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GCSE (9-1)

Examiners' report

GATEWAY SCIENCE PHYSICS A

J249
For first teaching in 2016

J249/04 Summer 2019 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. 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 can be downloaded from OCR.

Paper 4 series overview

J249/04 is one of the two Higher Tier papers for the GCSE (9-1) Physics A (Gateway Science).

It covers the topics:

- P5 Waves in matter
- P6 Radioactivity
- P7 Energy
- P8 Global challenges
- P9 Practical skills

Candidate performance overview

Candidates who did well on the paper generally did the following:

- Recalled and applied or manipulated equations
- Underlined key words
- Answered questions in depth, e.g. the Level of Response question
- Interpreted graphs to draw detailed conclusions.

Candidates who did less well on this paper generally did the following:

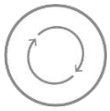
- Found it difficult to recall and apply or manipulate equations
- Lacked the necessary knowledge to describe and apply ideas about refraction
- Gave answers that lacked detail.

Section A overview

Section A consists of 15 multiple Choice Questions, concentrating on Assessment Objectives 1 and 2 (AO1 and AO2).

Almost all candidates attempted every question.

Most successful questions	*Least successful questions*
• Question 3 Identifying waves which can cause cancer • Question 7 Identifying renewable energy resources • Question 8 Facts about isotopes • Question 14 Efficiency calculations.	• Question 1 Refraction of a sound wave • Question 5 Medical tracers • Question 12 Satellites in orbit • Question 13 Transformers in the national grid.

	**AfL**	Candidates who did well on this section generally did the following: • Underlined keywords • Wrote equations and/or calculations next to the relevant questions • Worked through the options methodically e.g. by crossing out and dismissing incorrect options.

Question 1

1 A sound wave travels in air and enters water.

What happens to the sound wave as it enters the water?

	Speed	Frequency	Wavelength
A	decreases	decreases	decreases
B	decreases	stays the same	decreases
C	increases	increases	increases
D	increases	stays the same	increases

Your answer ☐ **[1]**

This question assessed candidates' knowledge of refraction of sound waves. Around a third of candidates did not know that a sound wave travels faster in water than air.

	**Misconception**	Many candidates had the misconception that a sound wave slows down when it enters water and incorrectly chose option B.

Question 2

2 An electromagnetic wave transfers energy.

Which row in the table is correct?

	Electromagnetic wave	Energy transfer
A	Infra-red	From a heating element of a toaster to the bread inside
B	Radio	From a radio to a transmitter
C	Gamma rays	From a high voltage supply to heating water in food
D	X-rays	From bones in the body to an X-ray machine

Your answer ☐ **[1]**

Most candidates successfully applied their knowledge of electromagnetic waves to identify that the energy transfer for row A was correct.

Question 4

4 Which row in the table shows realistic speeds?

	Speed (m/s)		
	Road cyclist	**Gale force wind**	**Sound in air**
A	40	12	1000
B	6	24	340
C	20	6	760
D	15	55	250

Your answer ☐ **[1]**

Candidates are expected to be able to recall typical speeds such as cycling, wind and sound. Most candidates were able to do this successfully.

Question 5

5 The table gives some information about four radioactive isotopes.

Which isotope is the best to use as a medical tracer?

	Half life	Radiation emitted
A	6 hours	alpha
B	6 hours	gamma
C	6 minutes	gamma
D	6 years	beta

Your answer ☐ **[1]**

This question required candidates to apply their scientific knowledge and analyse the information in the table about nuclear radiation in order to choose the best isotope to use as medical tracer.

?	**Misconception**	Many candidates could identify that gamma was the best radiation to use but had the misconception that a half-life of 6 minutes was long enough. Therefore, they incorrectly chose option C. Teaching often emphasises the need for a short half-life to reduce patient exposure to radiation, but this time cannot be shorter than the time required to carry out the procedure.

Question 9

9 The table contains statements about red-shift and galaxies.

Which row in the table is correct?

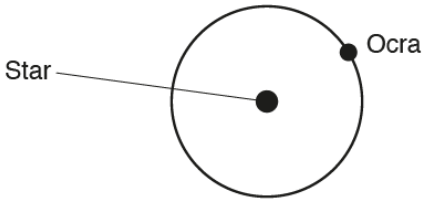
	Statement 1	Statement 2
A	All galaxies move apart at the same speed.	They show both red-shift and blue-shift.
B	Distant galaxies show more red-shift.	The distant galaxies are moving apart faster than nearby ones.
C	Distant galaxies show more red-shift.	The distant galaxies are moving apart slower than nearby ones.
D	There are no galaxies that show blue-shift.	All galaxies are moving away from each other.

Your answer ☐ **[1]**

Candidates were mainly able to apply their knowledge to link correctly the amount of red-shift to the movement of galaxies.

Question 11

11 Planet Ocra is in a circular orbit around a star.



Which statement is correct?

A The acceleration of Ocra is zero.

B The speed of Ocra is changing.

C The velocity of Ocra is changing.

D The velocity of Ocra is zero.

Your answer ☐ **[1]**

This question assessed candidates' knowledge of how the force of gravity can change the velocity of a planet but its speed stays the same. Most candidates correctly chose option C.

Question 12

12 An artificial satellite orbits the Earth in a circular path.

The satellite is moved further away from Earth to another orbit.

Which row in the table is correct?

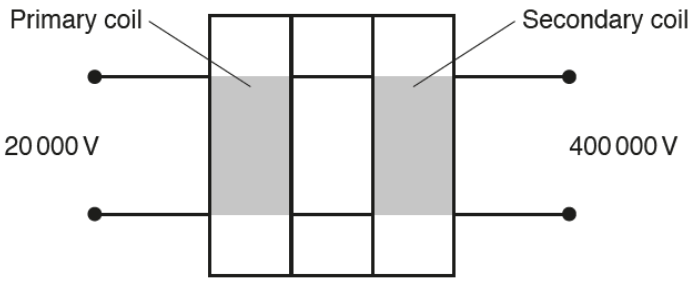
	Force of gravity	Speed in orbit	Time period
A	decreases	decreases	decreases
B	decreases	decreases	increases
C	decreases	increases	increases
D	increases	increases	increases

Your answer ☐ **[1]**

A number of candidates struggled with this question about satellite orbits. A common error was option C as candidates incorrectly thought that the speed of the satellite in orbit would increase as it is moved further from Earth.

Question 13

13 This is a diagram of a transformer used in the national grid.



Why is this transformer used in the national grid?

A To decrease the power in the national grid by a factor of 20.

B To decrease the power loss in the national grid by a factor of 400.

C To increase the power in the national grid by a factor of 20.

D To increase the power loss in the national grid by a factor of 400.

Your answer ☐ **[1]**

The majority of candidates found this question very challenging and did not recognise that the diagram showed a step-up transformer which would decrease the current in the secondary coil, and therefore decrease the power loss. Candidates also struggled to relate power loss to I^2 x R. he most common incorrect answer was option C.

Question 15

15 A car has a mass of 1000 kg and a kinetic energy of 12 500 J.

Calculate its speed.

Use the equation: kinetic energy = 0.5 × mass × (speed)^2

A 3.5 m/s

B 5.0 m/s

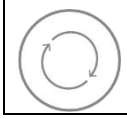
C 6.3 m/s

D 25.0 m/s

Your answer ☐ **[1]**

Questions 14 required candidates to recall and use the equation for efficiency and for question 15, candidates had to rearrange the equation provided for kinetic energy to calculate the speed of the car.

A common error that candidates made in question 15 was to use the incorrect equation: KE = 0.5 x mass x speed. Other candidates could be seen to correctly rearrange the equation but forgot to square root their answer so chose option D.

	**AfL**	The majority of candidates who were successful at these questions wrote their calculations by the side of each question.

Section B overview

Section B consisted of short, 1 mark, questions as well as questions requiring longer answer and the Level of Response question. It covered all of the AOs and many questions needed candidates to use mathematical skills. Questions 16 and 17 were the overlap questions with the Foundation Tier.

Most successful questions	*Least successful questions*
• Question 16 Power Ratings • Question 17bii Calculating stopping distance • Question 18b Reflections using mirrors • Question 21aii Drawing graphs.	• Question 18ei and 18eii Completing and explaining ray diagrams • Question 19ai Nuclear fusion reactions • Question 20a Production of radio waves • Question 21cii Ventilated bakes.

Candidates who did well on this section generally did the following:	*Candidates who did less well on this section generally did the following:*
• Underlined key words • Recalled/rearranged equations and wrote down all of their calculations • Worked methodically in order to explain trends in data and the structure of the Earth (Level of Response question) • Could interpret graphs and draw conclusion.	• Struggled to recall the correct equation for power or to rearrange equations • Changed unit prefixes unnecessarily • Only wrote the answers to questions involving equations, no calculations were shown • Gave responses that lacked depth e.g. Level of Responses question.

Question 16 (a)

16 (a) A TV has a power rating of 0.2 kW.

Calculate the energy transferred, in kWh, if the TV is switched on for 4 hours.

Energy transferred = ... kWh **[3]**

This question required candidates to recall the equation: energy transferred = power x time. The majority of candidates could substitute the values provided for power and time into the equation correctly and gained full credit. There was evidence that some candidates did not read the unit on the answer line carefully enough as they attempted to change kW into Watts and/or hours into minutes or seconds, and therefore scored 1 or 2 marks.

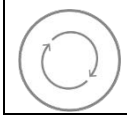
Question 16 (b)

(b) A different TV works with a 12.0 V battery. It has a current of 3.19 A.

Calculate the power rating of the TV.

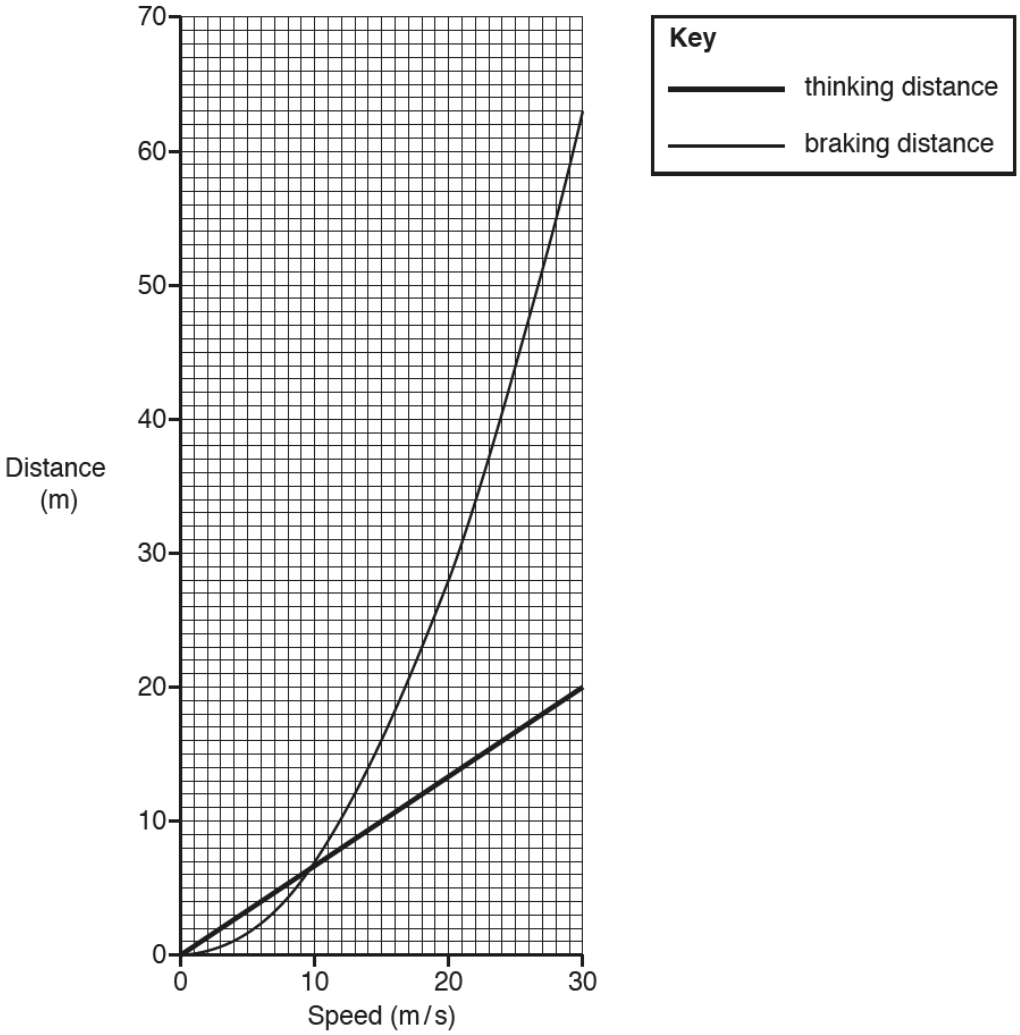
Power = ... W **[3]**

Candidates had to recall the equation: power = potential difference x current and substitute the values provided in the question. Most candidates achieved full marks although some of the less able candidates could not recall the equation and therefore gained no credit.

	**AfL**	Candidates would benefit from writing down the equation and their calculations rather than just their final answer so that compensatory marks may possibly be awarded.

Question 17 (a)

17 The graph shows thinking and braking distances for a car at different speeds.



(a) Describe how **thinking distance** varies with increasing speed.

Use data from the graph in your answer.

.....

.....

.....

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

This AO3 question assessed candidates' ability to interpret the distance-speed graph and draw conclusions about how thinking distance varies with increasing speed.

The question discriminated well. Most candidates were able to give a basic description that as speed increases, thinking distance increases but only the more able candidates were able to give a more detailed relationship, e.g. speed is proportional to thinking distance, for 2 marks.

Question 17 (b) (ii)

(ii) Calculate the **thinking time** at 24 m/s.

Use your answer to **(b)(i)** and the equation: distance travelled = speed × time

Give your answer to **2** decimal places.

Thinking time = ... s **[3]**

There were many excellent responses for this question with the majority of candidates gaining full credit. A few candidates could not rearrange the equation correctly and therefore did not score any marks. About one fifth of candidates did not give their answers to 2 decimal places as requested.

	AfL	A number of candidates gave two possible versions of rearranging the equation leading to two different answers. Candidates should be aware that marks cannot be awarded when they do this, even if one of the versions is correct.

Exemplar 1

(ii) Calculate the **thinking time** at 24 m/s.

Use your answer to **(b)(i)** and the equation: distance travelled = speed × time

Give your answer to 2 decimal places.

thinking time = $\frac{\text{distance}}{\text{speed}}$

= $\frac{16\ m}{24\ m/s}$

= 0.666... = 0.67

Thinking time = 0.67 s **[3]**

This is an excellent example of how the response should be set out. The candidate has clearly rearranged the equation, before substituting the correct values for distance and speed and writing down the answer. This would allow compensatory marks to be awarded if the candidate had then made an error such as mis-entered numbers into the calculator. Finally, the candidate has underlined the instruction to give their answer to 2 decimal places so that they do not forget to do this.

Question 17 (c) (i)

(c) (i) State **one** factor that could **increase** thinking distance.

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

Although the majority of candidates answered this question correctly, candidates should be aware that vague answers such as 'speed' or 'age' without any qualification will not gain credit.

Question 17 (c) (ii)

(ii) Calculate the **stopping distance** at 15 m/s.

Use the graph to help you.

Stopping distance = ... m **[2]**

This question assessed candidates' ability to read the values of thinking distance and braking distance from the distance-speed graph. Most candidates scored 1 mark for reading at least 1 value correctly but many did not calculate the stopping distance by adding the thinking distance and braking distance together, with some multiplying or subtracting the values instead.

Question 17 (d)

(d) How does the speed affect the **kinetic energy** and **braking distance** of the car?

Use the graph in your answer.

.....

.....

.....

.....

..... **[3]**

This question covered Assessment Objectives 2 and 3 and assessed candidates' ability to apply their knowledge of kinetic energy and braking distance as well as to interpret the graph. The majority of candidates scored 2 marks for linking a higher speed to increased kinetic energy and braking distance.

Although some candidates recognised that the relationships were linked to a 'square factor' they could not express it clearly and therefore only the more able candidates gained full credit for recognising that speed is directly proportional to kinetic energy and/or braking distance.

Question 18 (a)

18 A student investigates reflection and refraction of light rays.

(a) The student sends a ray of red light into a glass prism.

Fig. 18.1 shows the light ray as it leaves the glass prism.

On **Fig. 18.1** complete the ray of light as it travels towards **and** through the glass prism.

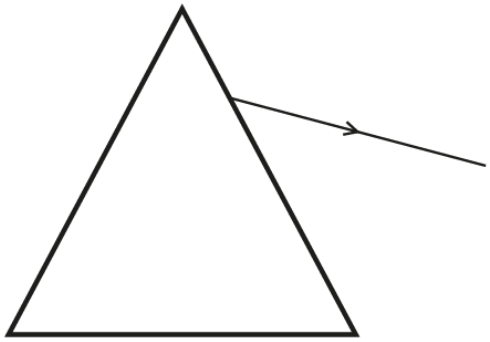


Fig. 18.1 **[2]**

This question proved very difficult for most candidates. Although some candidates could accurately draw the ray of light as it travelled through the glass prism, only the more able gained 2 marks.

Question 18 (d) (i)

(d) A wall is painted red.

When some coloured lights shine on it, the wall appears black.

(i) Explain why.

.....

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

Over half of the candidates were able to answer this question correctly. Incorrect answers involved misconceptions about the 'coloured lights mixing' to give black or the lights being transmitted by the wall.

Question 18 (e) (ii)

(ii) Explain your answer to **(e)(i)**.

.....

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

Question 18e assessed candidates' knowledge of the refraction of different colours of light through a convex lens. It was evident that the majority of candidates did not know that green light would focus between the lens and F_R because it has a shorter wavelength and therefore refracts more.

Question 18 (e) (iii)

(iii) Is the lens in **Fig. 18.4** and **18.5** suitable for correcting long-sight or short-sight?

Tick (✓) **one** box.

Long-sight ☐

Short-sight ☐

Explain your answer.

.....

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

This question discriminated well. Most candidates successfully identified that the lens was suitable for correcting long-sight and the more able could also explain that it was because the lens was convex.

Question 19 (a) (i)

19 (a) Nuclear **fusion** is a reaction that happens in stars. This equation for fusion is incomplete.

(i) What else is produced in this reaction?

.....

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

About two thirds of the candidates did not know that neutrons were also produced in a fusion reaction. Common misconceptions included water, carbon dioxide and protons.

Question 19 (a) (ii)

(ii) Stars are formed from dust and gas.

What causes the dust and gas to undergo fusion?

.....

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

The majority of candidates answered this correctly.

Question 19 (c)

(c) Nuclear fission can be used as a power source to produce electricity.

Give one **advantage** and one **disadvantage** of using nuclear power to produce electricity.

advantage .....

.....

disadvantage .....

.....

[2]

Most candidates gained at least 1 mark, usually for identifying a disadvantage of nuclear power. Poor communication skills were an issue for many candidates and vague answers such as 'no pollution', 'produces waste', 'produces more energy' and 'expensive' did not gain any credit.

Question 20 (a)

20 Energy is transferred at high voltages in the national grid.

(a) This house is near to a transmission line.

Explain why radio waves may be produced by the transmission line.

.....

.....

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

This Assessment Objective 1 question assessed candidates' knowledge and understanding of how radio waves are produced. This proved to be one of the most difficult questions on the paper but also discriminated well. Only the most able candidates gained marks for relating the production of radio waves to the oscillations of electrons in the transmission lines.

	**Misconception**	Common misconceptions included radio waves being produced by something in the house or because the transmission lines produced heat.

Question 20 (b)

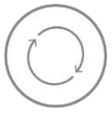
(b) Explain why it is more efficient to transfer energy at high voltages.

.....

.....

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

Although this question has been asked often in past GCSE Physics papers, over one quarter of candidates did not gain credit. Many gained 1 mark for the idea of less energy lost (as heat) but only the more able candidates were able to link this to higher voltages resulting in a lower current.

	**AfL**	Candidates had many misconceptions about why energy should be transferred at high voltages. The responses often referred to incorrect ideas e.g. 'to make the energy move faster/further' or 'to transfer enough power to the home' or 'to reduce the resistance'. Candidates should also be aware that the idea of **NO** energy losses will not gain credit.

Question 20 (c)

(c) The transmission line has a power loss of 6.156 kW.

Its resistance is 15.39 Ω.

Calculate the current in the transmission line.

Current = ... A **[5]**

The majority of candidates scored either zero marks or 5 marks for this question. Over a quarter of candidates did not know the correct equation: power = (current)^2 x resistance. It was common to see an incorrect version of the equation (power = current x resistance) used instead. Some candidates did show their calculations and could therefore score 1 mark for converting kW into W.

Question 21 (a) (i)

21 (a) **Fig. 21.1** is a speed-time graph for car **P**.

The driver of car **P** reacts to a traffic light at time = 0.00 s, then presses the brakes at time = 0.50 s.

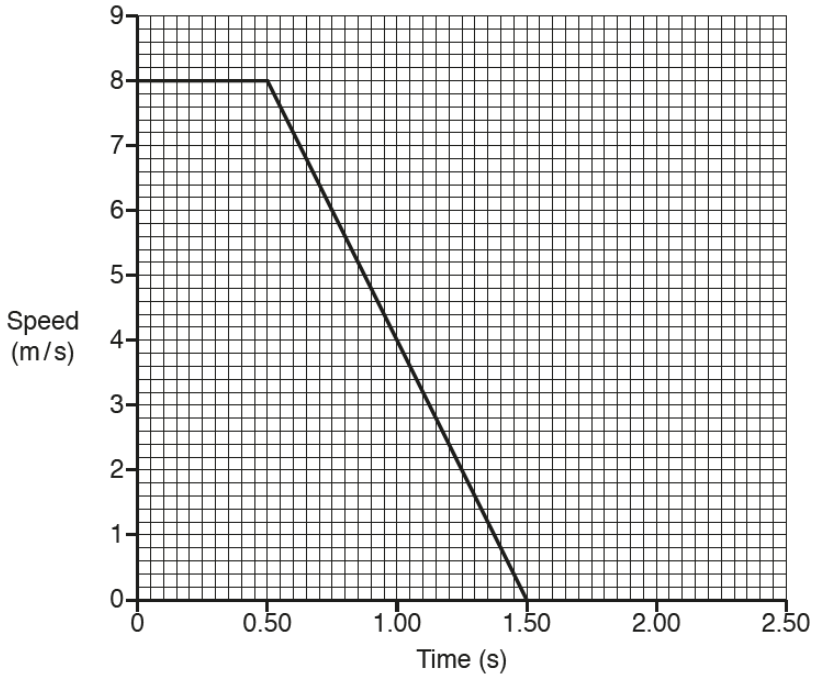


Fig. 21.1

(i) The braking distance is the same size as the thinking distance.

Explain how the graph in **Fig. 21.1** shows this.

.....

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

This question was a good discriminator as only the more able candidates recognised that the braking distance and thinking distance could be calculated from the area under the graph and that both had the same value.

Question 21 (b) (i)

(b) Driver **P** measures the reaction time of driver **Q** using a 30 cm ruler.

Driver **P** drops a 30 cm ruler vertically and driver **Q** catches it.

(i) Explain how the ruler can be used to estimate reaction time.

.....

.....

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

The majority of candidates gave a correct response but it was also common to see incorrect explanations referring to using a stopwatch to time how long it took driver Q to catch the ruler.

Question 21 (c) (i)

(c) In the brakes of a car there are brake pads and a brake disc, as shown in **Fig. 21.2**.

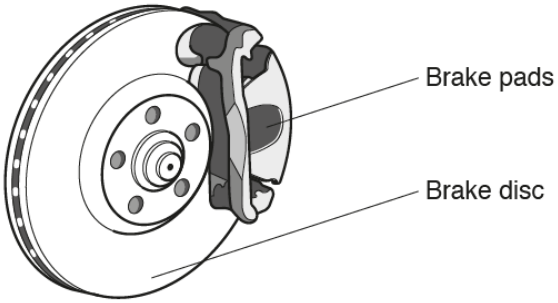


Fig. 21.2

When a car stops, energy transfers between stores.

The brake pads squeeze the brake disc and cause a friction force.

(i) Explain how braking stops the car.

Include ideas about **energy stores** in your answer.

.....

.....

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

This question assessed candidates' ability to apply their knowledge of energy stores. Most candidates scored at least 1 mark for identifying either kinetic energy or thermal energy but it was generally only the more able candidates that identified both energy stores correctly.

Question 21 (c) (ii)

(ii) High speed cars have ventilated brakes with air holes in the disc, as shown in **Fig. 21.3**.

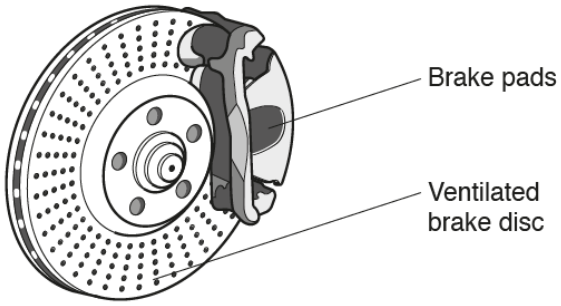


Fig. 21.3

The air holes allow more air to circulate around the disc.

Suggest how these brakes can reduce braking distances.

.....

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

It was evident that most candidates found this question very challenging, with usually only the most able gaining 1 mark.

Question 22

22* The Earth contains a crust, mantle and core as shown in **Fig. 22.1**.

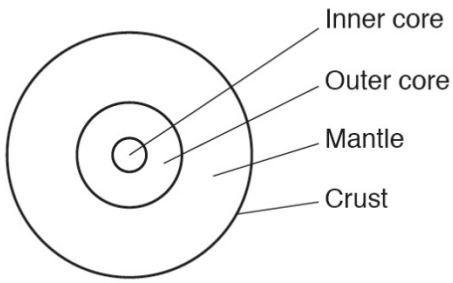


Fig. 22.1

Table 22.1 gives some data about seismic waves and the Earth.

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Table 22.1

Describe what information the data in **Table 22.1** gives about the structure of the Earth.

In your answer you should explain any trends in the data in **Table 22.1**.

.....

..... **[6]**

This was the Level of Response question, targeted up to Grade 9, and assessed AO2 and AO3. There was a wide range of marks achieved and the question discriminated well. Very few candidates did not achieve any credit.

The majority of candidates were able to describe some basic trends in the table for density and speed of P and S waves. More detailed responses also included a description of the structure of the Earth for Level 2.

Many excellent responses from the more able candidates at Level 3 included:
- trends in the data identified and explained
- linking facts about P and S waves to an explanation of why the outer core is liquid.

Poor quality of communication, including contradictions or the same facts repeated a number of times, prevented some candidates from achieving a higher mark.

Exemplar 2

Describe what information the data in **Table 22.1** gives about the structure of the Earth.

In your answer you should explain any trends in the data in **Table 22.1**.

P waves are longitudinal and travel through both solid and liquids but S waves are transverse and only travel through solids. There is no data for the wave speed of S waves through the top of the outer core and the bottom so the core must be made of liquid, however both waves can travel through the crust and the mantle as there is data for, if so these must be made of solid. The density of the layers of the earth increases down the table so the density of the earth must increase from the surface of the crust to the centre of the inner core. The speed of both P waves and S waves increase down the table as well, P waves travel faster in denser material as the particles are closer together so they carry the wave to each other faster, which the data therefore backs up that the density of the earth increases towards the centre. [6]

22

This response achieved Level 3, 6 marks. The candidates included a detailed description of the structure of the Earth, including ideas about density and the liquid outer core.

There is also a detailed explanation of the trends shown in the table.

Question 23 (a)

23 A teacher measures the activity of different radioactive isotopes.

Fig. 23.1 is a graph of her results for isotope **A**.

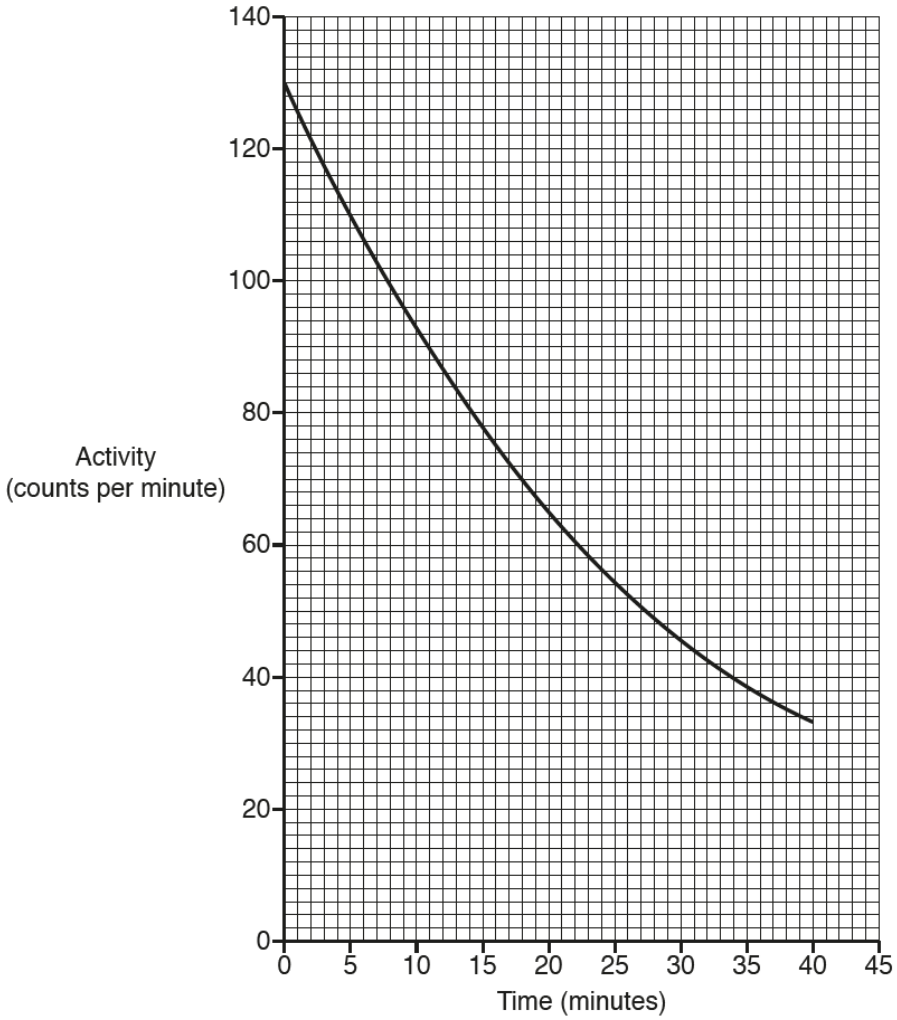


Fig. 23.1

(a) Use **Fig. 23.1** to calculate the half-life of isotope **A**.

Show your working on the graph in **Fig. 23.1**.

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

Most candidates were able to successfully work out the half-life of isotope A from the graph, although there was evidence that some candidates had not read the initial activity from the scale on the y axis correctly.

Question 23 (b)

(b) The teacher measures the activity of isotope **B**.

She starts taking activity measurements after 20 minutes.

Table 23.1 shows her results for isotope **B**.

Time (minutes)	Activity (counts per minute)
0	
10	
20	84
30	64
40	52
50	40
60	32
70	25
80	20
90	16

Table 23.1

Predict the activity of isotope **B** at 0 minutes.

Use the information in **Table 23.1** to help you.

Activity = ... counts per minute **[2]**

Candidates found this question challenging. Most candidates' answers were in the range allowed for 1 or 2 marks but many made the common error of trying to find the differences between values in the table rather than spotting where the activity had halved.

Question 23 (c)

(c) The teacher measures the activity of isotope **C**.

Fig. 23.2 is a graph which shows how activity varies with time for isotope **C**.

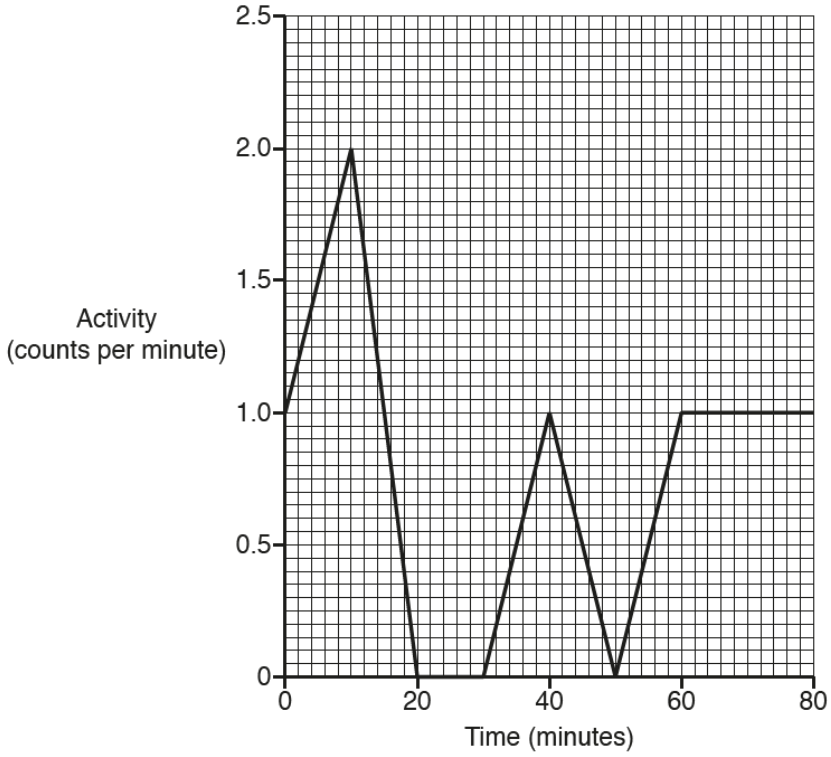


Fig. 23.2

A student makes two conclusions from the graph in **Fig. 23.2**:

Conclusion 1: I think the results are very inaccurate.
The isotope stops being radioactive and then gets more radioactive again.

Conclusion 2: I do **not** think the isotope has a half-life.

Is the student correct?

Evaluate **each** conclusion and explain your answer.

Conclusion 1 .....

.....

.....

Conclusion 2 .....

.....

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

This Assessment Objective 3 question tested candidates' ability to analyse the information from the graph and draw conclusions about the activity and the half-life. Many candidates agreed with both conclusions and tried to justify their answers. Candidates were most likely to evaluate conclusion 2 correctly and state that all (radioactive) isotopes have a half-life. It was rare to see conclusion 1 evaluated correctly as candidates did not link the graph to the random nature of radioactive decay.

Question 24 (a) (i)

24 (a) Some students try to measure the speed of sound, as shown in **Fig. 24.1**.

One student makes a loud sound by clapping her hands.

The sound of the clap reflects from the gym wall causing an echo.

Another student measures the time between hearing the clap and hearing the echo.

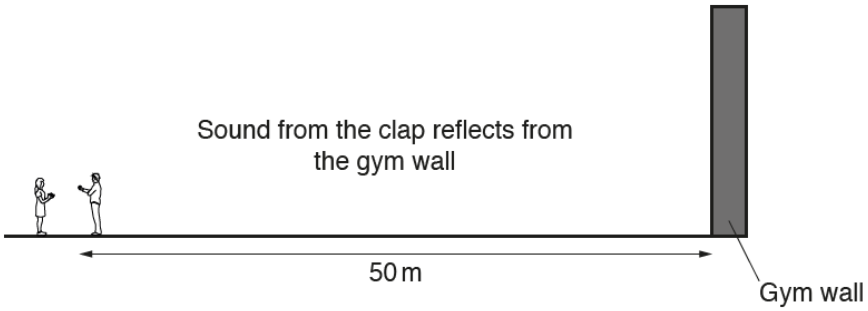


Fig. 24.1

They repeat the experiment three times and record their results in the table below.

Distance to wall (m)	Time 1 (s)	Time 2 (s)	Time 3 (s)	Mean time (s)
50	0.28	0.32	0.54	

(i) The student did not pay attention when recording **time 3**.

Calculate the **mean** time taken for the sound of the clap to return, using suitable values from the table.

Mean time taken = ... s **[1]**

	AfL	Candidates need to be aware that anomalous readings in a set of results, due to a mistake or lack of attention, are not included in calculations of the mean.

Question 24 (a) (ii)

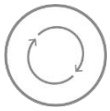
(ii) Calculate the speed of sound for the clap.

Use your answer to **(a)(i)** and the equation: distance travelled = speed × time

Give your answer to **3** significant figures.

Speed of sound = ... m/s **[4]**

The majority of candidates could rearrange the equation provided, substitute values and give their answer to 3 significant figures. However, many candidates did not take into account that the sound travelled 100m to the wall **and** back again so used 50m in their calculations instead.

	**AfL**	A number of candidates gave two possible versions of rearranging the equation leading to two different answers. Candidates should be aware that marks cannot be awarded when they do this, even if one of the versions is correct.

Question 24 (a) (iii)

(iii) Describe **two** ways to improve and develop their method.

1 .....

.....

2 .....

.....

[2]

This Assessment Objective 3 question required candidates to analyse information in order to develop the experimental procedure of the students (in Question 24(a)). There is evidence that over half of the candidates did not read the question carefully as they suggested improvements relating to **other** methods such as videoing, using microphones etc. Many candidates suggested taking more readings but did not mention calculating the mean and therefore could not score the mark.

Question 24 (b)

(b) Ultrasound wave pulses are used by vets to scan inner tissues inside animals.

The ultrasound pulses partially reflect from different layers of tissue. These reflected wave pulses (echoes) are collected by the detector as shown in **Fig. 24.2**.

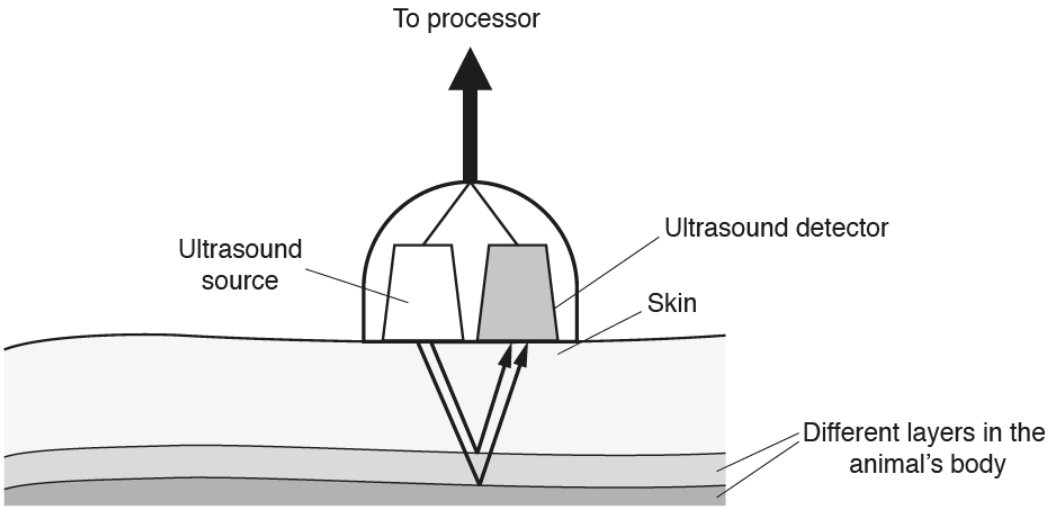


Fig. 24.2

In a scan using ultrasound pulses, three layers of tissue are detected, with each layer having a different thickness.

Describe and explain how the results from the detector can show:
- that there are three layers
- that each layer has a different thickness.

.....

.....

.....

.....

.....

..... **[3]**

This question assessed candidates' ability to apply their knowledge of ultrasound. It proved challenging to a number of candidates and about one third did not gain any credit. Candidates used their knowledge of ultrasound but often did not relate this to the question asked, or their answers were not specific enough e.g. the number of pulses shows that there are 3 layers of tissue.

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