. Where an equation is given, candidates should be encouraged to write the equation out again with the relevant number for each quantity directly underneath thus clearly showing the correct substitution before starting the calculation.

Graph work was generally well done on this paper with most candidates able to correctly plot points and draw a curve of best fit. Candidates also managed to interpret the given velocity time graph. However, more advanced skills such as extrapolating a line and finding a percentage change scored less well.

The questions that tested practical skills were answered with mixed success. Many candidates managed to give creditable reasons for repeating measurements but methods for increasing accuracy were often not relevant, instead relating to consistency and reliability.

## Question 1(a)

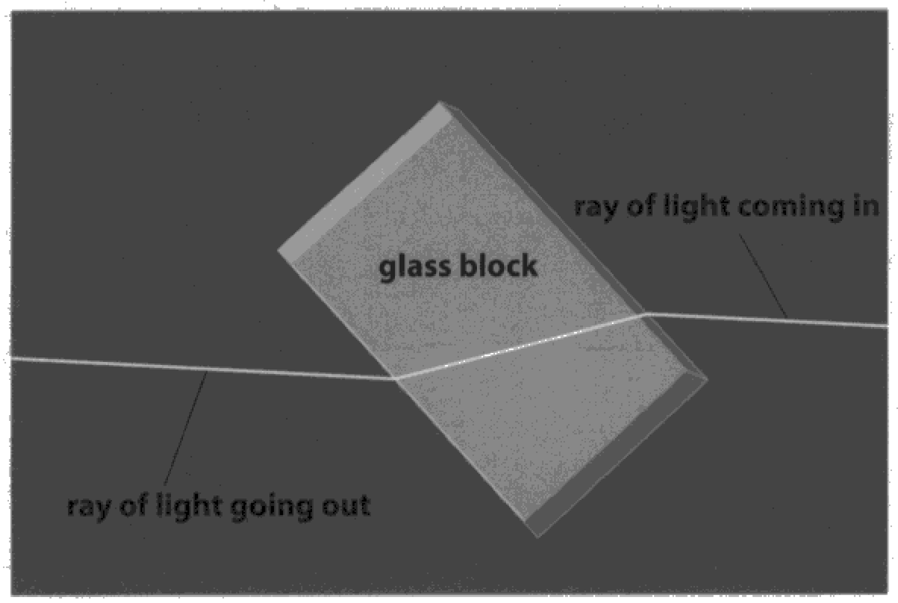
A common error here was to give UV as the most dangerous radiation or to mix up radio and gamma as most/least dangerous.

It was also common to see candidates mix up infra-red and UV uses.

## Question 1(c)i-ii

Most candidates plotted the points correctly. Where candidates scored 1 mark, rather than 2 overall, it was more often due to a failure to plot (70,39) accurately.

(c) Figure 1 is a diagram of a glass block being used to investigate the refraction of light.




(Source: © ajizai/docstoc.com)

**Figure 1**

The angle of incidence was varied and the angle of refraction was measured each time.

Figure 2 shows the results in a table.

| angle of incidence in degrees | angle of refraction in degrees |
|---|---|
| 20 | 13 |
| 30 | 20 |
| 40 | 25 |
| 50 | 31 |
| 60 | 35 |
| 70 | 39 |
| 80 | 41 |

**Figure 2**

Figure 3 shows a graph of these results.

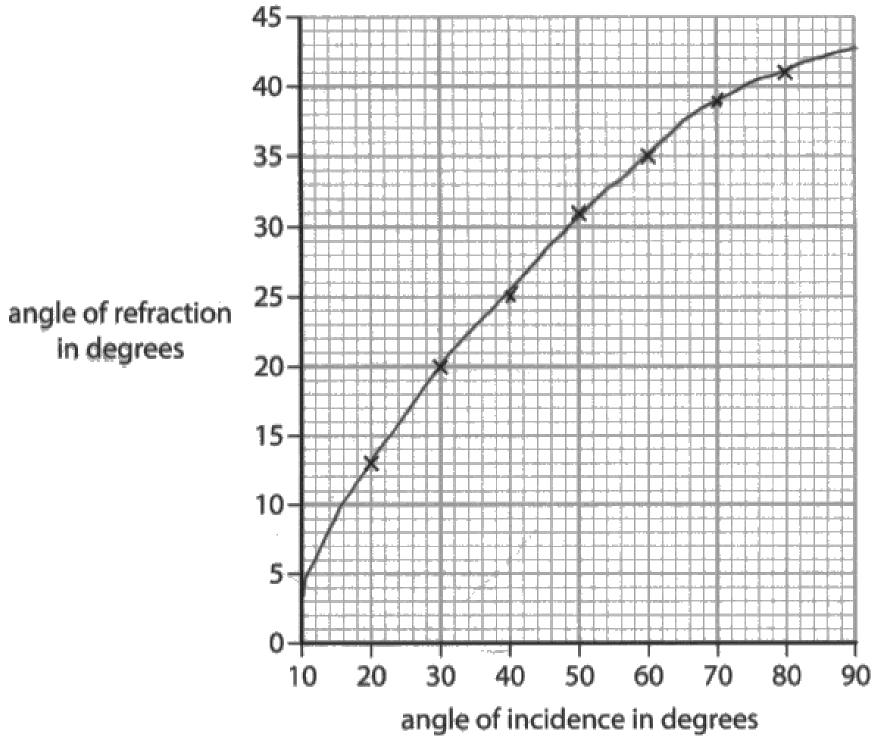



**Figure 3**

(i) The two shaded rows in Figure 2 are not plotted on the graph in Figure 3.

Plot these missing results on the graph in Figure 3.

**(2)**

(ii) Draw a curve of best fit through the points on the graph in Figure 3.

**(1)**

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Examiner Comments

This response shows both points plotted correctly with a good curve of best fit. It is important for candidates to practice drawing curves; the curve should be one continuous line, that follows the trend of the data.

# Question 1(c)iii

Many candidates did not understand what 'relationship' meant in this context and some just read from the graph or gave the difference between some of the values.

Some candidates scored the first mark but then were not clear enough to score the second mark. Comments such as "the angle of refraction stops increasing" or "slows down" did not receive credit.

(iii) Using figure 3, describe the relationship between the angle of refraction and the angle of incidence.

**(2)**

non - linear, as angle of refration increases so does the angle of incidence.

**ResultsPlus**
**Examiner Comments**

This response scores 2 marks, giving both the relationship between the quantities and the idea that it is a non-linear relationship.

# Question 2(a)i

Most candidates scored at least 2 marks here by correctly interpreting the change in velocity shown by the graph.

When candidates lost a mark, it was with graph stage SR.

**2** Figure 4 shows a velocity/time graph for a car moving on a test track.

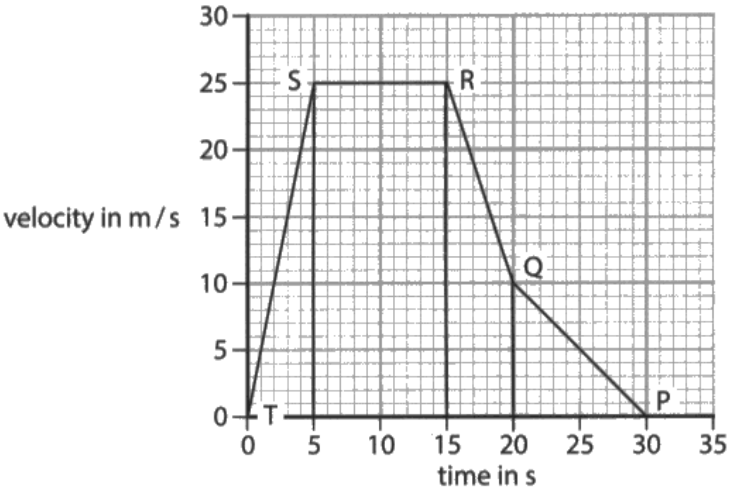


**Figure 4**

(a) (i) Use this graph to describe the velocity of the car in stages TS, SR and RQ.

**(3)**

TS

~~Ka~~ rapid increase in velocity by 25

SR

Stationary or ~~movi~~ velocity stays the same. at 25

RQ

rapid decrease in velocity by 15

ResultsPlus
Examiner Comments

The most common incorrect answer for SR was 'stationary' or 'stopped'. This response loses a mark for that reason, it is also worth noting that the correct answer is given, but when an incorrect answer is also given the mark is not scored as it is a contradiction. It is likely that candidates are confusing distance time graphs and velocity time graphs, here remembering that a horizontal line means stationary in one of those graphs.

## Question 2(a)ii

Many candidates did not score here due to either not making a clear comparison between the two motions or making a comparison between the lines on the graph rather than the actual motions.

(ii) State how the motion of the car is different in RQ compared with QP.

**(1)**

The line on RQ is more steeper, meaning it's decelerating faster.

**ResultsPlus**
**Examiner Comments**

This response scores the mark as there is a clear comparison and it describes the motion rather than just the graph line. If the response had just read "The line on RQ is more steeper" then it would not have scored the mark. The mark is scored for what comes after. This is an acceptable way to express the idea as given in the mark scheme guidance column.

## Question 2(b)i

(b) (i) Calculate the acceleration of the car in Figure 4 in the first 5 s.

Use the equation

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

~~accel.~~ $a = \frac{v-u}{t} = \frac{25-0}{5} = \frac{25(2)}{5} = 5$

acceleration = 5 m / s²

ResultsPlus
Examiner Comments

Most candidates scored the mark here. Some, like this response, did show working, which should be encouraged. Working shown like this with the algebraic equation shown first followed by the numerical substitution is ideal and is likely to allow calculation errors to still score some marks.

# Question 2(b)ii

Candidates were required to calculate the area underneath the line on the graph between 5 and 15 seconds. A very common error was to multiply the velocity of 25 m/s by 15 seconds, perhaps showing a recognition of the correct equation, but not scoring any credit here.

# Question 3(a)

**3** (a) Figure 5 shows a diagram of a helium atom.

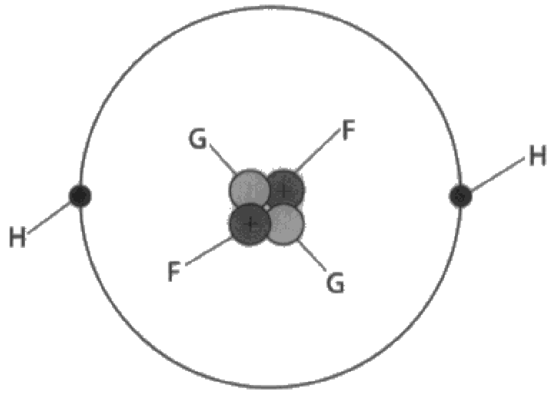


**Figure 5**

Complete the table for particles G and H, as shown in Figure 5.

**(4)**

| particle | name of particle | charge |
|---|---|---|
| F | proton | positive |
| G | neutron | no charge |
| H | electron | negative |

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Examiner Comments

Most candidates knew the names of the labelled particles as the response shown here did, however some had them the wrong way around, giving H as a neutron and G as an electron. The proton is given in the question and so these candidates appeared to remember the other two particles in the atom, but could not place them in the correct location. Candidates who did mix up the location were still awarded marks for correctly matching the particle to the correct charge.

## Question 3(b)i

A common incorrect answer here was 9. However, more candidates scored this mark than scored the mark in Q03(b)(ii).

## Question 3(b)ii

Fewer candidates scored the mark here than in the previous question part. This required candidates to make a link between proton number and number of electrons for an atom.

# Question 3(c)ii

(ii) The isotope nitrogen-13 (N-13) has a half-life of 10 minutes.

A sample of N-13 has an initial mass of 120 g.

Calculate the mass of N-13 that remains after 30 minutes.

**(2)**

~~[illegible]~~

$120 \div 2 = 60$

$60 \div 2 = 30g$

mass remaining = 30 g

**ResultsPlus**
**Examiner Comments**

Not many candidates appeared to know how to approach this question. Many incorrect calculations were seen, such as multiplying the given mass by 3 or diving by one of the other given numbers. Very few candidates scored 2 marks for the correct answer with those who did have the correct approach only dividing by 2 twice as shown in this response. This scores 1 mark as it only shows two half-lives. The idea of half-life is commonly examined and although it was pleasing to see some candidates knowing the required method, very few could determine how many half-lives were required to obtain the answer.

# Question 4(a)i

Due to the three-dimensional nature of the light gate in the diagram a vertical arrow drawn anywhere within the range shown on the mark scheme was allowed.

**4** (a) Figure 6 shows apparatus set up to investigate the speed of a falling object.

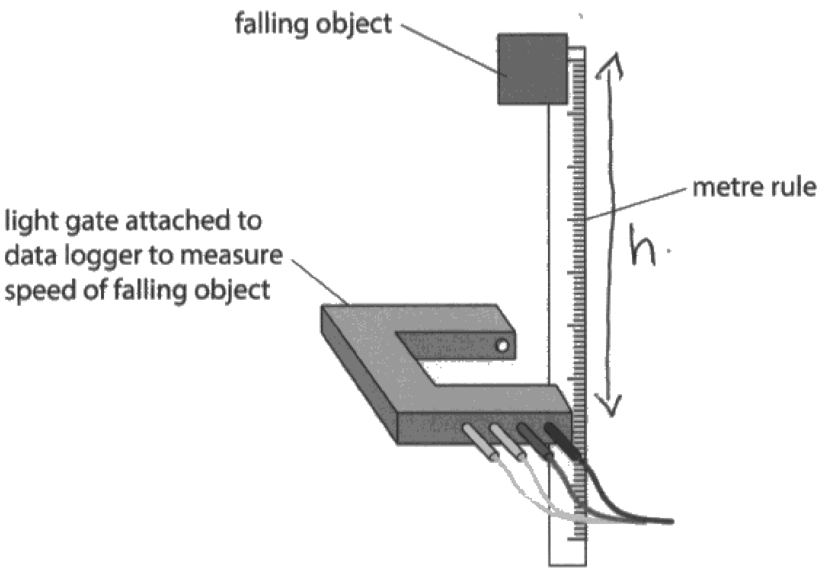


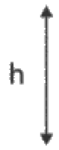

**Figure 6**

The object is dropped from rest at the position shown.
The object falls through the light gate.

(i) The speed of the object, after it has fallen through a height, h, is measured by the light gate.

Label Figure 6 to show the height, h.
Your label should look like this

**(1)**



This response scores the mark as the top end of the arrow is below the top edge of the falling object and the bottom end is also in range. Common incorrect responses were arrows drawn too short, usually not reaching the bottom edge of the falling object.

# Question 4(a)ii

The best responses here described the idea of checking for anomalies or the idea of calculating an average.

Many candidates attempted to describe the idea of checking for consistency, although this was sometimes not expressed clearly enough.

Comments about accuracy were ignored here since repeating does not improve accuracy.

(ii) The speed is measured at least four times for each drop height.

Give **one** reason for repeating the measurements.

(1)

To See is the results Stay the Same

ResultsPlus
Examiner Comments

This response scores the mark for the idea of checking for consistency.

(ii) The speed is measured at least four times for each drop height.

Give **one** reason for repeating the measurements.

(1)

to gain more accurate results

**Examiner Comments**

This response does not score the mark as the idea of improving accuracy was ignored.

# Question 4(a)iii

This question required candidates to suggest how a single measurement could be taken more accurately.

Many candidates described the idea of repeating or using the same equipment which does not improve accuracy. Another common response was about releasing the object from the same height; this is closer to the correct idea but does not score without some method to achieve this such as using a marker or reading the scale from eye level.

Some candidates described securing the ruler or keeping it straight but did not describe how this would be achieved.

(iii) The metre rule shown in Figure 6 is used to measure the height, h.

Suggest **two** ways to make the measurement of h as accurate as possible.

(2)

1 Don't move metre ruler

2 Drop object more than once

## ResultsPlus Examiner Comments

The idea of not moving the ruler does not score on its own. Candidates are required to give a practical method such as clamping the ruler in place. The idea of repeating was ignored as this does not improve accuracy.

(iii) The metre rule shown in Figure 6 is used to measure the height, h.

Suggest **two** ways to make the measurement of h as accurate as possible.

**(2)**

1 Keep the ruler Straight up.

2 make sure the falling object is falling from the Correct ~~hight~~ height.

ResultsPlus
Examiner Comments

"Keep the ruler straight up" was awarded a mark for the idea that the ruler needs to be vertical. If the ruler was also clamped the response would score 2 marks. The idea that the object must fall from the same height did not score unless a method to ensure this was described, such as the use of a marker.

# Question 4(b)

This diagram shows energy transfers.

Candidates were required to name the energy store at the start of the fall and the two energy stores that the energy is transferred to as the object falls.

The energy stores on the right side could be in either order here.

(b) As the object in Figure 6 falls, energy is transferred.

These energy transfers are represented in Figure 7.

Complete the labels of the energy stores involved.

**(3)**

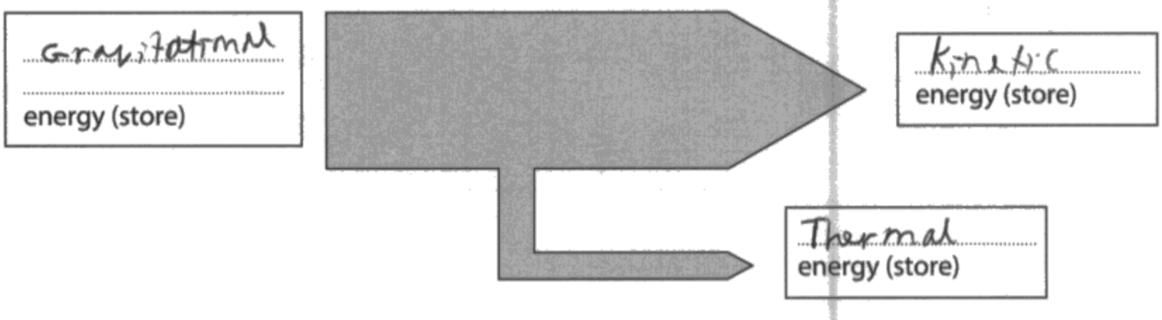



**Figure 7**

**ResultsPlus**
**Examiner Comments**

This response correctly names all three energy stores and therefore scores 3 marks.

(b) As the object in Figure 6 falls, energy is transferred.

These energy transfers are represented in Figure 7.

Complete the labels of the energy stores involved.

**(3)**

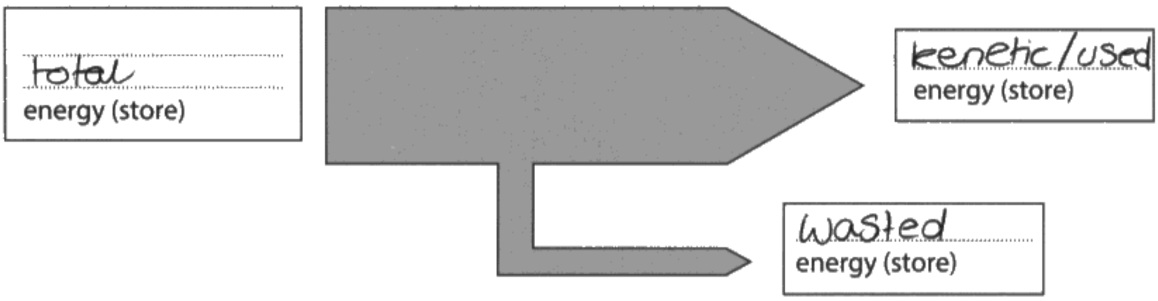



**Figure 7**

ResultsPlus
Examiner Comments

This response scores 1 mark for "kenetic". Note that spelling is not penalised so long as the word is recognisable as the correct word. Also note that here the alternative answer given does not contradict the given correct answer (used is assumed to mean 'useful' in this context) and so does not negate the mark.

# Question 4(c)

Many candidates managed to read the correct values from the graph but usually did not go much further.

It was clear from the responses that most candidates did not know how to calculate a percentage change. Even candidates who did calculate the difference between 740 and 60 often did not use this to calculate a percentage.

(c) Figure 8 shows wind power generation from the year 2000 onwards.

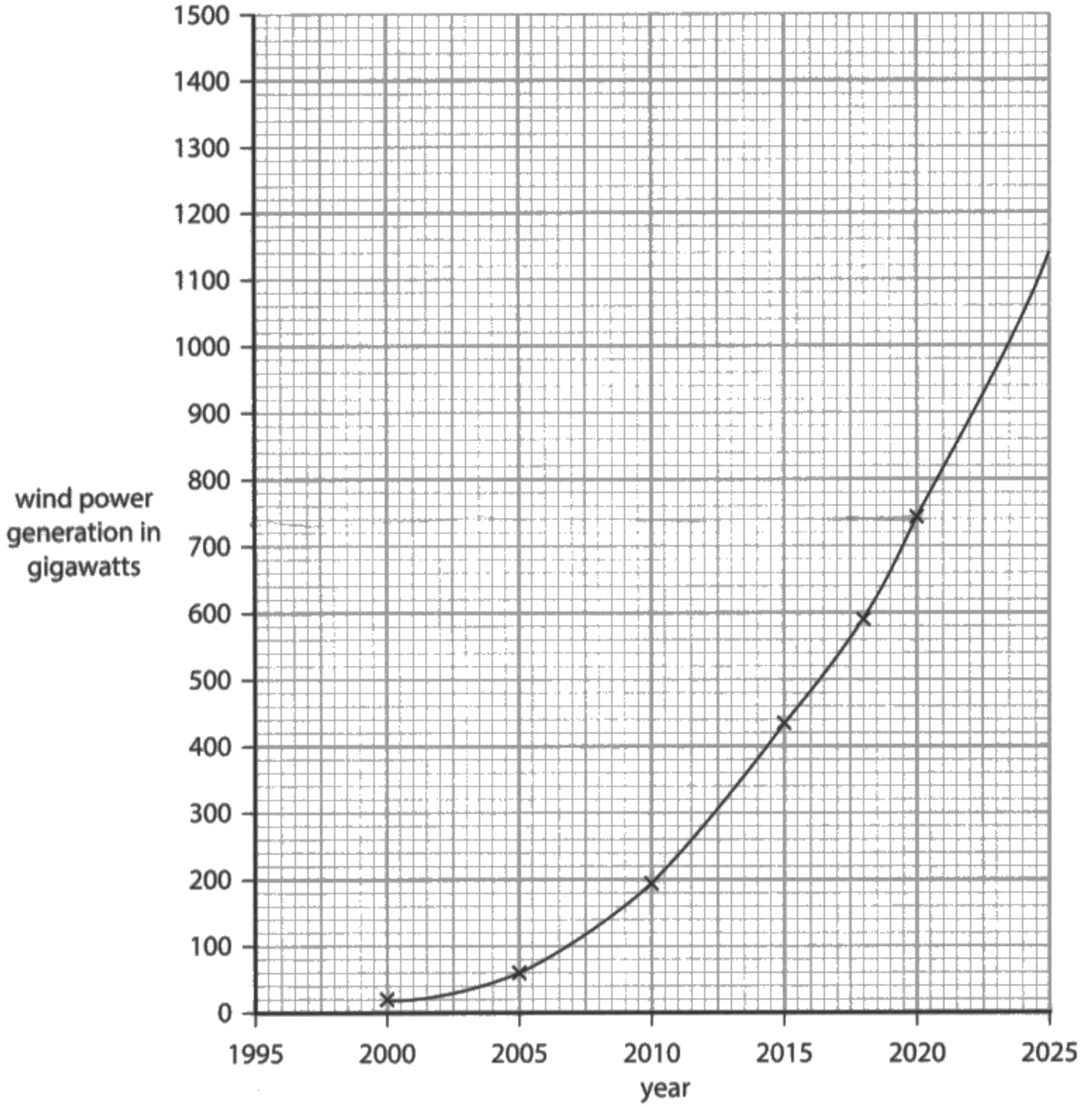



**Figure 8**

Estimate the percentage change in wind power generation from 2005 to 2020.

**(3)**

$\frac{740 - 60}{740} \times 100 = 91.891...$

$= 92$

percentage change = 92 %

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Examiner Comments

This response scores 2 marks as there is a correct change calculated (740-60) and this is divided by 740, which does not give the correct percentage change but has calculated the change as a percentage of the final value and is therefore almost the correct idea and worthy of 2 marks.

(c) Figure 8 shows wind power generation from the year 2000 onwards.

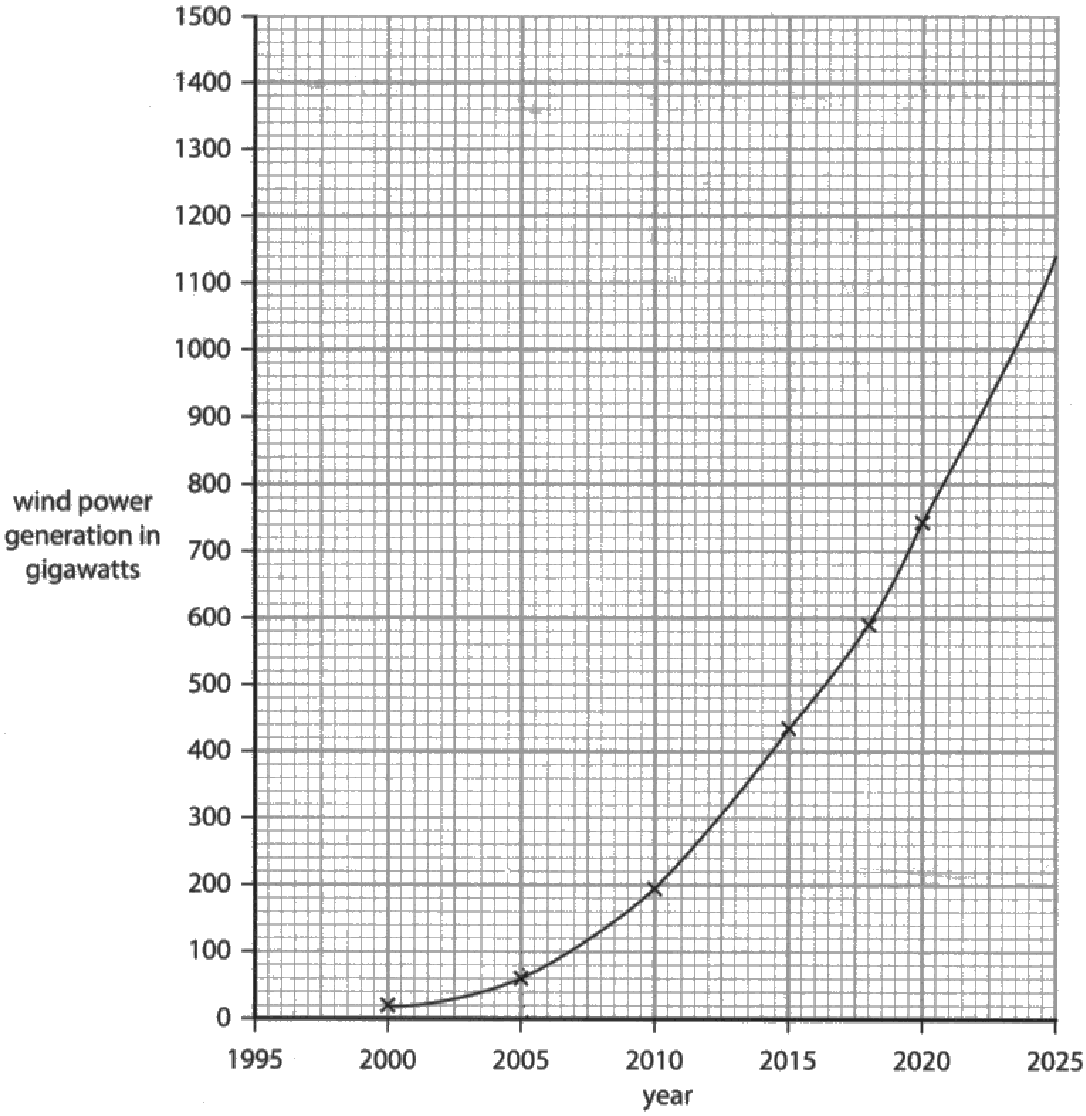


**Figure 8**

Estimate the percentage change in wind power generation from 2005 to 2020.

**(3)**

60 → 740

$\cancel{\frac{60}{740}} \times 100$ $\quad \frac{740}{60} \times 100$

percentage change = $1233.\dot{3}$ %

**ResultsPlus**
**Examiner Comments**

This response scores 1 mark for selecting the correct points from the graph (740 and 60). The subsequent processing is incorrect and so no further marks are scored.

# Question 5(a)ii

Most candidates scored the mark here although relatively few gave the correct name of 'mass balance'.

# Question 5(b)i

Candidates were rewarded here for selecting the correct force for use in the given equation.

Those that also went on to correctly rearrange the equation scored more marks.

This again demonstrates why it is important for candidates to show the substitution of numbers into given equations before doing any processing.

(b) Figure 9 shows the two forces acting on a beach ball as it falls through the air.

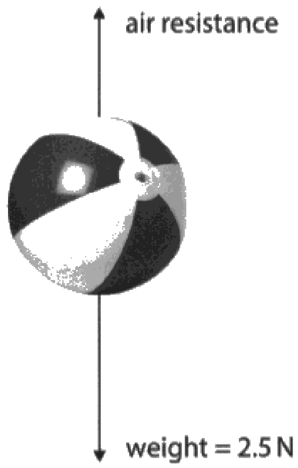


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**Figure 9**

The resultant of these two forces is 0.92 N downwards.

(i) The mass of the beach ball is 0.25 kg.

Calculate the acceleration of the beach ball as it falls.

Use the equation

$$F = m \times a$$

$\frac{F}{m \times a}$

$a = \frac{F}{M}$

$\frac{0.92\,N}{0.25\,Kg} = 3.68$

(3)

acceleration = 3.68 m/s²

**ResultsPlus**
**Examiner Comments**

This response demonstrates clear working, showing an algebraic rearrangement followed by substitution of correct values before calculating.

(b) Figure 9 shows the two forces acting on a beach ball as it falls through the air.

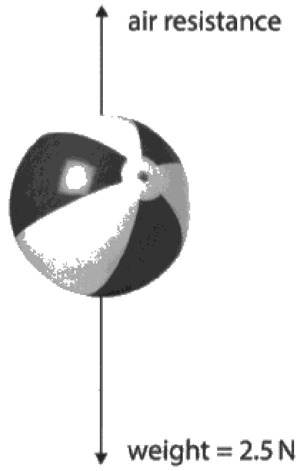


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**Figure 9**

The resultant of these two forces is 0.92 N downwards.

(i) The mass of the beach ball is 0.25 kg.

Calculate the acceleration of the beach ball as it falls.

Use the equation

$$F = m \times a$$


$F \times m = a$

(3)

$F = m \times a$

$0.92 \times 0.25 = 0.23$

$F = 0.92$

$m = 0.25$

acceleration = 0.23 m/s²

This response scores 1 mark for use of 0.92 N as the force. There appears to be a mistake in the rearrangement of the equation meaning no further marks are scored.

## Question 5(b)ii

Very few candidates scored this mark. A common answer was one of the values from the previous question such as the weight force.

## Question 5(c)i

Most candidates demonstrated that they could calculate the mean here.

This is a commonly examined skill and one that candidates should become very familiar with as they work through their GCSE science course.

# Question 5(c)ii

Candidates were expected to extend the given line so that the force at a height of 0.80m could be read from the line.

Some candidates attempted to extend the line, but the line was not always straight and in the same direction as the given line, which resulted in an incorrect force.

The students then measure values of the force, F, for several different values of h, the height of the runway.

Figure 11 is a graph of F against h.

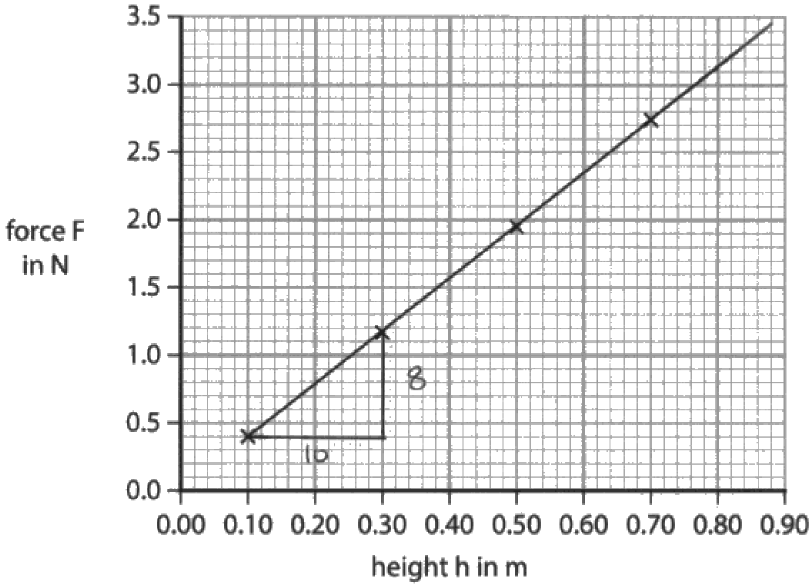


**Figure 11**

(ii) Use the graph in Figure 11 to determine the value of F when h = 0.80 m.

**(2)**

F = 3.12 N

**ResultsPlus**
**Examiner Comments**

This response shows a good drawn line that extends to give a force value within the range on the mark scheme for 2 marks.

The students then measure values of the force, F, for several different values of h, the height of the runway.

Figure 11 is a graph of F against h.

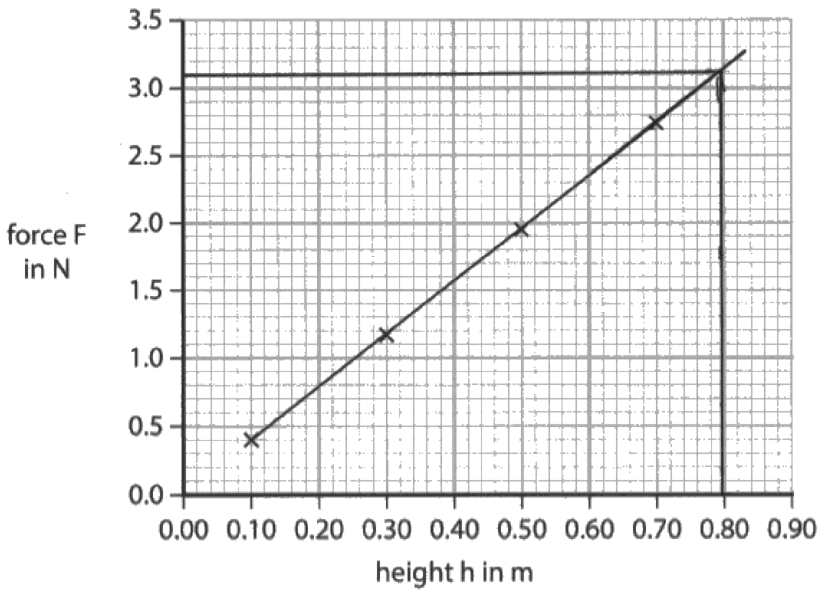


**Figure 11**

(ii) Use the graph in Figure 11 to determine the value of F when h = 0.80 m.

(2)

F = 3.01 N

ResultsPlus
Examiner Comments

This line is extended correctly, but the force is read off incorrectly and so only scores 1 mark for the drawn line.

## Question 5(c)iii

Many candidates received only partial credit here, usually for knowing that a triangle should be drawn against the line but not correctly using it to calculate the gradient.

A common misconception here was that the gradient could be calculated by drawing a triangle in the correct position and then counting the number of squares in the y and x directions to complete the division with.

Other candidates lost the second mark through incorrectly reading the coordinates from the line or dividing change in x by change in y.

The students then measure values of the force, F, for several different values of h, the height of the runway.

Figure 11 is a graph of F against h.

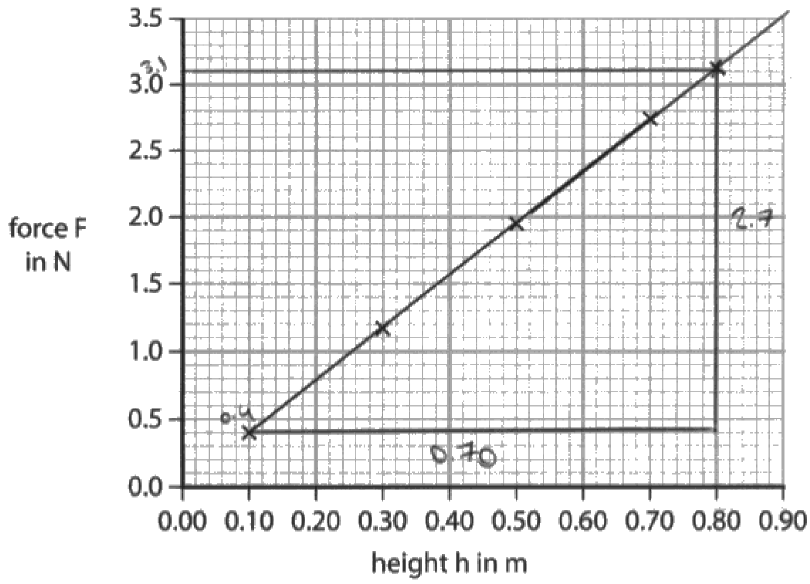


**Figure 11**

(ii) Use the graph in Figure 11 to determine the value of F when h = 0.80 m.

(2)

F = 3.1 N

(iii) Determine the gradient of the graph in Figure 11.

(2)

$$G = \frac{\text{change in } y}{\text{change in } x} = \frac{2.7}{0.7} = 3.\dot{8}5714\dot{2}$$

gradient = $3.\dot{8}5714\dot{2}$ N/m

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Examiner Comments

This response shows an ideal method. The candidate has drawn a large triangle on the graph and written on both the change in y and change in x values. They have then written out the relationship being used before substituting the values in to get the correct answer.

# Question 6(a)i

Less commonly scored than the next question part with the most common answer given as 20cm.

# Question 6(a)ii

More commonly scored than the previous question part showing candidates are generally more familiar with wavelength than amplitude.

However, there were still many candidates giving answers such as 24cm or 16cm. This is perhaps because it was difficult to determine the number of complete wavelengths if measuring peak to peak.

# Question 6(a)iii

To score both marks here candidates needed to give clear measurements in the context of the given scenario and then give the relevant equation to calculate the wave speed.

Many candidates missed out on the first marking point due to not being clear enough about the quantity they were measuring.

The responses given here exemplify this.

(iii) The water wave shown in Figure 12 is generated in a large tank.

A student observes the wave.

Describe how the student could determine the wave speed of the wave.

**(2)**

Measure the distance of the wave and use a stop watch to take the time. Then do distance ÷ time = wave speed.

**ResultsPlus**
**Examiner Comments**

This response does not score the first mark as it is not clear what is meant by the 'distance' and it is not clear that the time is measured over a specific distance travelled. The second mark is scored for the relevant equation.

(iii) The water wave shown in Figure 12 is generated in a large tank.

A student observes the wave.

Describe how the student could determine the wave speed of the wave.

(2)

wave speed = $\frac{\text{distance}}{\text{time}}$. The student can measure the distance of the wave and the time, then divide them to calculate the wave speed.

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Examiner Comments

This is another response that does not make it clear what the distance and time are in relation to the waves. A clear method for scoring the first mark is to give a specific distance, eg 30cm and then state that the time taken for the wave to travel 30cm is measured.

# Question 6(b)i

A common incorrect answer was to give seismic waves, or to name a seismic wave. Candidates should learn that repeating examples given in the question will not score marks.

Some candidates described a transverse wave which indicates that they did not read the question carefully enough.

(b) When an earthquake happens, waves are transmitted through the Earth.
Figure 13 is a diagram of a part of the Earth's crust.

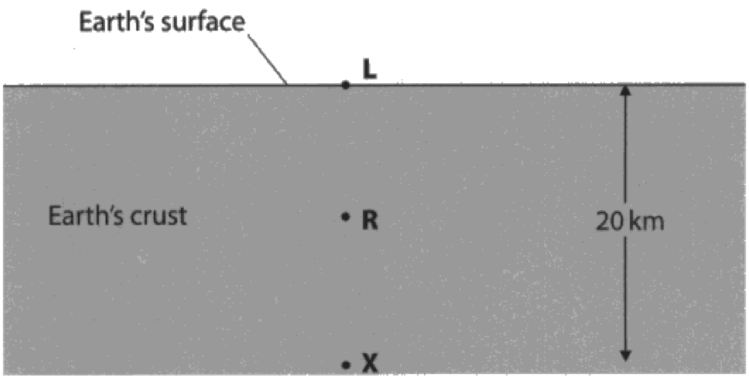


**Figure 13**

An earthquake happens at point **X**, 20 km below the Earth's surface.

An earthquake wave from **X** is detected at point **L**.

This earthquake wave is a transverse wave.

(i) State **one** other example of a transverse wave.

**(1)**

Radio waves

**ResultsPlus**
**Examiner Comments**

Any type of electromagnetic wave scores the mark here.

## Question 6(b)ii

Many candidates scored the first marking point here for the idea that the rock will vibrate, however very few scored the second marking point for the idea that the vibrations are perpendicular to the direction of the wave.

Some candidates described the rock moving with the wave up towards the surface or focussed too much on the consequence of the earthquake on the rock (such as the idea that it would break or shatter).

# Question 6(c)

To score full credit here candidates had to make correct links between the given data and the penetration ability of alpha and gamma to draw the conclusion that the source emits both.

Not many candidates provided a Level 3 response here, often due to either not making correct links or through contradicting themselves with incorrect science.

A common confusion was between the terms absorb and emit; the candidates often wrote that the data in the table was showing emission from the objects (paper, lead etc) as opposed to the count rate from radiation which had penetrated the object. It is important for candidates to become familiar with terms such as 'absorb' and 'emit' as it gives them a better chance of writing a response that is clear enough to score marks.

Contradictions often came from candidates writing a conclusion at the beginning of their response and then changing their mind towards the end. Candidates should be encouraged to use the given data to make links and describe relationships first and then draw a conclusion at the end after the information has been fully considered.

Some of the best responses were carefully considered and more concise than answers which scored lower. This is likely from candidates who thought through their response (sometime annotating the diagram and table) before writing their answer.

*(c) A scientist investigates a sample of an unknown radioactive material.

The scientist finds that the sample does **not** emit beta radiation.

The scientist sets up the experiment shown in Figure 14 and uses different absorbers to investigate alpha and gamma radiation.

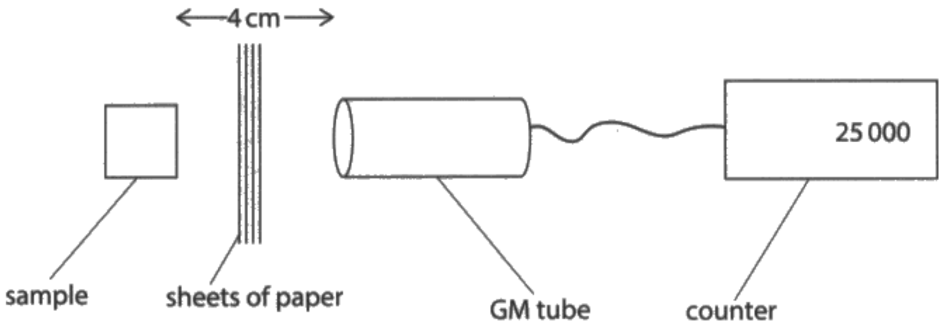


**Figure 14**

The results are shown in Figure 15.

The count rates are rounded to two significant figures.

The background radiation was 18 counts per minute (cpm).

| absorber | count rate / cpm |
|---|---|
| none | 33 000 |
| 4 sheets of paper | 25 000 |
| 3 cm of lead | 4 000 |

**Figure 15**

Discuss whether the sample emits alpha or gamma radiation or both.

Your answer should refer to

- the data shown in Figure 15
- how the data gives evidence for particular radiations.

**(6)**

gamma It would be both alpha and gamma radiation because of the evidence given to us.
Alpha only stop when paper is put infronte of it because the particules cant be stopped due to the distance it can

Have and what it passed through. As the paper is put infronte of the Giger muller tube the counting decreases which proves alpha is involved in the sample however it only decreases by 1,000 this leaves 25,000 ~~left~~ particals passing through.

Gamma radiation stops when you put lead or wood infronte of it. After it reduces due to the paper this shows us that there are gamma particals within ~~the~~ sample we get proven this as when the lead is put infronte of it decreases significantly from 25,000 to 4,000 this means the passing through has decreased by ~~1000~~ 21,000 which is slowing and making the particales harder to pass through.

Therefore this proves that both Alpha and gamma are in the sample due to the counter and what was put infronte ~~of it~~ of it.

ResultsPlus
Examiner Comments

This is an example of a well thought out Level 3 response. The candidate has clearly thought through the given information and processed the data before starting to form their answer. There is a clear link between the idea that paper will absorb alpha radiation and the reduction in the count rate when paper is used. Then there is a clear separate part of the response where the penetration of gamma radiation is linked to the count rate decrease when lead is used. A conclusion is given at the beginning, however it is clear that the candidate had the answer prepared before starting leading to a clear response overall.

*(c) A scientist investigates a sample of an unknown radioactive material.

The scientist finds that the sample does **not** emit beta radiation.

The scientist sets up the experiment shown in Figure 14 and uses different absorbers to investigate alpha and gamma radiation.

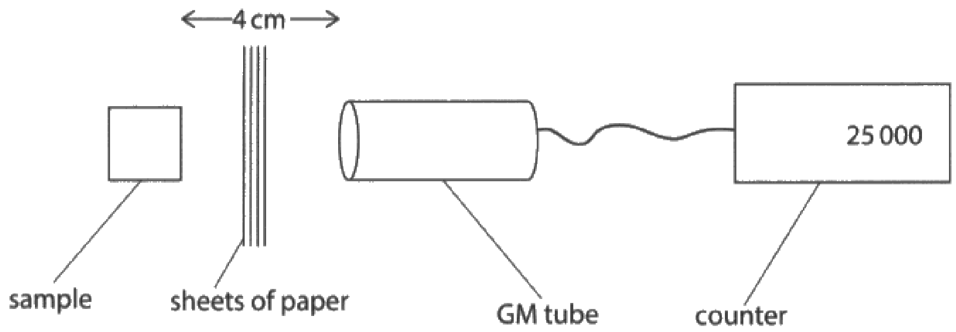


**Figure 14**

The results are shown in Figure 15.

The count rates are rounded to two significant figures.

The background radiation was 18 counts per minute (cpm).

| absorber | count rate / cpm |
|---|---|
| none | 33 000 |
| 4 sheets of paper | 25 000 |
| 3 cm of lead | 4 000 |

**Figure 15**

Discuss whether the sample emits alpha or gamma radiation or both.

Your answer should refer to

- the data shown in Figure 15
- how the data gives evidence for particular radiations.

(6)

- Gama rays are stopped by lead.
- Alpha rays are stopped by sheet of paper.
- Gamma rays are effective So they can go through 4 sheets of paper.

• Alpha rays are present when there is no sheet of paper to stop them.
• The GM Tube (Geiger-Muller) is used to determine if alpha and gamma radiations are present.
• The more click sounds the GM Tube make the higher frequency of the radiation is present.
• Alpha radiation has lower frequency therefore it will make less clicks.
• Gamma radiation has higher frequency therefore it will make more clicks.
• The count rate determines that there is more alpha radiation present then gamma radiation.
• They have a different of 8000 cpm.

ResultsPlus
Examiner Comments

This response scores 2 marks and does not move out of Level 1. Although the candidate does give some correct physics here regarding both alpha and gamma radiation, there is no link to the data given in the question and so the response does not move out of Level 1.

# Paper Summary

Based on their performance on this paper, candidates should:

- Show full substitution into equations before starting to rearrange or calculate.
- Learn the meaning of command words and make sure to answer the question based on the command word used.
- Carefully read questions before starting to answer.
- Practice calculating gradients and using data from graphs.
- Practice questions involving radioactive half-life.
- Be careful to clearly describe how to take measurements or improve methods in experimental questions.
- Learn key words from each topic and know how to use them in descriptions and explanations.

# Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link: https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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