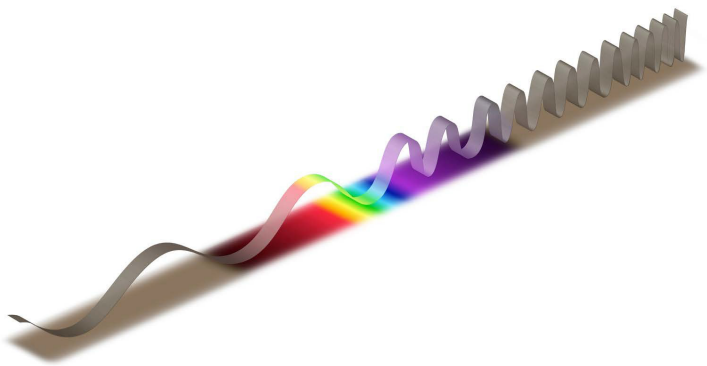
Cambridge Assessment International Education

Specimen Paper Answers – Paper 3

Cambridge IGCSE™ / IGCSE (9–1)

Physics 0625 / 0972

For examination from 2023



Version 1

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Contents

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE / IGCSE (9-1) Physics 0625 / 0972, and to show different examples of answers within an overall good performance.

In this booklet, we have provided answers for all questions with examiner comments where relevant. This paper requires candidates to answer short-answer and structured questions and candidates are awarded maximum of 80 marks for this paper and the mark scheme provides the answers required to gain the marks.

In some cases, the question and answer is followed by an examiner comment on the candidates answer. Additionally, the examiner has set out a number of common mistakes that occur when candidates answer the questions. In this way, it is possible to understand what candidates have done to gain their marks and how they could improve their answers and avoid errors.

The mark schemes for the Specimen Papers are available to download from the School Support Hub at www.cambridgeinternational.org/support

2023 Specimen Paper 3 Mark Scheme

Past exam resources and other teaching and learning resources are available on the School Support Hub www.cambridgeinternational.org/support

Assessment at a glance

The syllabus for Cambridge IGCSE Physics 0625 is available at www.cambridgeinternational.org

All candidates take three papers. Candidates who have studied the Core syllabus content, or who are expected to achieve a grade D or below, should be entered for Paper 1, Paper 3 and either Paper 5 or Paper 6. These candidates will be eligible for grades C to G.

Candidates who have studied the Extended syllabus content (Core and Supplement), and who are expected to achieve a grade C or above, should be entered for Paper 2, Paper 4 and either Paper 5 or Paper 6. These candidates will be eligible for grades A* to G.

Core assessment

Core candidates take Paper 1 and Paper 3. The questions are based on the Core subject content only:

Paper 1: Multiple Choice (Core)	
45 minutes	
40 marks	30%
40 four-option multiple-choice questions	
Externally assessed	

Paper 3: Theory (Core)	
1 hour 15 minutes	
80 marks	50%
Short-answer and structured questions	
Externally assessed	

Extended assessment

Extended candidates take Paper 2 and Paper 4. The questions are based on the Core and Supplement subject content:

Paper 2: Multiple Choice (Extended)	
45 minutes	
40 marks	30%
40 four-option multiple-choice questions	
Externally assessed	

Paper 4: Theory (Extended)	
1 hour 15 minutes	
80 marks	50%
Short-answer and structured questions	
Externally assessed	

Practical assessment

All candidates take one practical paper from a choice of two:

Paper 5: Practical Test	
1 hour 15 minutes	
40 marks	20%
Questions will be based on the experimental skills in Section 4	
Externally assessed	

Paper 6: Alternative to Practical	
1 hour	
40 marks	20%
Questions will be based on the experimental skills in Section 4	
Externally assessed	

Question 1

Question 1(a)

1 Model trains move along a track passing through two model stations, A and B.
Students analyse the motion of a model train.
They start a digital timer as the train starts to move.
They record the time it enters Station A and the time it enters Station B.

Fig. 1.1 shows the time on entering Station A.
Fig. 1.2 shows the time on entering Station B.

time entering Station A

Fig. 1.1

time entering Station B

Fig. 1.2

(a) Calculate the time taken from the train entering Station A to the train entering Station B.
State your answer in seconds.

time taken = ...72..... s [1]

Mark awarded = 1 out of 1

Examiner comment

Subtract the times and convert minutes to seconds.

Question 1(b)

(b) A faster train takes 54 s to travel from Station A to Station B.
The distance between the stations is 120 m.

Calculate the average speed of this train.

Speed = distance ÷ time

= 120/54

average speed = ...35..... m / s [3]

Mark awarded = 3 out of 3

Examiner comment

Should give some explanation – line 1 or 2 would suffice. The unit is given so no need to write out again.

Question 1(c)

(c) Fig. 1.3 shows the speed-time graph for another model train travelling on a different part of the track.

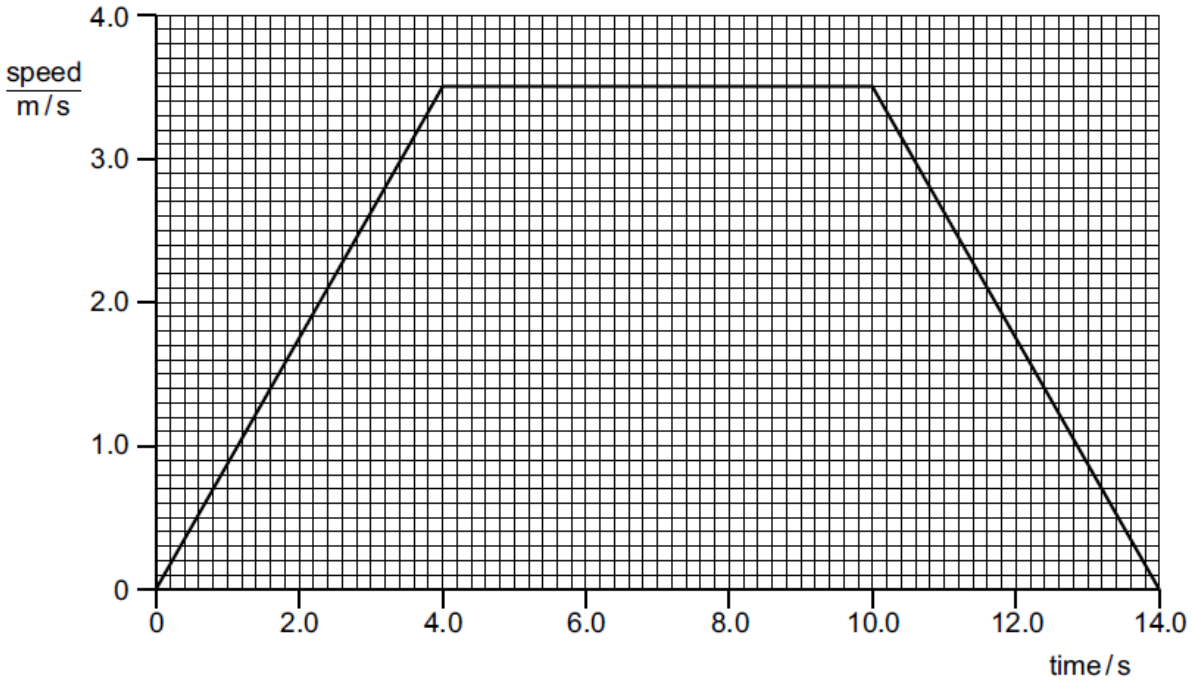


Fig. 1.3

Using the graph, determine the total distance travelled by this train on this part of the track.

Distance given by area under line

= (½ × 4 × 3.5) + (6 × 3.5) + (½ × 4 × 3.5)

distance = 35 ..... m [4]

Mark awarded = 4 out of 4

Examiner comment

A mark is awarded for area of each section. If no working is shown, then any error in the answer would mean that no credit could be given. The unit is given so no need to quote it.

Total mark awarded = 8 out of 8

Question 2

Question 2(a)

2 (a) A piece of metal has an irregular shape. The weight of the metal is 3.0 N.

Calculate the mass of the metal.

Weight = mass × g

mass = 3.0 / 9.8

mass = 0.31 kg [2]

Mark awarded = 2 out of 2

Examiner comment

For full credit, must use 9.8, not 10. Some explanation is always advisable. The unit is given so there is no need to quote it.

Question 2(b)(i)

(b) Fig. 2.1 shows the piece of metal, a measuring cylinder and a beaker containing water.

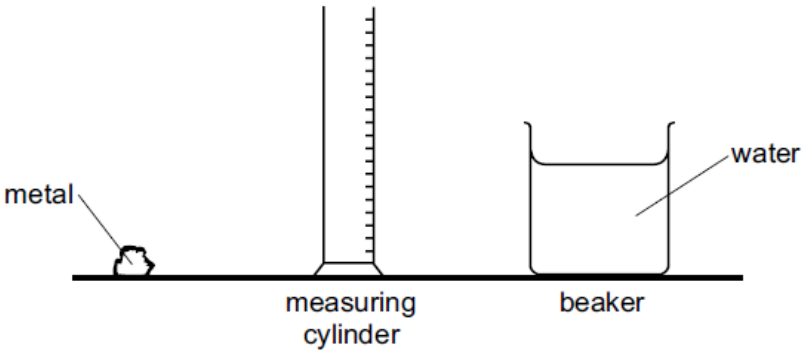


Fig. 2.1

(i) Describe how to determine the volume of the piece of metal, using the equipment in Fig. 2.1.

Pour water into the cylinder and measure the volume V.

The metal lump is put into the cylinder and new volume v is read.

Volume of metal is V – v

[4]

Mark awarded = 3 out of 4

Examiner comment

This is awarded 3 marks. There is no indication that cylinder should be partly filled or that lump must be totally submerged.

Question 2(b)(ii)

(ii) Explain why the procedure in **(b)(i)** is not suitable for finding the volume of a piece of low-density wood that is a similar shape and size to the piece of metal.

The wood would float.

..... [1]

Mark awarded = 1 out of 1

Question 2(b)(iii)

(iii) The mass of another piece of metal is 405 g and its volume is 150 cm^3.
Calculate the density of this piece of metal.

Density = mass ÷ volume

= 405 / 150

density = *2.7* ..... g / cm^3 [3]

Mark awarded = 3 out of 3

Examiner comment

If answer is incorrect, then partial credit cannot be given unless some correct working is shown.

Total mark awarded = 9 out of 10

Question 3

Question 3(a)(i)

3 A man uses a metal bar to remove an iron nail from a piece of wood, as shown in Fig. 3.1.

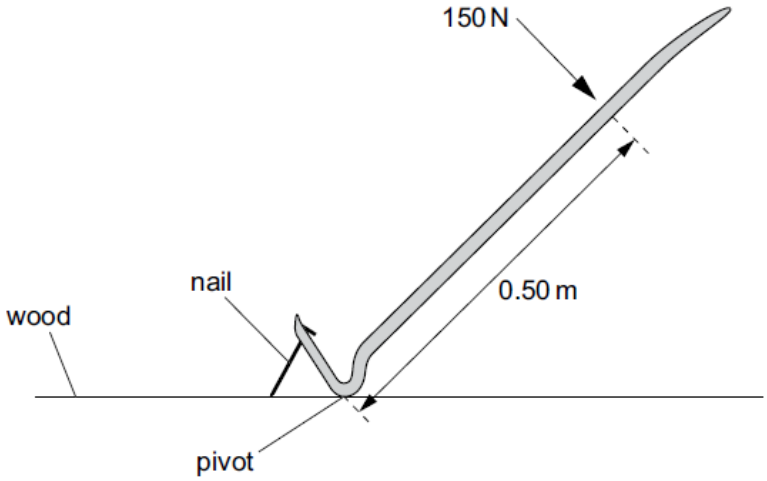


Fig. 3.1

(a) (i) The man applies a force of 150 N perpendicular to the bar and at a distance of 0.50 m from the pivot.

Calculate the moment of this force about the pivot. Give the unit.

Moment = 150 × 0.5

moment = ...75 Nm..... [4]

Mark awarded = 4 out of 4

Examiner comment

The word equation is not given but can be implied from numbers. The unit is essential as it is not quoted on question paper.

Question 3(a)(ii)

(ii) The force applied by the man produces a turning effect (moment) about the pivot.

Describe another example of using the turning effect of a force.

.....

Opening a door

..... [1]

Mark awarded = 0 out of 1

Examiner comment

Any example is acceptable if the turning effect is clear. In this case, it is not clear and needs to state 'by pushing on the handle'.

Question 3(b)

(b) The man tries to use the metal bar to remove another nail from the piece of wood.
He applies the same force of 150 N at a distance of 0.50 m from the pivot.
The turning effect produced is not enough to remove this nail from the piece of wood.

Describe how the man can increase the turning effect without increasing the force.

.....

Change distance of force along bar ..... [1]

Mark awarded = 0 out of 1

Examiner comment

Yes, but it is not made clear that the distance should be increased.

Total mark awarded = 4 out of 6

Question 4

Question 4(a)

4 Fig. 4.1 and Fig. 4.2 show two methods of using renewable sources to generate electrical power.

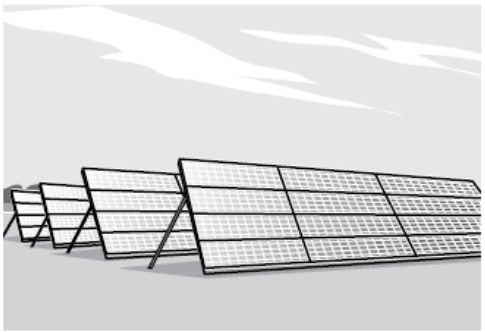


Fig. 4.1

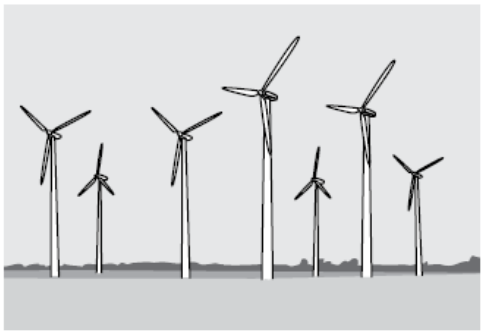


Fig. 4.2

(a) Name the energy source used by each method.

In Fig. 4.1 the energy source is ...Sun.....

In Fig. 4.2 the energy source is ...Wind.....

[2]

Mark awarded = 2 out of 2

Examiner comment

Sun can be accepted for solar energy.

Question 4(b)(i)

(b) (i) State **two** advantages of using the renewable sources in either Fig. 4.1 or Fig. 4.2 for generating electrical power compared to using a coal-fired power station.

1 ...No pollution.....

.....

2 ...Fossil fuels not used.....

.....

[2]

Mark awarded = 2 out of 2

Examiner comment

'Pollution' is acceptable although it should state 'atmospheric pollution'. Accept any reasonable alternatives, e.g. no global warming.

Question 4(b)(ii)

(ii) State **one** disadvantage of using the renewable sources in either Fig. 4.1 or Fig. 4.2 for generating electrical power compared to using a coal-fired power station.

It will depend on whether wind is blowing

..... [1]

Mark awarded = 1 out of 1

Examiner comment

Accept any reasonable alternatives, for example, many windmills will be needed.

Total mark awarded = 5 out of 5

Question 5

Question 5(a)(i)

5 Fig. 5.1 shows a glass bottle containing air. The bottle is sealed with a cap. The mass of the air in the bottle is constant.

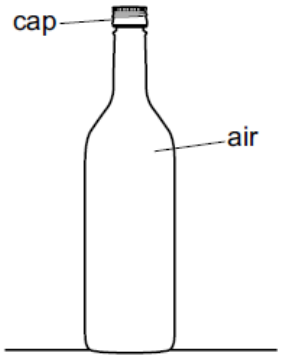


Fig. 5.1

(a) The temperature of the air in the bottle increases.

(i) State what happens to the pressure of the air in the bottle.

It increases ..... [1]

Mark awarded = 1 out of 1

Question 5(a)(ii)

(ii) Explain why the pressure of the air in the bottle changes.
Use ideas about gas particles in your answer.

.....

There are more collisions with walls and they are harder.

The collisions give rise to a force on the walls.

.....

.....

..... [4]

Mark awarded = 2 out of 4

Examiner comment

It has not been stated that particles would be moving more quickly. 'More collisions' does not indicate that the collisions are more frequent.

Common mistakes

'More collisions' is stated rather than increased frequency, i.e. no time dependence.

Question 5(b)

(b) The bottle has a weight of 5.4 N and an area of 9.2 cm^2 in contact with the table.

Calculate the pressure produced by the bottle on the table.

$P = F/A$

$= 5.4 / 9.2$

pressure = 0.6 ..... N / cm^2 [3]

Mark awarded = 3 out of 3

Examiner comment

Conventional symbols are acceptable. The answer can be given in significant figures. The unit is given so there is no need to quote it in the answer.

Total mark awarded = 6 out of 8

Question 6

Question 6(a)

6 A student constructs a device for absorbing thermal energy from the Sun.
Fig. 6.1 shows the device.

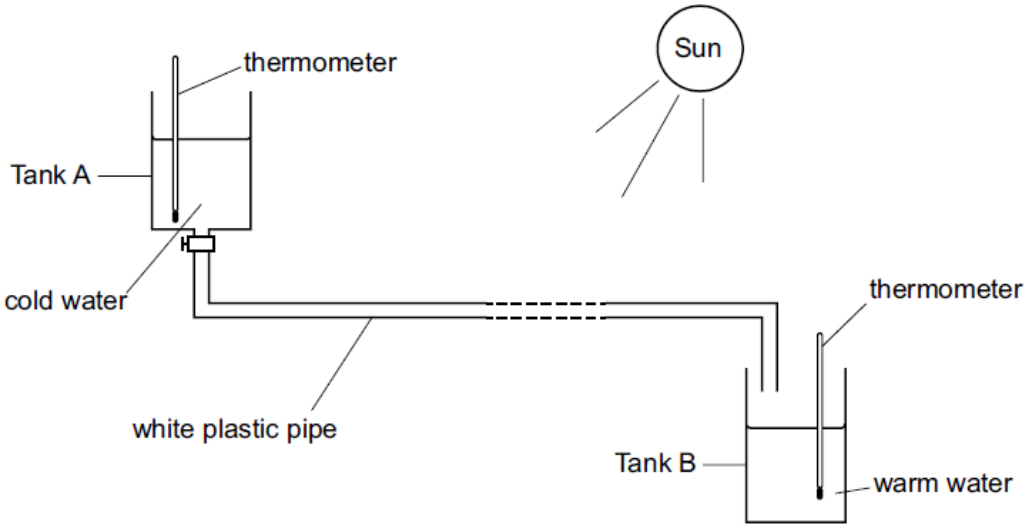
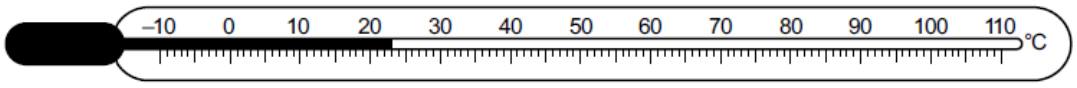


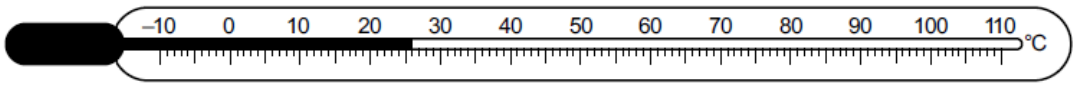
Fig. 6.1

The student places the white plastic pipe in sunlight. The cold water flows slowly from Tank A to Tank B. Energy from the Sun heats the water in the pipe.

Fig. 6.2 shows the temperatures in Tank A and in Tank B.



thermometer showing temperature in Tank A



thermometer showing temperature in Tank B

Fig. 6.2

(a) Determine the rise in temperature of the water as it passes between Tank A and Tank B.

temperature rise = ...3..... °C [1]

Mark awarded = 1 out of 1

Examiner comment

There is no need to show the working.

Question 6(b)

(b) The student wants to increase the thermal energy absorbed by the water in the pipe. State **three** improvements she can make to increase the thermal energy absorbed.

1 ....use metal pipe.....

.....

2 ....paint dull black.....

.....

3 ....reduce flow rate.....

.....

[3]

Mark awarded = 3 out of 3

Examiner comment

'Black' and 'matt' may be considered as two points. Any reasonable ideas will be accepted (a maximum of 3).

Question 6(c)

(c) Describe the processes that transfer the thermal energy from the Sun to the water inside the pipe.

....Radiation from the Sun.....

....Conduction in pipe..... [2]

Mark awarded = 0 out of 2

Examiner comment

The first point must specify ‘infrared’ in order to be awarded the mark. The second point must state 'through the walls of the pipe'.

Total mark awarded = 4 out of 6

Question 7

Question 7(a)

7 Fig. 7.1 shows a floating plastic ball attached by a long rope to a weight on the bottom of a lake. A water wave on the surface of the lake causes the ball to move vertically up and down.

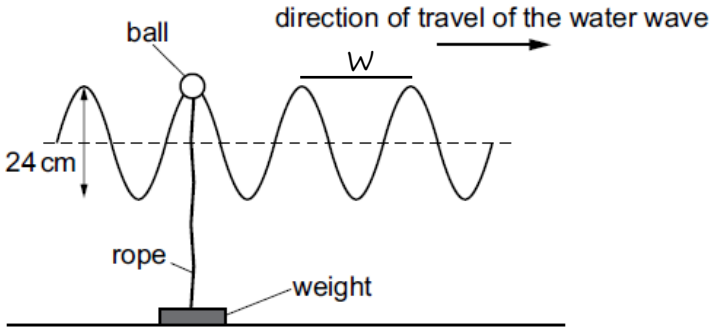


Fig. 7.1

(a) On Fig. 7.1, show the wavelength of the wave. Label the distance W. [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate is correct. The distance between two adjacent crests or troughs would be considered a correct answer.

Question 7(b)

(b) Determine the amplitude of the wave.

amplitude = ...12..... cm [1]

Mark awarded = 1 out of 1

Examiner comment

The unit is given so there is no need to quote it.

Common mistakes

A common incorrect answer is 24cm.

Question 7(c)

(c) The ball reaches its maximum height 40 times in 60 seconds. Calculate the frequency of the wave.

Frequency = 40 / 60

frequency = ...0.7..... Hz [2]

Mark awarded = 2 out of 2

Examiner comment

The unit is given so there is no need to quote it.

Question 7(d)

(d) Explain how the motion of the ball shows that the water wave is transverse.

Ball moves vertically and the wave moves horizontally

..... [1]

Mark awarded = 1 out of 1

Examiner comment

'In different direction to' is insufficient here. The concept of right-angles is needed.

Question 7(e)

(e) State another example of a transverse wave.

Light waves ..... [1]

Mark awarded = 1 out of 1

Examiner comment

Allow any component of electromagnetic spectrum or seismic S waves.

Total mark awarded = 6 out of 6

Question 8

Question 8(a)

8 (a) A ray of light refracts as it travels from air into glass, as shown in Fig. 8.1.

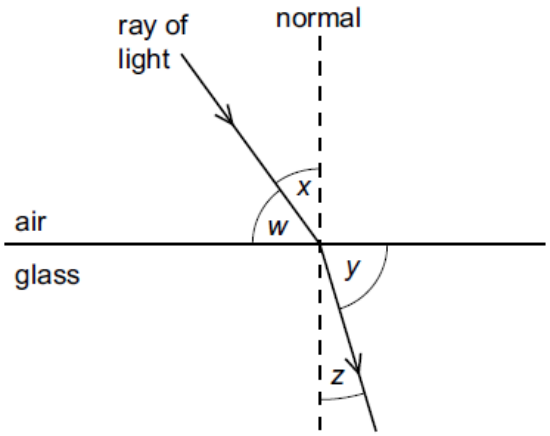


Fig. 8.1

State which angle *w*, *x*, *y* or *z*, is the angle of refraction.

z ..... [1]

Mark awarded = 1 out of 1

Question 8(b)

(b) Fig. 8.2 represents some wavefronts approaching a barrier with a narrow gap.

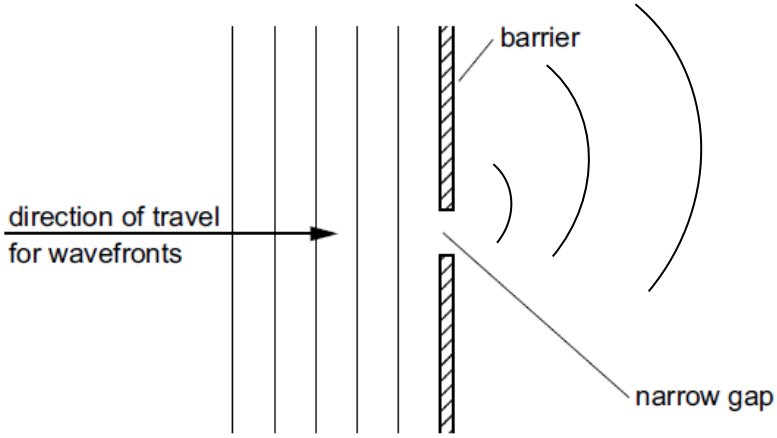


Fig. 8.2

On Fig. 8.2, draw **three** wavefronts that have passed through the gap. [3]

Mark awarded = 1 out of 3

Examiner comment

Arc centres must be in the gap and arcs must have equal spacing. For any credit, there must be 3 arcs.

Total mark awarded = 2 out of 4

Question 9

Question 9(a)(i)

9 Fig. 9.1 shows some parts of the electromagnetic spectrum.

radio waves		infrared waves	visible light	ultraviolet waves	X-rays	γ-rays

Fig. 9.1

(a) (i) In Fig. 9.1, one part of the electromagnetic spectrum is **not** labelled.

State the name of this part.

microwaves ..... [1]

Mark awarded = 1 out of 1

Question 9(a)(ii)

(ii) The speed of visible light waves in a vacuum is 3.0×10^8 m / s.

State the value for the speed of infrared waves in a vacuum.

speed = 3.0×10^8 ..... m / s [1]

Mark awarded = 1 out of 1

Examiner comment

The unit is given so there is no need to quote it.

Question 9(a)(iii)

(iii) Some parts of the electromagnetic spectrum have a wavelength shorter than that of visible light.

State **one** example.

microwaves ..... [1]

Mark awarded = 0 out of 1

Examiner comment

This should be ultraviolet or X-rays or gamma.

Question 9(b)(i)

(b) (i) X-rays and γ-rays are used in hospitals.

Describe **one** medical use for X-rays and **one** medical use for γ-rays.

X-rays ..... *viewing broken bones* .....

.....

γ-rays ..... *detecting cancer* .....

.....

[2]

Mark awarded = 2 out of 2

Examiner comment

Allow 'viewing' but 'detecting' would be preferable. Allow any sensible alternatives for either response.

Question 9(b)(ii)

(ii) State **two** reasons why γ-rays are dangerous to living things.

1 ..... *damage to DNA* .....

.....

2 ..... *radiation burns* .....

.....

[2]

Mark awarded = 2 out of 2

Examiner comment

'Mutate cells' would also be accepted.

Total mark awarded = 6 out of 7

Question 10

Question 10(a)

10 Fig. 10.1 shows a simplified circuit diagram for an electric oven. The oven contains a fan driven by a motor.

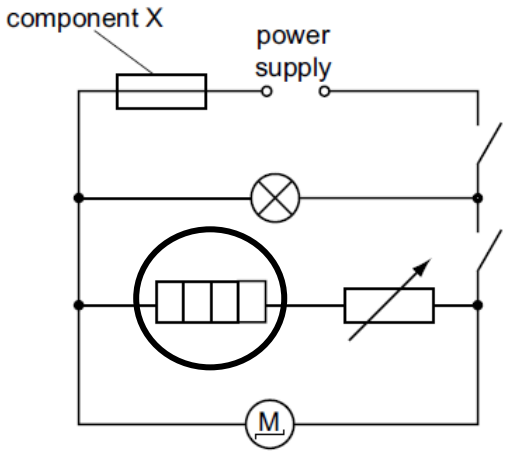


Fig. 10.1

(a) On Fig. 10.1, circle the symbol representing the heater. [1]

Mark awarded = 1 out of 1

Examiner comment

Correct symbol circled.

Question 10(b)

(b) Fig. 10.1 includes a variable resistor.

Explain the function of the variable resistor in this circuit.

.....

Varies the current in the heater ..... [2]

Mark awarded = 1 out of 2

Examiner comment

For 2 marks, the candidate would also be expected to refer to the heat output of the heater.

Question 10(c)

(c) The potential difference across the motor is 250 V. The current in the motor is 2.0 A.

Calculate the resistance of the motor.

$V = iR$

resistance = 250/2

resistance = ...125..... Ω [3]

Mark awarded = 3 out of 3

Examiner comment

Conventional symbols accepted. If the correct answer is given, there is no need for explanation but then the mark would 0/3 if answer is incorrect and no explanation is given.

Question 10(d)

(d) State the name of component X and explain how it contributes to the safety of the user.

name of component X ....fuse.....

explanation .....too large current melts fuse.....

.....

[2]

Mark awarded = 1 out of 2

Examiner comment

For 2 marks, the response needs to include cutting off the current.

Total mark awarded = 6 out of 8

Question 11

Question 11(a)

11 (a) The nuclide notation ${}^{A}_{Z}X$ describes the nucleus of one type of atom.
On Fig. 11.1 draw a line from each symbol to the correct description for that symbol.

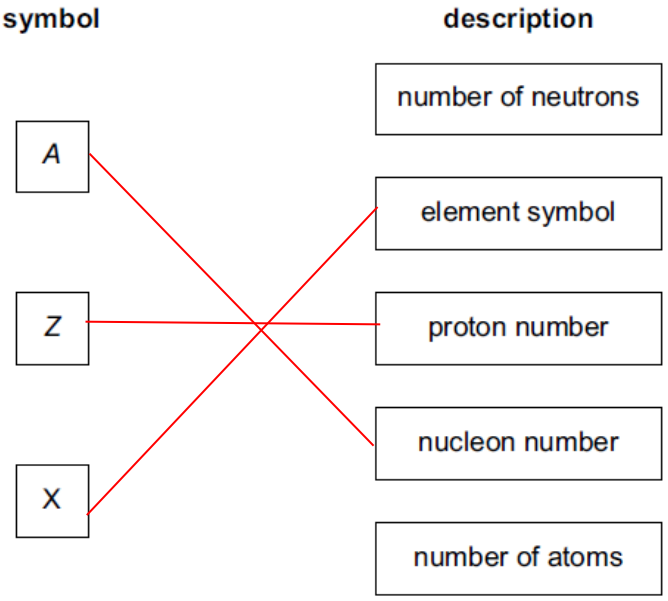


Fig. 11.1 [3]

Mark awarded = 3 out of 3

Question 11(b)

(b) A radioactive isotope has a half-life of 6.0 years.
A sample of this isotope has a mass of 12 mg.

Calculate the mass of this isotope that remains in the sample after 18 years.

3 half-lives

12 to 6 to 3 to 1.5

mass remaining = *1.5* mg [3]

Mark awarded = 3 out of 3

Examiner comment

Could show division by 8. No working needs to be shown here. The unit is not required as it is given.

Total mark awarded = 6 out of 6

Question 12

Question 12(a)(i)

12 (a) The Sun is our nearest star.

(i) State the **three** main forms of electromagnetic radiation emitted by the Sun.

1 ultraviolet

2 infrared

3 visible

[2]

Mark awarded = 2 out of 2

Question 12(a)(ii)

(ii) State the **two** main elements that are found in the Sun.

1 hydrogen

2 helium

[1]

Mark awarded = 1 out of 1

Question 12(b)

(b) State and explain what can be deduced from the 'redshift' observed by astronomers in the light from all distant galaxies.

Wavelengths of light from galaxy are longer.

Called 'redshift' and shows galaxy is moving away from Earth.

[3]

Mark awarded = 2 out of 3

Examiner comment

For 3 marks to be awarded, the response should refer to wavelength from galaxy compared with measured wavelength in laboratory OR that line spectra are examined.

Total mark awarded = 5 out of 6

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