

## SAMPLE

This is a real Paper 4 I marked for a student, shown as they got it back. Two things are changed to keep them anonymous: their name is removed, and their answers are retyped word for word in a handwriting font, so none of the writing is theirs. Every mark, note and examiner report line is what they received.

## YOUR OWN PAPER

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## Here's your Paper 4.

0625/43, October/November 2025 (Paper 4, Variant 3). Marked against Cambridge's published mark scheme for that paper, the way I marked scripts for Cambridge.

**68** / 80  
YOUR MARK

| Q1   | Q2  | Q3  | Q4  | Q5   | Q6  | Q7   | Q8  | Q9  | Q10 |
|------|-----|-----|-----|------|-----|------|-----|-----|-----|
| 8/11 | 5/5 | 6/6 | 9/9 | 7/10 | 8/9 | 7/10 | 6/7 | 7/7 | 5/6 |

### The one thing I'd fix before your Paper 4

Your calculations are secure: apart from 1(a)(iv), every one scored full marks. Your written explanations are where the marks went, and they went the same way each time: you described what happens, then stopped before the step the mark is on.

- **1(b)**: air resistance balances the weight, but not that air resistance **increases as the ball speeds up**. (note 2)
- **5(c)(ii)**: the speed change, but not the name of the process, **refraction**. (note 4)
- **5(d)**: greenhouse gases, but not an **increase** in them, and not what that does: less radiation escapes **through the atmosphere**. (note 5)
- **6(a)(ii)**: the reading goes up, but not that the LDR takes a **bigger share of the 5.0 V**. (note 6)

When a question says *explain*, find the thing that changes, then write down what causes the change. That sentence is usually where the mark is.

### Where the other marks went

The blue numbers match the blue circles on your script.

#### 1 1(a)(iv) 1 MARK

You wrote  $KE = GPE = 9.5 \text{ J}$ . Halfway down, the ball has lost only half its height, so only half the GPE has become kinetic energy:  $0.5 \times 9.5 = \mathbf{4.8 \text{ J}}$ .

**EXAMINER REPORT** "Stronger candidates recognised the kinetic energy would be half of the gravitational potential energy when the ball had fallen half the distance."

#### 2 1(b) 1 MARK

You said air resistance "eventually" acts, then jumped to it balancing the weight. The mark is for the middle: as the ball speeds up, air resistance increases, so the resultant force and the acceleration both decrease.

**EXAMINER REPORT** Stronger answers explained "the change in motion of the ball as the speed increased causing the air resistance to increase."

#### 3 1(c) 1 MARK

"Transferred to thermal energy", but thermal energy of what? The scheme wants the thermal store of the ground or the air, or the energy used to squash the ball.

**EXAMINER REPORT** The strongest answers stated "the transfer of thermal energy to the ground or air."

4 5(c)(ii) 1 MARK

You got the mark for the speed decreasing, but with the benefit of the doubt (BOD on your script), because the reason you gave is the wrong way round: the outer core is **denser** than the mantle, not less dense. What slows the P-wave at X is that it passes from solid rock into a **liquid**, and waves like this travel more slowly in liquids than in solids. The other mark is for naming the process: **refraction**.

EXAMINER REPORT "Stronger candidates gave the process as refraction."

5 5(d) 2 MARKS

Two separate points, and both are about what changes. First, the scheme underlines the word **increase**: greenhouse gases being there doesn't explain a temperature *rise*, more of them does. Second, the comparison that matters is not what the Sun gives the ground against what the ground gives off. It's how much radiation gets **out through the atmosphere**. More greenhouse gas means less thermal radiation escapes into space and more is sent back to the surface, so the Earth absorbs more than it loses.

EXAMINER REPORT Stronger answers linked "an increase in greenhouse gases and the amount of radiation that is prevented from escaping the atmosphere."

6 6(a)(ii) 1 MARK

You wrote that the current "remains the same". It doesn't. In the dark the LDR's resistance goes up, so the total resistance goes up and the current falls. The voltmeter reading rises because the LDR now takes a bigger share of the 5.0 V. That share is the mark.

7 7(b)(ii) 3 MARKS

All four lines are the wrong way round, which means one idea is reversed. The e.m.f. is greatest when the coil is **cutting through the most field lines** each second, and that happens as it passes through **horizontal** in Fig. 7.4, with its sides moving straight across the field. When the coil is **vertical** its sides are moving along the field lines, cutting none, so the e.m.f. is **zero**. Check it against the question: at time 0 the e.m.f. is 0, and Fig. 7.3 shows the coil vertical. So A and D, where the e.m.f. is at a peak, are horizontal; B and C, where it is zero, are vertical.

EXAMINER REPORT "Many candidates were able to identify one or two correct positions".

8 8(b)(ii) 1 MARK

"Upwards" is right, but the explanation has to link it to the alpha particle: alpha particles are positive and bend towards the negative plate, and the field points the way a positive charge is pushed.

EXAMINER REPORT "To gain credit candidates needed to identify the direction of the electric field and give an explanation linking to the charge of an alpha particle."

9 10(a) 1 MARK

Your orbit is a good ellipse. The Sun goes at a focus, which on a long ellipse like this is close to one end, not near the middle.

EXAMINER REPORT The best diagrams showed an elliptical orbit "often with the Sun placed clearly at a focus."

## Reading the marks on your script

✓ Mark awarded, placed where you earned it

✓ In a calculation, all the ticks go by the final answer

✗ Not awarded

^ Something the mark needed is missing here

BOD Benefit of the doubt

2/2 Your mark for that part

Good luck with the real one.

Rich

\* 0000800000002 \*

DFD

2

- 1 (a) A hard ball is dropped vertically downwards.

Fig. 1.1 shows the speed–time graph for the ball from when it is dropped until it hits the ground.

Air resistance is ignored.

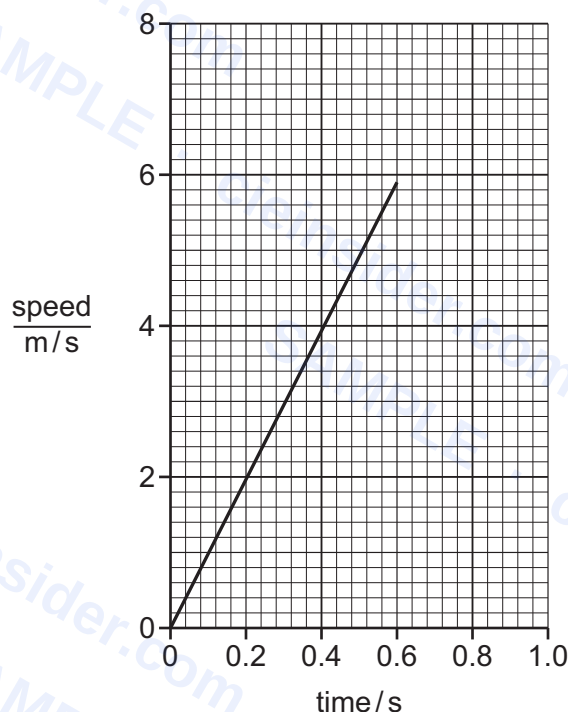


Fig. 1.1

- (i) Describe the motion of the ball in Fig. 1.1.

Constant acceleration ✓

[1] 1/1

- (ii) Show that the distance travelled by the ball is 1.8 m.

$$\frac{1}{2} \times 5.9 \times 0.6 = 1.77 \checkmark$$

$$\approx 1.8 \checkmark$$

[2] 2/2

- (iii) The mass of the ball is 0.54 kg. Calculate the gravitational potential energy stored in the ball immediately before it is dropped.

$$\begin{aligned} GPE &= mgh \\ &= 0.54 \times 9.8 \times 1.8 \\ &= 9.5256 \end{aligned}$$

gravitational potential energy = 9.5 ✓✓ [2] 2/2





- (iv) Determine the kinetic energy of the ball when it has fallen half way to the ground.

$$KE = GPE$$

kinetic energy =  $9.5 \text{ J}$  <sup>1</sup> [1] 0/1

- (b) The same ball is dropped from an aeroplane. Air resistance acts on the ball.

Explain how the vertical motion of the ball changes, from when it is dropped to just before it hits the ground.

Use the idea of forces in your answer.

Initially, only weight acts on the ball. <sup>✓</sup> Ball  
accelerates and eventually, air resistance acts on the  
ball, opposing force against weight. Eventually, air resistance  
balances out weight and resultant force = 0.  $F = ma$ ,  
acceleration = 0 and ball falls at terminal velocity. <sup>✓</sup> [3] 2/3

- (c) A soft ball is dropped by a student so that it bounces on the ground.

Fig. 1.2 shows the height–time graph for the ball. The height is measured from the ground.

The ball bounces four times.

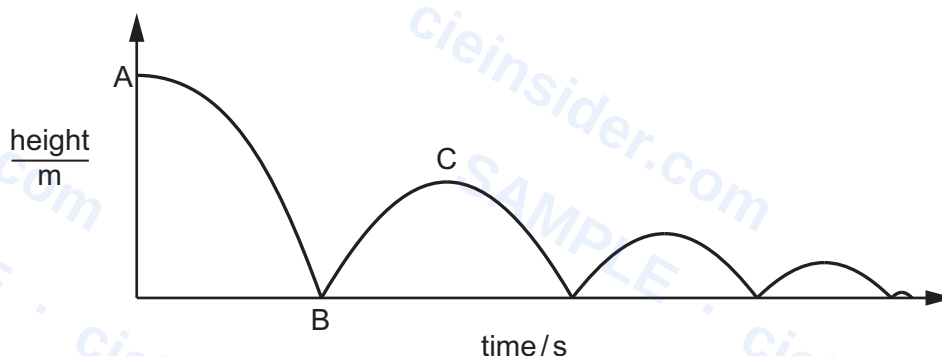


Fig. 1.2

Explain why the change in height of the ball between B and C is less than the change in height between A and B.

Energy lost and transferred to thermal energy. <sup>✓</sup>  
More GPE at point A and no GPE at  
point B. GPE is converted to KE. GPE at C  
is lower with decreased height [2] 1/2

[Total: 11]



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4

- 2 A cricket ball is travelling at a speed of 25 m/s horizontally through the air. The mass of the ball is 0.14 kg.

A player catches the ball and the ball comes to rest.

- (a) Calculate the change in momentum of the ball during the catch.

$$\begin{aligned} m(v - u) \\ = 0.14(0 - 25) \\ = -3.5 \end{aligned}$$

change in momentum = 3.5 kg m/s ✓✓ [2] 2/2

- (b) The player's hands are in contact with the moving ball for 9.7 ms.

Calculate the horizontal force exerted by her hands to bring the ball to rest.

$$\begin{aligned} F &= \frac{mv - mu}{t} \\ &= \frac{3.5}{9.7 \times 10^{-3}} \end{aligned}$$

force = 360 N ✓✓✓ [3] 3/3

[Total: 5]



- 3 (a) Fig. 3.1 shows a Sankey diagram for the power transfer in a coal-fired power station.

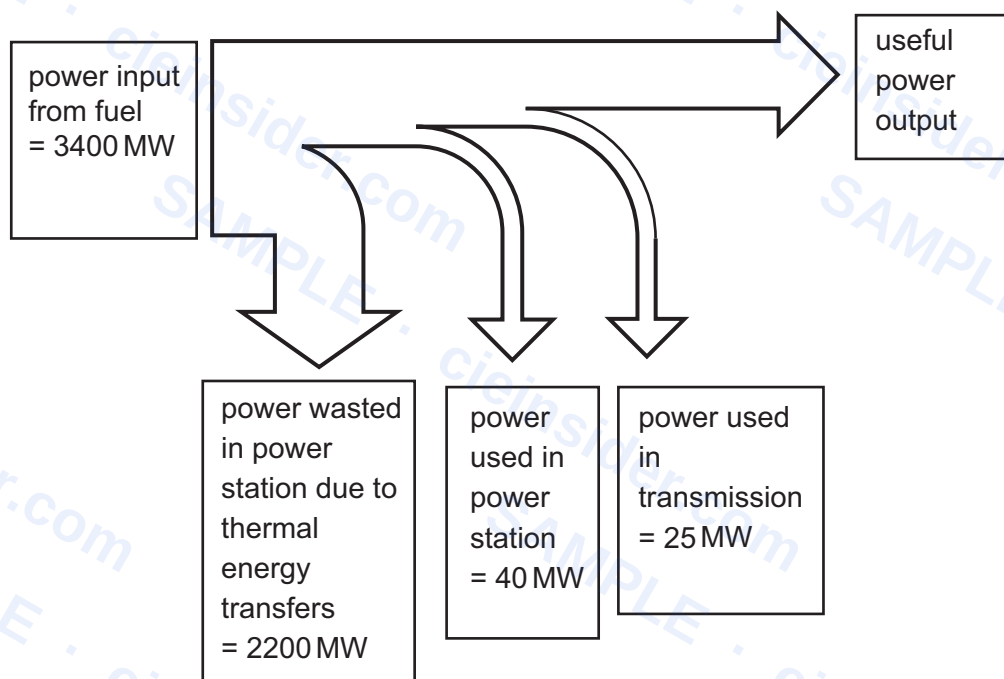


Fig. 3.1

- (i) Show that the useful power output from the power station is approximately 1100 MW.

$$3400 - 2200 - 40 - 25 = 1135 \approx 1100$$

[2] 2/2

- (ii) Calculate the efficiency of the power station.

$$\frac{\text{useful}}{\text{total}} \times 100\% = \frac{1100}{3400} \times 100\%$$

efficiency = 32%

[2] 2/2

- (b) Describe how useful energy may be obtained from geothermal resources.

Heat from underground rocks that are hot turns water to steam. Steam flows through pipe, and turns turbine, in which turbine generator generates electricity.

[2] 2/2

[Total: 6]



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DFD

6

- 4 (a) (i) A rectangular glass tank contains  $3.0 \text{ m}^3$  of liquid. The mass of the liquid is  $2800 \text{ kg}$ . Calculate the density of the liquid.

density =  $930 \text{ kg/m}^3$  [1] 1/1

- (ii) A metal block is placed in the tank and it sinks to the bottom. The top surface of the block is  $1.1 \text{ m}$  below the surface of the liquid.

Fig. 4.1 shows the block on the bottom of the tank.

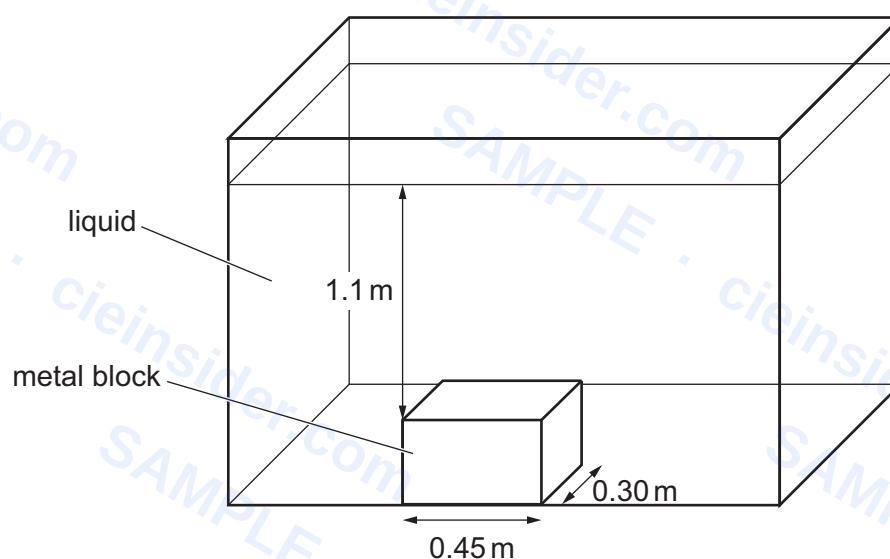


Fig. 4.1

Calculate the force exerted by the liquid on the top of the block.

$$P = \frac{F}{A}, F = P \times A$$

$$10025.4 = \frac{F}{0.45 \times 0.3}$$

$$F = 10025.4 \times (0.45 \times 0.3) \\ = 1353 \approx 1400$$

$$P = \rho gh \\ = 930 \times 9.8 \times 1.1 \\ = 10025.4$$

force on top of the block =  $1400 \text{ N}$  [4] 4/4



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(b) Fig. 4.2 shows part of a steel railway track. There are small gaps between sections of the rail.

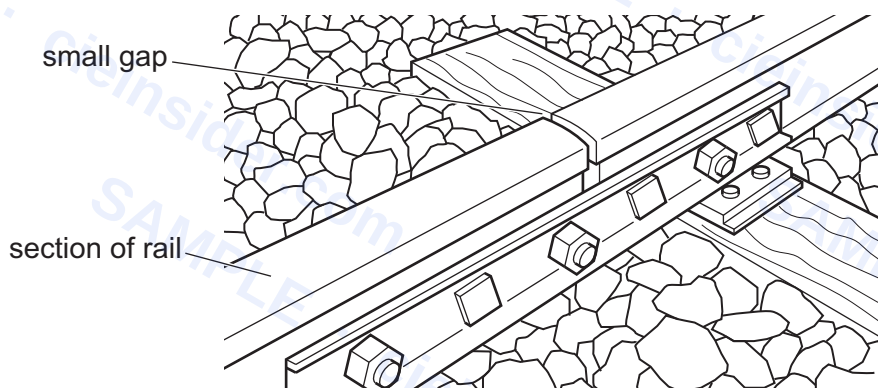


Fig. 4.2

State why gaps are needed between the sections of rail. Explain your answer in terms of particles.

statement *Thermal expansion occur* ✓

explanation *Rails expand because during the day, ✓ there's greater thermal energy so particles have greater kinetic energy*

[2] 2/2

(c) Fig. 4.3 shows a saucepan of boiling water on the heating ring of an electric cooker.

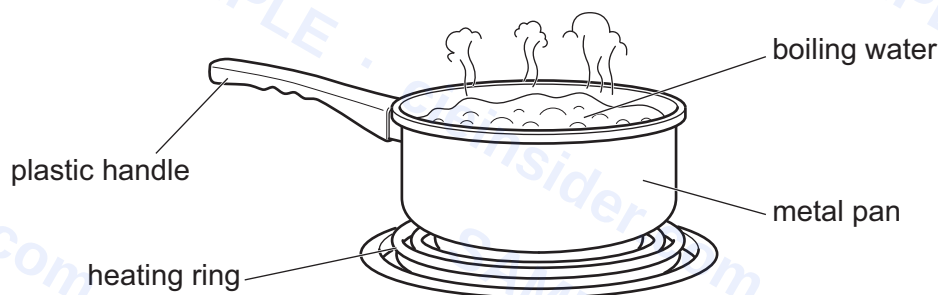


Fig. 4.3

The handle is made from plastic.  
Explain why this material is suitable.

*Bad conductor of heat, ✓ good insulator of heat. Prevents the handle from getting too hot for hand to touch* ✓

[2] 2/2

[Total: 9]



- 5 (a) (i) Electromagnetic waves have many uses.

On Fig. 5.1 draw **one** line from each use to the region of the electromagnetic (e-m) spectrum it uses.

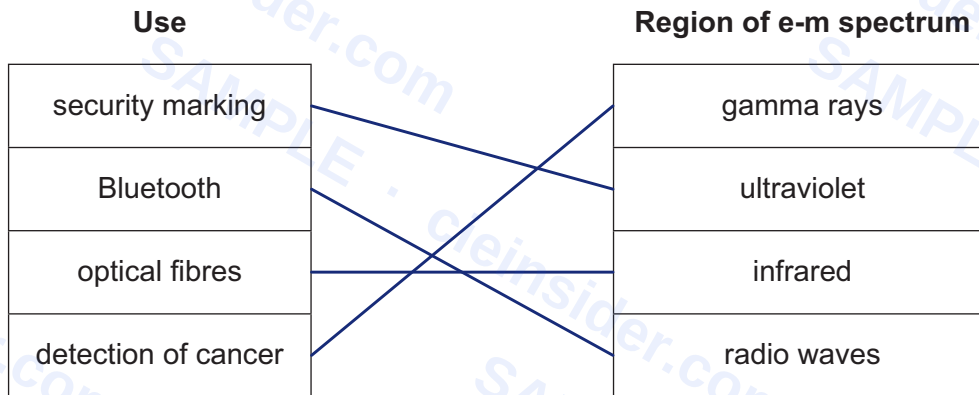


Fig. 5.1



[2] **2/2**

- (ii) State **one** advantage of using microwaves compared with radio waves to transmit mobile (cell) phone signals.

*Can travel over long distances, allowing  
for a high transmission rate* ✓ **BOD**

[1] **1/1**

- (b) Describe the difference between transverse waves and longitudinal waves.

*Transverse wave: Particles vibrate perpendicularly  
to wave propagation.* ✓

*Longitudinal wave: Particles vibrate parallel to  
wave propagation.* ✓

[2] **2/2**



- (c) Fig. 5.2 shows a simplified diagram of seismic P-waves travelling through the Earth. The paths of the waves are curved. Seismic waves are produced by rock movements in earthquakes.

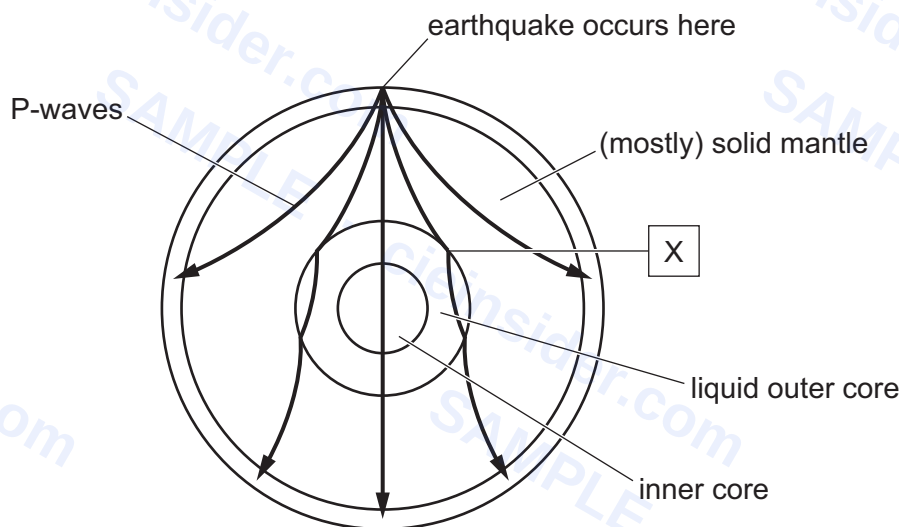


Fig. 5.2 (not to scale)

- (i) State the type of wave that P-waves can be modelled as.

*Longitudinal wave* ✓

[1]

1/1

- (ii) At point X, the P-wave travels from the solid mantle to the liquid core. There is a sudden change in direction of the path of the wave.

Explain the change in direction of the P-wave at point X.

4 *Speed of wave decreases because wave is* ✓ *travelling from a more dense to less dense* <sup>BOD</sup>  
*medium.*

[2]

1/2

- (d) The Earth's surface absorbs incoming radiation from the Sun and also emits thermal radiation from its surface.

Over the past 50 years, scientists estimate that the average temperature of the Earth's surface has increased by approximately  $0.75^{\circ}\text{C}$ .

Explain what is causing this average temperature rise.

*Rate of radiation absorbed from Sun is greater than*  
*rate of thermal radiation from Earth's surface.* ✗  
*Due to the* <sup>5</sup> *effect of greenhouse gases*  
*leading to global warming.*

[2]

0/2

[Total: 10]



\* 0000800000010 \*

DFD

10

- 6 (a) Fig. 6.1 shows a circuit which includes an LDR (light-dependent resistor).

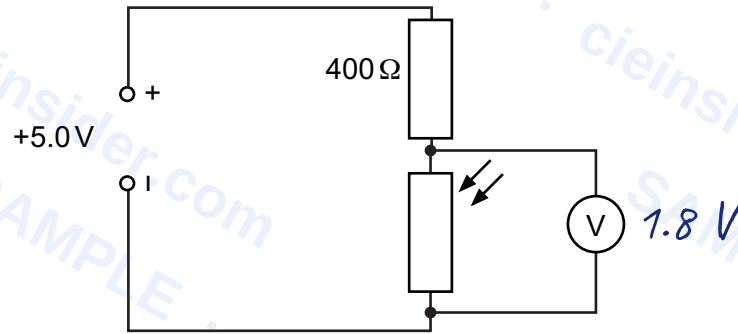


Fig. 6.1

The LDR is in a brightly lit room. The voltmeter reads 1.8V.

- (i) Calculate the current in the 400Ω resistor.

$$\begin{array}{r} 5.0 \text{ V} \\ / \quad \backslash \\ 1.8 \text{ V} : 3.2 \text{ V} \\ \div 1.8 \\ 1 : \frac{16}{9} \end{array}$$

$$V = IR, \quad I = \frac{V}{R}$$

$$3.2 = I \times 400$$

$$I = \frac{3.2}{400} = 0.008$$

current = 0.008 A ✓✓✓ [3] 3/3

- (ii) The light level in the room changes from bright to dark.

State and explain the effect on the voltmeter reading.

statement Increases ✓

explanation Resistance of LDR increases. ✓  $V = IR$

current flowing through circuit remains the same.

So if resistance increases, potential

difference (V) increases.

[3] 2/3



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DFD



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- (b) Fig. 6.2 shows two light-emitting diodes (LEDs) connected in parallel in a circuit. R is a red LED and G is a green LED.

The voltmeter across the LEDs shows a potential difference (p.d.) of 2.0 V.

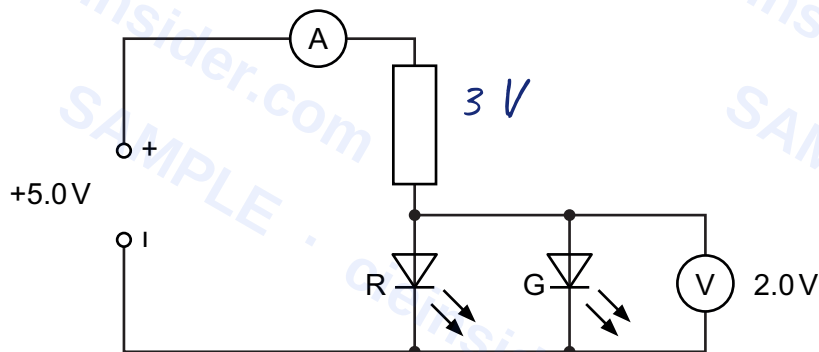


Fig. 6.2

- (i) Fig. 6.3 shows a current-p.d. graph for the LEDs.

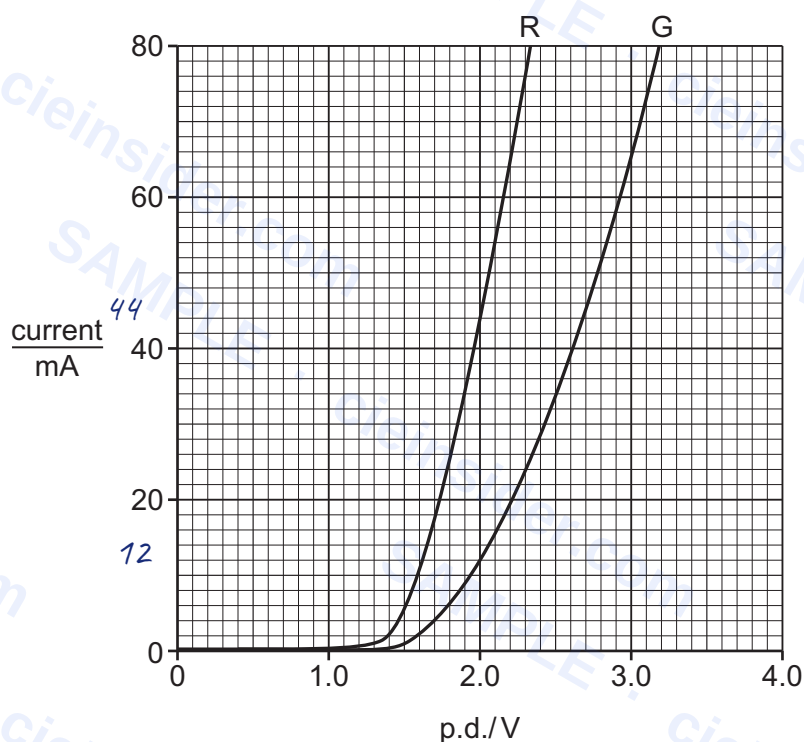


Fig. 6.3

Use Fig. 6.3 to determine the current in the ammeter.

$$44 + 12 = 56 \text{ mA}$$

current = 56 mA ✓✓ [2] 2/2

- (ii) The connections to the power supply are reversed. State the reading on the ammeter.

current = 0 A ✓ [1] 1/1



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DFD

13

7 Fig. 7.1 shows a simple a.c. generator.

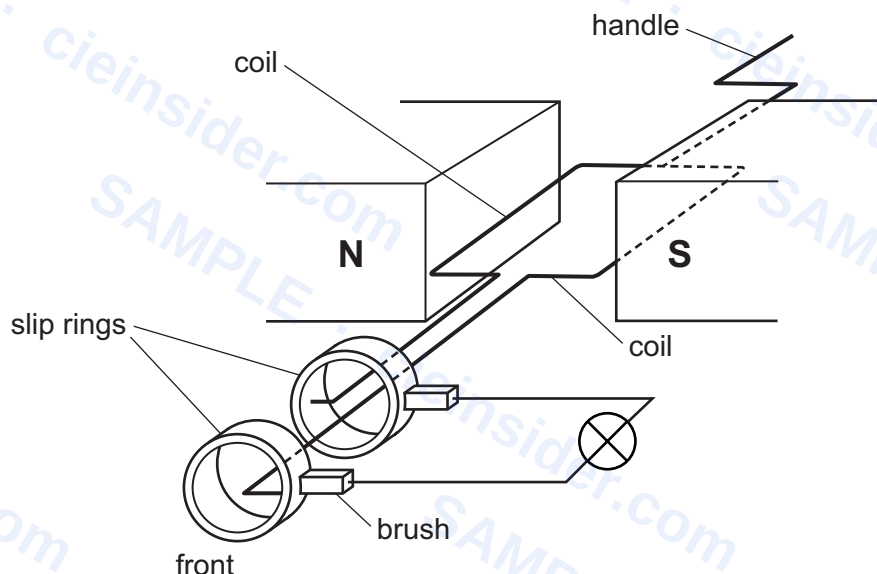


Fig. 7.1

- (a) (i) Explain the function of the slip rings and brushes.

*Brushes Conducts electricity to circuit without twisting and tangling and breaking the wires.* ✓

[1] 1/1

- (ii) Describe how an alternating current is generated in the lamp.

*Rotating Coil rotates through the magnetic field of magnet. ✓ Coil cuts magnetic field ✓ of magnet, inducing e.m.f. ✓*

[3] 3/3

- (iii) State **two** possible changes that cause a larger maximum current in the lamp.

1 *Use a stronger magnet* ✓

2 *Increase number of turns on coil* ✓

[2] 2/2



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(b) Fig. 7.2 is a graph to show how the electromotive force (e.m.f.) varies with time for the coil.

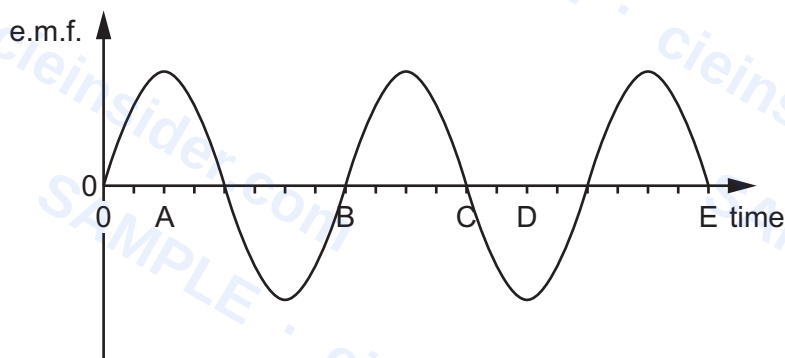


Fig. 7.2

(i) Determine how many revolutions the coil has made, from time = 0 to E.

number of revolutions = ..... 2.5 ✓ [1] 1/1



- (ii) Fig. 7.3 shows the end view of the position of the plane of the coil at time = 0. The coil is rotating anti-clockwise.

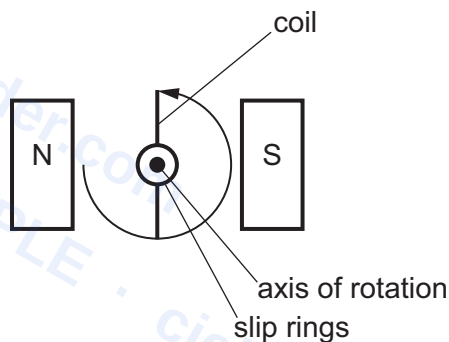


Fig. 7.3

On Fig. 7.4, draw **four** lines to match the coil position to the times A, B, C and D. The coil is viewed from the front.

Each coil position may be used once, more than once or not at all.

| time label<br>from graph | coil position |
|--------------------------|---------------|
| A                        |               |
| B                        |               |
| C                        |               |
| D                        |               |

Fig. 7.4

[3] 0/3

[Total: 10]



- 8 (a) Alpha ( $\alpha$ ) particles are directed at a very thin sheet of gold foil.

The following observations provide evidence for the nuclear model of the atom.

State what conclusions may be made about the model of the atom from these observations.

- (i) Observation: most of the particles pass straight through the foil.

conclusion *most of atom is empty space* ✓

[1] 1/1

- (ii) Observation: a few particles bounce back or are deflected through large angles.

conclusion *Nucleus of atom is positively-charged* ✓

[1] 1/1

- (b) Fig. 8.1 shows three beams of ionising radiation, alpha, beta and gamma, passing between two parallel plates. The plates are charged and there is a uniform electric field between them.

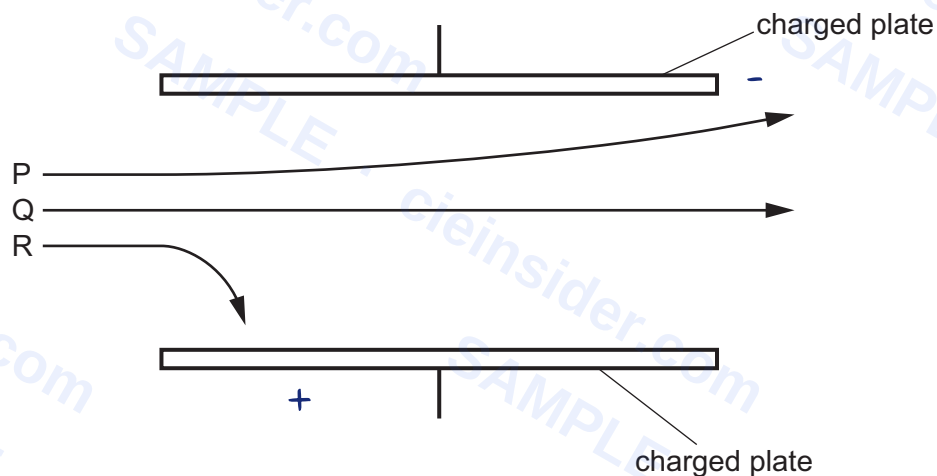


Fig. 8.1

- (i) State and explain which path P, Q or R shows a beam of alpha particles.

path *P* ✓

explanation *Alpha particles have + charge, so it will deflect. Alpha particle have more mass, so deflect at a lower angle* ✓

[2] 2/2



\* 0000800000017 \*

DFD



17

(ii) State and explain the direction of the electric field between the plates.

direction upwards

explanation Direction of electric field is from  
positive to negative.

8

[1] 0/1

(c) Curium-242 is a radioactive isotope. It emits alpha particles. It has a half-life of 160 days.

After 480 days, the mass of curium-242 in a sample is  $2.4 \times 10^{-3}$  g.

Calculate the initial mass of curium-242 in the sample.

$$0 : x$$

$$\frac{x}{8} = 2.4 \times 10^{-3}$$

$$160 : \frac{x}{2}$$

$$x = 8 \times 2.4 \times 10^{-3}$$

$$320 : \frac{x}{4}$$

initial mass of curium-242 = 0.0192 g ✓✓ [2] 2/2

$$480 : \frac{x}{8}$$

[Total: 7]



9 (a) Cosmic microwave background radiation (CMBR) can be observed in every direction in space around us.

(i) State when CMBR was produced.

*Shortly after the Universe was formed* ✓ [1] 1/1

(ii) State and explain how the wavelength of this radiation has changed since it was formed.

*Radiation has redshifted as the Universe expanded.* ✓

*Increase in the observed* ✓ *wavelength from receding stars and galaxies.* [2] 2/2

(b) Table 9.1 shows data about planets in our solar system.

Table 9.1

| planet  | average radius of orbit around the Sun / $10^6$ km | time for one orbit / Earth years | average surface temperature / $^{\circ}\text{C}$ |
|---------|----------------------------------------------------|----------------------------------|--------------------------------------------------|
| Venus   | 108                                                | 0.62                             | 460                                              |
| Earth   | 150                                                | 1.00                             | 15                                               |
| Mars    | 228                                                | 1.90                             | -65                                              |
| Jupiter | 778                                                | 12.00                            | -110                                             |
| Saturn  | 1430                                               | 29.00                            | -140                                             |

(i) The orbit of Venus is approximately circular.

Calculate the average orbital speed  $v$  of Venus. Give your answer in km/h.

$$v = \frac{2\pi r}{T}$$

$$= \frac{2\pi(108)(\times 10^6)}{0.62 \times 365 \times 24} = 124941$$

orbital speed = *120 000* ✓✓✓ km/h [3] 3/3

(ii) State how the average surface temperature of a planet changes as its distance from the Sun increases.

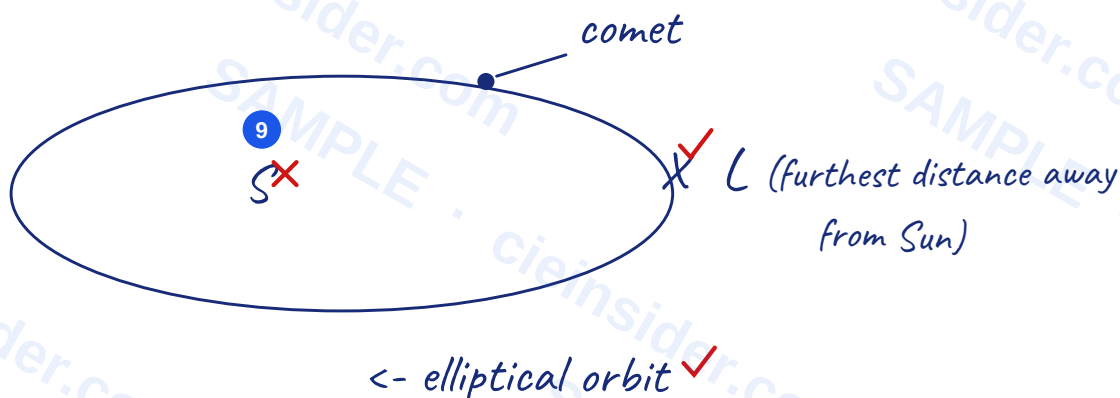
*decrease* ✓ [1] 1/1

[Total: 7]



- 10 (a) Sketch a diagram to show the orbital path of a comet around the Sun.

Mark the position of the Sun on your diagram using an S.



[2] 1/2

- (b) Draw a cross on your diagram to show where the comet is travelling with the slowest speed. Label the cross L.

[1] 1/1

- (c) Explain why the speed of a comet changes as it travels around its orbit.

Use the conservation of energy in your explanation.

GPE decreases and KE increases as comet gets closer to Sun, so maximum speed nearest to the Sun as it has most kinetic energy. The total energy of comet = GPE + KE.

[3] 3/3

GPE means gravitational potential energy,  
KE means kinetic energy.

[Total: 6]



# Want yours marked like this?

Everything before this page is a real script I marked for a student. I marked A Level Physics (9702) and IGCSE Physics (0625) for Cambridge, and your paper gets marked the same way.

## What comes back

- Your paper marked against the published mark scheme, with every mark placed where it was earned or lost.
- For every lost mark: the words that cost it, what the scheme needed instead, and the physics worked through to the right answer.
- The patterns across the whole paper, and the one thing I'd fix first.

## How it works

- 1 Sit a full 0625 or 9702 past paper, timed, in one go. Keep your working as you wrote it: photos of your handwriting are fine.
- 2 Go to [cieinsider.com/marked](https://cieinsider.com/marked), pick your paper and pay. It's from £25 a paper, and every price is on that page.
- 3 Email your paper to [rich@cieinsider.com](mailto:rich@cieinsider.com) with the subject "Marked script", from the address you paid with.
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