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Interactive

Interactive Example Candidate Responses

Paper 3 (May / June 2016), Question 1

Cambridge IGCSE™ Physics 0625

Version 2.0

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1 Fig. 1.1 shows part of the speed-time graphs for a cyclist and for a runner.

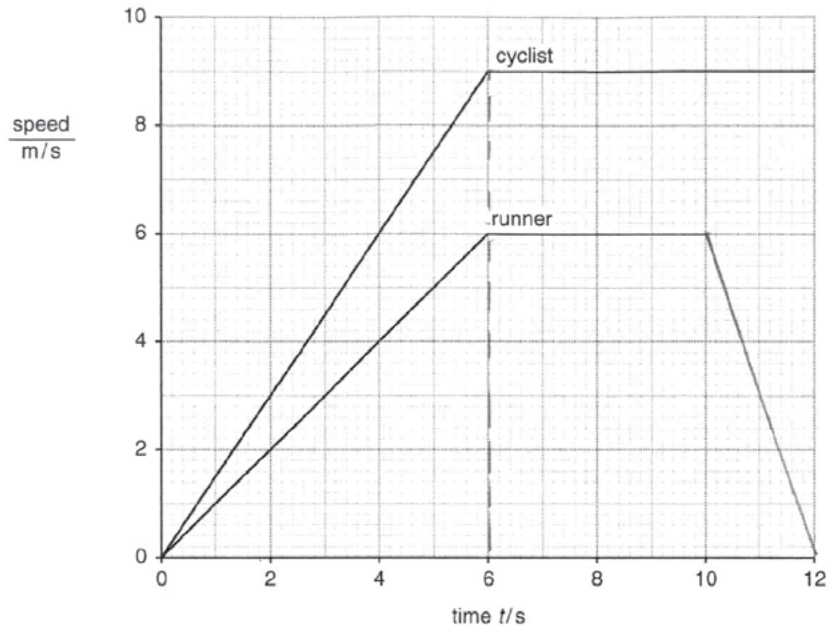

Fig. 1.1

(a) Compare the motion of the cyclist and the runner during the first 6 seconds. Explain your answer.

The cyclist picks up speed leaving the runner at 6m/s while the cyclist is 9m/s ~~to~~ with a gap of 3m/s. [3]

(b) Describe the motion of the cyclist between time $t = 6.0$ s and time $t = 12.0$ s.

Its constant [1]

(c) Calculate the total distance travelled by the cyclist between $t = 0$ and $t = 12.0$ s.

$D = S \times T$

$\frac{1}{2} \times 6 \times 9 = 29$

$6 \times 9 = 54$

83

distance travelled = 83 m [4]

Select page

MIDDLE

LOW

Your Mark

1(a)

1(b)

1(c)

1(d)

Examiner marks and comments

Mark	Comment
1/3	This response indicates that the cyclist is gaining speed but does not give details of the motion of the runner. A mark is scored for identifying correctly the faster speed of the cyclist.
1/1	Constant speed is the required answer.
2/4	The graph gives an indication of the areas of a triangle and a rectangle. The candidate has calculated the area of the triangle incorrectly. The final mark is a quality mark awarded to candidates who obtain the value of 81 m having completed correctly all parts of the calculation.
2/2	The graph is completed correctly.

EXAMINER COMMENTS

MARK SCHEME

(d) After the first 6.0 seconds, the runner moves at constant speed for 4.0 seconds. He then slows down uniformly and stops in a further 2.0 seconds.

On Fig. 1.1, complete the graph for the runner's motion. [2]

[Total: 10]

Select page

MIDDLE

LOW

Your Mark

1(a)

1(b)

1(c)

1(d)

Examiner marks and comments

Mark	Comment
1/3	This response indicates that the cyclist is gaining speed but does not give details of the motion of the runner. A mark is scored for identifying correctly the faster speed of the cyclist.
1/1	Constant speed is the required answer.
2/4	The graph gives an indication of the areas of a triangle and a rectangle. The candidate has calculated the area of the triangle incorrectly. The final mark is a quality mark awarded to candidates who obtain the value of 81 m having completed correctly all parts of the calculation.
2/2	The graph is completed correctly.

EXAMINER COMMENTS

MARK SCHEME

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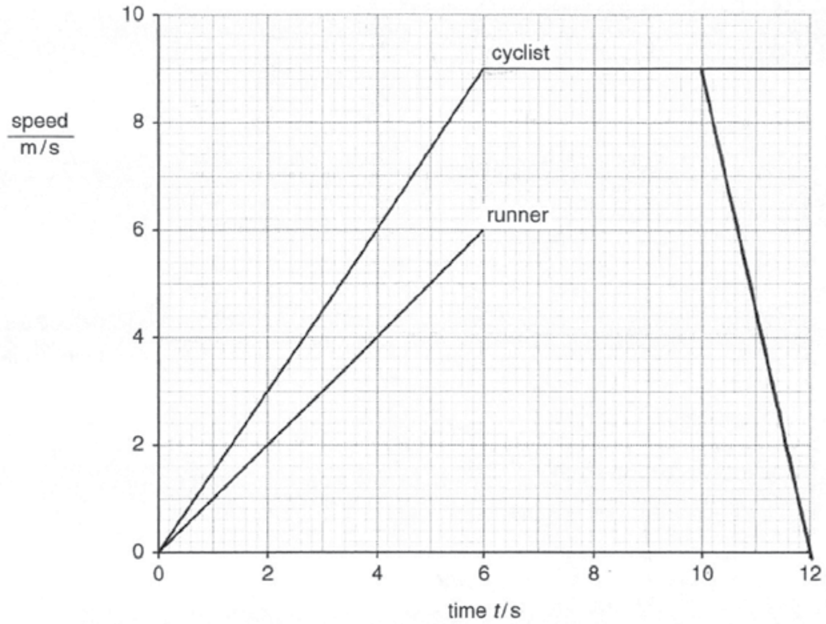

Fig. 1.1

(a) Compare the motion of the cyclist and the runner during the first 6 seconds. Explain your answer.

During the first 6 second the cyclist was having more speed than the runner and that is because a cyclist is machine and the runner is human so their is a hug difference between them. [3]

(b) Describe the motion of the cyclist between time t = 6.0 s and time t = 12.0 s.

9 m/s and it moves in constant speed [1]

(c) Calculate the total distance travelled by the cyclist between t = 0 and t = 12.0 s.

Total distance = Total speed × Total time

= 9 × 12 = 108m

=

distance travelled = 108 m [4]

Your Mark

1(a)

1(b)

1(c)

1(d)

Q1	Mark scheme
(a)	cyclist accelerating OR moving faster OR cyclist has higher speed both (cyclist and runner) accelerating cyclists gradient steeper OR acceleration values calculated
(b)	Constant OR steady OR uniform (speed or motion)
(c)	indication of an area calculated 6 × 9 = 54(m) ½ (6 × 9) = 27(m) 81(m)
(d)	horizontal line finishes at 10 seconds straight line to time zero in two seconds

(d) After the first 6.0 seconds, the runner moves at constant speed for 4.0 seconds. He then slows down uniformly and stops in a further 2.0 seconds.

On Fig. 1.1, complete the graph for the runner's motion. (decelrates) [2]

[Total: 10]

Select page

MIDDLE

LOW

Your Mark

1(a)

1(b)

1(c)

1(d)

Q1	Mark scheme
(a)	cyclist accelerating OR moving faster OR cyclist has higher speed both (cyclist and runner) accelerating cyclists gradient steeper OR acceleration values calculated
(b)	Constant OR steady OR uniform (speed or motion)
(c)	indication of an area calculated $6 \times 9 = 54$(m) ½ $(6 \times 9) = 27$(m) <u>81(m)</u>
(d)	horizontal line finishes at 10 seconds straight line to time zero in two seconds

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Paper 3 (May / June 2016), Question 2

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Physics 0625

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2 A boy steps off a high board into a swimming pool.

Fig. 2.1 shows the forces acting on the boy at one point in his fall.

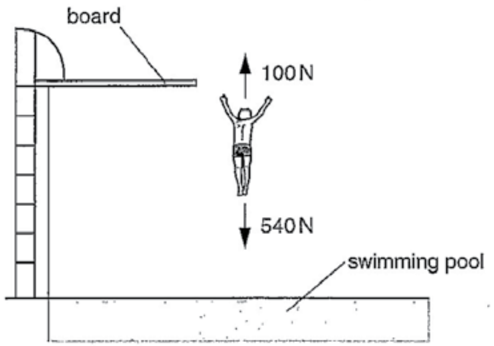

Fig. 2.1

(a) The 540 N force is caused by gravitational attraction.

State the cause of the 100 N force.

air resistance .... [1]

(b) Calculate the mass of the boy.

m =

540 ÷ 10 = 54

mass of boy = ... 54 .... kg [2]

(c) Calculate the resultant force on the boy. State its direction.

100 ÷ 10 ~~540 ÷ 100 = 5.4~~

~~100~~

resultant force = ... 5.4 10 .... N

direction = ... Downwards ....

[2]

[Total: 5]

Select page

Your Mark

2(a) ☐

2(b) ☐

2(c) ☐

Q2	Mark scheme
(a)	air resistance
(b)	W = m × g in any form 54 (kg)
(c)	(540 – 100) = 440 (N) B1 downwards

2 A boy steps off a high board into a swimming pool.

Fig. 2.1 shows the forces acting on the boy at one point in his fall.

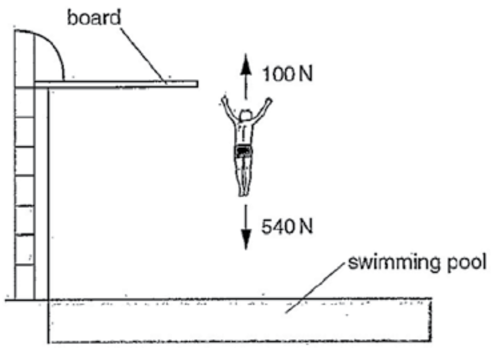

Fig. 2.1

(a) The 540 N force is caused by gravitational attraction.

State the cause of the 100 N force.

Energy force ....[1]

(b) Calculate the mass of the boy.

540 − 100

$\frac{440}{10}$

mass of boy = ...44.... kg [2]

(c) Calculate the resultant force on the boy. State its direction.

resultant force = ...640.... N

direction = ...Down....

[2]

[Total: 5]

Select page

Your Mark

2(a)

2(b)

2(c)

Q2	Mark scheme
(a)	air resistance
(b)	W = m × g in any form 54 (kg)
(c)	(540 – 100) = 440 (N) B1 downwards

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Select page

MIDDLE

LOW

3 Fig. 3.1 shows a metal plate-warmer.

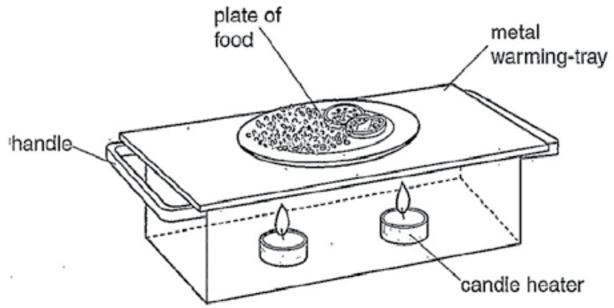

Fig. 3.1

The plate-warmer contains two small candle heaters. Plates of food are placed on top of the warming-tray.

(a) (i) State the name of a process by which the thermal energy from the candles passes to the warming-tray.

radiation ....[1]

(ii) State the name of the process by which thermal energy moves through the warming-tray.

Convection ....[1]

(b) The outside of the plate-warmer is shiny.

Suggest how this helps the plate-warmer to stay hot.

~~It conducts heat and~~ prevents heat from being lost ....[1]

(c) The handles of the plate-warmer are made from metal.

Identify a problem with this, and suggest how the problem could be solved.

problem: metal conducts heat hence the handles will be ~~too hot~~ too hot to touch.

action: make the handles out of something that does not conduct out of heat, [2]

[Total: 5]

Your Mark

3(a)(i)

3(a)(ii)

3(b)

3(c)

Q3	Mark scheme
(a)(i)	convection OR radiation
(a)(ii)	conduction
(b)	poor emitter OR poor radiator (of thermal energy)
(c)	(handles) become hot use an insulator

EXAMINER COMMENTS

MARK SCHEME

3 Fig. 3.1 shows a metal plate-warmer.

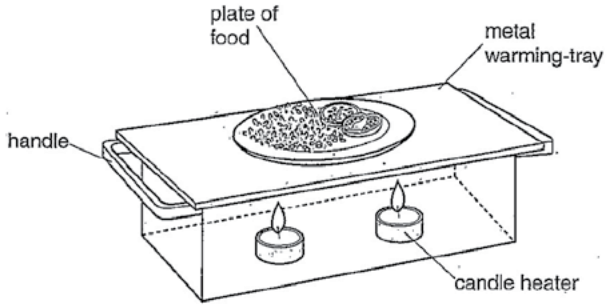

Fig. 3.1

The plate-warmer contains two small candle heaters. Plates of food are placed on top of the warming-tray.

(a) **(i)** State the name of a process by which the thermal energy from the candles passes to the warming-tray.

........thermal energy........ [1]

(ii) State the name of the process by which thermal energy moves through the warming-tray.

........it moves the smoke up to the tray........ [1]

(b) The outside of the plate-warmer is shiny.

Suggest how this helps the plate-warmer to stay hot.

........get reflection........ [1]

(c) The handles of the plate-warmer are made from metal.

Identify a problem with this, and suggest how the problem could be solved.

problem: The handle could be heated and difficult to touch.

action: using a product that is against heat or use gloves.

[2]

[Total: 5]

Select page

MIDDLE LOW

Your Mark

3(a)(i)

3(a)(ii)

3(b)

3(c)

Q3	Mark scheme
(a)(i)	convection OR radiation
(a)(ii)	conduction
(b)	poor emitter OR poor radiator (of thermal energy)
(c)	(handles) become hot use an insulator

EXAMINER COMMENTS

MARK SCHEME

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4 Fig. 4.1 is a simplified diagram of a geothermal power station.

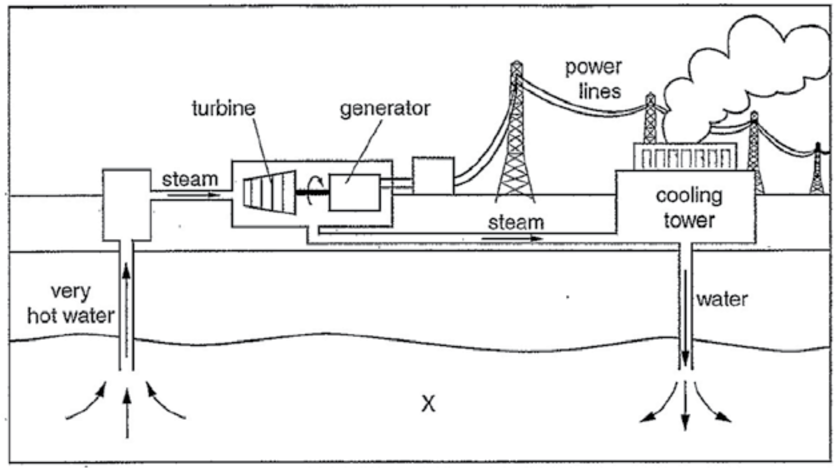

Fig. 4.1

(a) Describe the energy resource labelled X in Fig. 4.1.

Renewable ....[1]

(b) Identify the useful energy transformation that takes place in the geothermal power station. Tick **one** box in each column.

input energy		output energy	
chemical	☐	chemical	☐
electrical	☐	electrical	☑
gravitational	☐	gravitational	☐
sound	☐	sound	☐
thermal	☑	thermal	☐

[2]

(c) State **two** disadvantages of obtaining energy from fossil fuels.

1. It is ~~better~~ pollutant.

2. It is non-renewable.

[2]

[Total: 5]

Select page

MIDDLE LOW

Your Mark

4(a)

4(b)

4(c)

Q4	Mark scheme
(a)	hot rocks
(b)	input: thermal output: electrical
(c)	**any two from:** air pollution OR atmospheric pollution climate change OR global warming OR greenhouse gases use up diminishing resources OR non-renewable

EXAMINER COMMENTS

MARK SCHEME

Select page

MIDDLE

LOW

4 Fig. 4.1 is a simplified diagram of a geothermal power station.

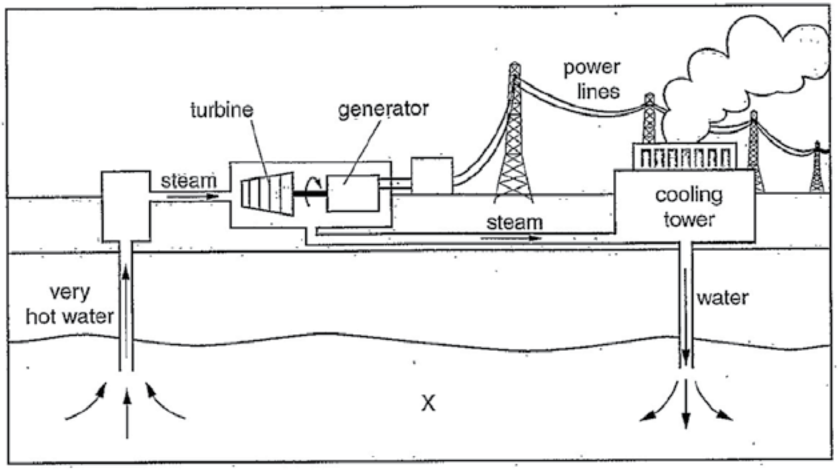

Fig. 4.1

(a) Describe the energy resource labelled X in Fig. 4.1.

hydro electric energy ....[1]

(b) Identify the useful energy transformation that takes place in the geothermal power station. Tick **one** box in each column.

input energy		output energy	
chemical		chemical	✓
electrical		electrical	
gravitational		gravitational	
sound		sound	
thermal	✓	thermal	

[2]

(c) State **two** disadvantages of obtaining energy from fossil fuels.

1. air Pollution from the power Station

2. noisy from the Power Station

[2]

[Total: 5]

Your Mark

4(a)

4(b)

4(c)

Q4	Mark scheme
(a)	hot rocks
(b)	input: thermal output: electrical
(c)	**any two from:** air pollution OR atmospheric pollution climate change OR global warming OR greenhouse gases use up diminishing resources OR non-renewable

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5 Fig. 5.1 shows two men repairing a weak roof using a crawler-board.

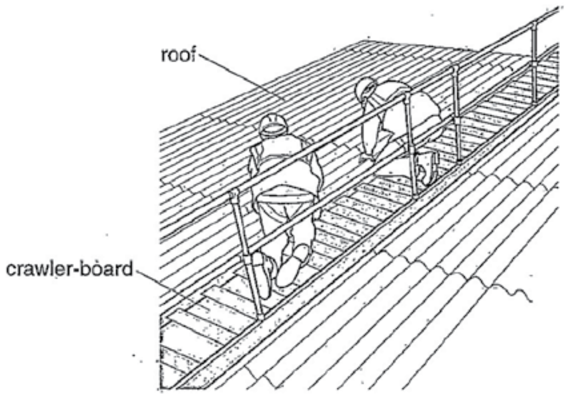

Fig. 5.1

(a) Explain why use of the crawler-board prevents the men from falling through the roof.

~~The~~ ~~they have support by~~
It has a large surface area
which will prevent ~~from~~ the roof to
collapse when presure is aded. [2]

(b) The crawler-board has a weight of 400 N. The total weight of the two men is 1600 N. The area of the crawler-board in contact with the roof is $0.8\,m^2$.

Calculate the pressure on the roof when the men are on the crawler-board. Include the unit.

$1600 - 400 = 1200$

$1200 \div 0.8$

pressure = 960 N/m^2 [5]

[Total: 7]

Select page

Your Mark

5(a)

5(b)

Q5	Mark scheme
(a)	any two from: larger area (in contact with roof) weight OR force spread out lower pressure (on roof)
(b)	400 + 1600 seen OR 2000 (N) P = F/A stated 2000/0.8 2500 N/m^2 OR Pa

5 Fig. 5.1 shows two men repairing a weak roof using a crawler-board.

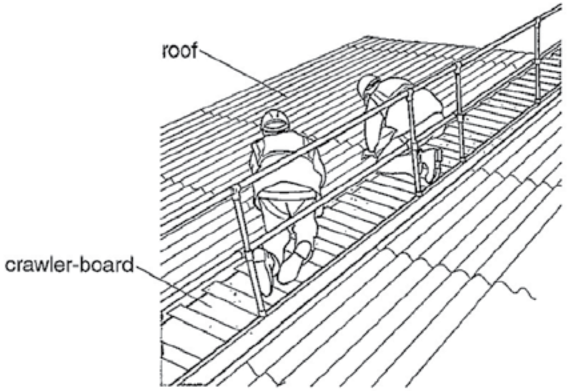

Fig. 5.1

(a) Explain why use of the crawler-board prevents the men from falling through the roof.

To reduce friction because that helps him to balance while walking and not slippery. and also to be able to walk properly. [2]

(b) The crawler-board has a weight of 400 N. The total weight of the two men is 1600 N. The area of the crawler-board in contact with the roof is 0.8 m^2.

Calculate the pressure on the roof when the men are on the crawler-board. Include the unit.

$\frac{400}{1600} \times 0.64$

pressure = 0.16 [5]

[Total: 7]

Select page

Your Mark

5(a)

5(b)

Q5	Mark scheme
(a)	any two from: larger area (in contact with roof) weight OR force spread out lower pressure (on roof)
(b)	400 + 1600 seen OR 2000 (N) P = F/A stated 2000/0.8 2500 N/m^2 OR Pa

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Paper 3 (May / June 2016), Question 6

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6 Fig. 6.1 shows an experiment to observe the motion of smoke particles in air.

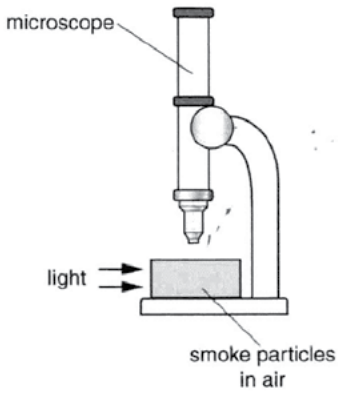

Fig. 6.1

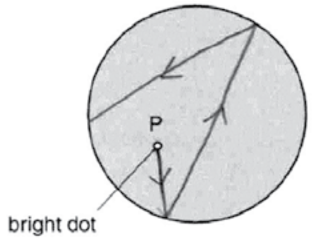

Fig. 6.2

(a) **(i)** Fig. 6.2 shows the view through the microscope of one smoke particle, labelled P.

On Fig. 6.2, draw 3 lines to show the movement of this particle.

[2]

(ii) Explain what causes the smoke particle to move.

gas particles move about freely in whatever container they are in. The more space a particle has, the more energy it has so the more it moves. [2]

(b) The air containing the smoke particles becomes warmer.

Suggest how this changes the movement of the smoke particles.

They move more because they have more ~~[illegible]~~ energy. move faster [1]

[Total: 5]

Your Mark

6(a)(i)

6(a)(ii)

6(b)

Q6	Mark scheme
(a)(i)	three straight lines, joined end to end at least two changes of direction
(a)(ii)	collisions OR bumps OR bounces off (with moving) air molecules
(b)	more collisions OR changes of direction

Select page

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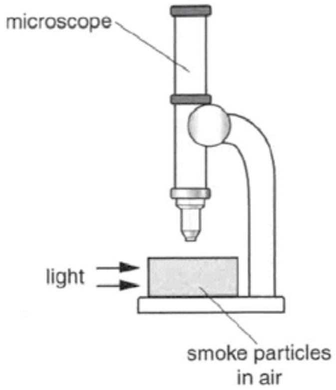

Fig. 6.1

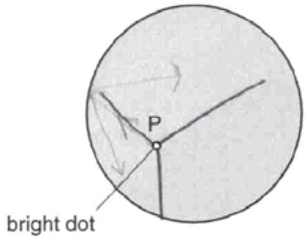

Fig. 6.2

(a) (i) Fig. 6.2 shows the view through the microscope of one smoke particle, labelled P.

On Fig. 6.2, draw 3 lines to show the movement of this particle. [2]

(ii) Explain what causes the smoke particle to move.

These particles contein energy which makes them move around and bounce of any objects

[2]

(b) The air containing the smoke particles becomes warmer.

Suggest how this changes the movement of the smoke particles.

The movements increese becouse more heat couse the particles to obtein more ~~energ~~ energy [1]

[Total: 5]

Your Mark

6(a)(i)

6(a)(ii)

6(b)

Q6	Mark scheme
(a)(i)	three straight lines, joined end to end at least two changes of direction
(a)(ii)	collisions OR bumps OR bounces off (with moving) air molecules
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7 Fig. 7.1 shows equipment used to demonstrate thermal expansion.

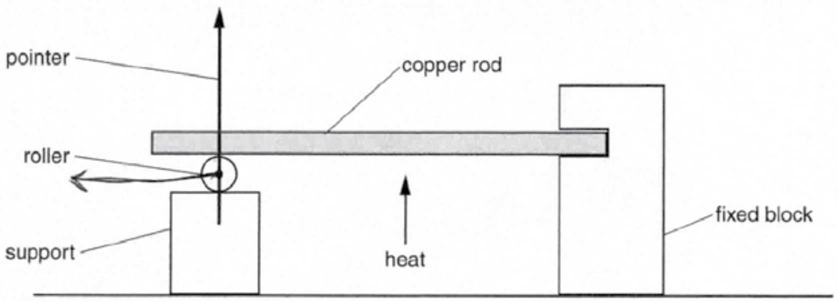

Fig. 7.1

(a) The copper rod is heated and expands. It turns the roller and moves the pointer.

On Fig. 7.1, draw the new position of the pointer. [1]

(b) As the rod is heated, some of its properties change.

Identify how each property changes. Place **one** tick in each row of the table.

property of rod	decreases	increases	stays the same
volume		✓	
mass			✓
density	✓		

[3]

(c) Suggest **one** disadvantage of thermal expansion.

It is dangerous because it takes long to cool down [1]

[Total: 5]

Select page

Your Mark

7(a)

7(b)

7(c)

Q7	Mark scheme
(a)	to the left OR anticlockwise
(b)	row 1 – increases row 2 – stays the same row 3 – decreases
(c)	electric cables lower to ground OR telephone lines in summer OR buckling tracks

7 Fig. 7.1 shows equipment used to demonstrate thermal expansion.

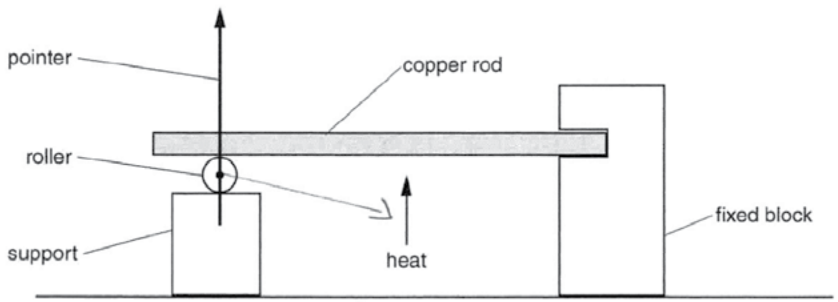

Fig. 7.1

(a) The copper rod is heated and expands. It turns the roller and moves the pointer.

On Fig. 7.1, draw the new position of the pointer.

[1]

(b) As the rod is heated, some of its properties change.

Identify how each property changes. Place **one** tick in each row of the table.

property of rod	decreases	increases	stays the same
volume		✓	
mass			✓
density			✓

[3]

(c) Suggest **one** disadvantage of thermal expansion.

Because of thermal expansion metals can melt and ~~rease~~ come out of the place that they're fixed into. e.g A fixed block. [1]

[Total: 5]

Select page

Your Mark

7(a)

7(b)

7(c)

Q7	Mark scheme
(a)	to the left OR anticlockwise
(b)	row 1 – increases row 2 – stays the same row 3 – decreases
(c)	electric cables lower to ground OR telephone lines in summer OR buckling tracks

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Paper 3 (May / June 2016), Question 8

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8 A student directs a ray of light towards a plane mirror, as shown in Fig. 8.1.

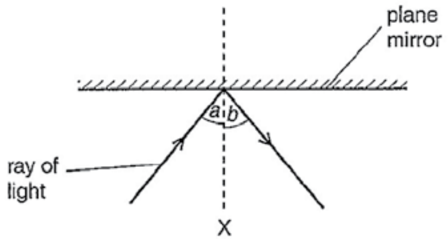

Fig. 8.1

(a) **(i)** Name the line labelled X.

Line of ~~incidence~~ ~~reflection~~ symmetry [1]

(ii) When angle *a* is 45°, angle *b* is also 45°.

Angle *a* is changed to 20°.

What is the new value of angle *b*? Tick **one** box.

20° [√] 25° [ ] 45° [ ] 65° [ ] 80° [ ] [1]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme
(a)(i)	<u>normal</u>
(a)(ii)	20°
(b)	d g f R OR S
(c)	any two rays correctly drawn from top of O: ray parallel to axis, through lens, and beyond F ray undeviated through centre of lens and beyond ray through F, through lens, then parallel to axis inverted image correctly drawn and positioned at intersection of two rays

(b) The student now makes the ray of light from Fig. 8.1 pass into a glass block, as shown in Fig. 8.2.

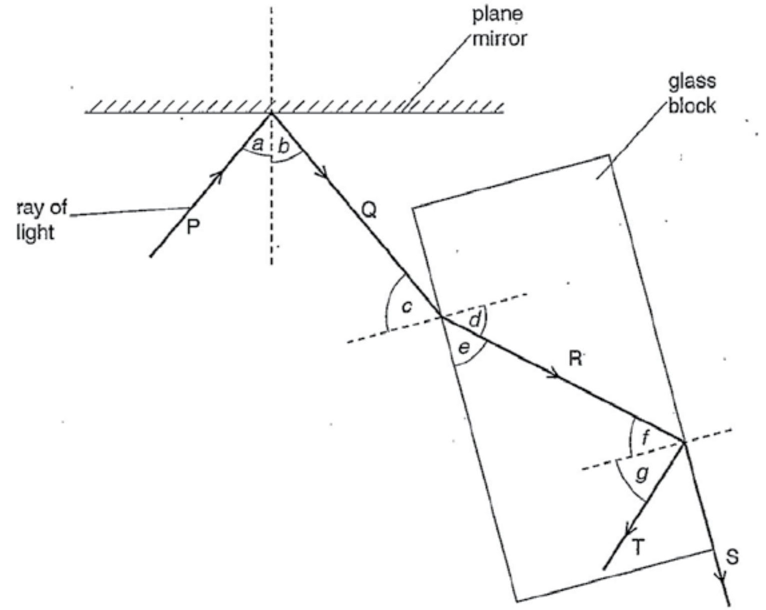

Fig. 8.2

Complete the table, using the labels from Fig. 8.2. The first label is done for you.

description	label
an angle of incidence	*a*
an angle of refraction	d
an internally reflected angle	g
a critical angle	f
a refracted ray	R

[4]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme
(a)(i)	<u>normal</u>
(a)(ii)	20°
(b)	d g f R OR S
(c)	any two rays correctly drawn from top of O: ray parallel to axis, through lens, and beyond F ray undeviated through centre of lens and beyond ray through F, through lens, then parallel to axis inverted image correctly drawn and positioned at intersection of two rays

(c) The student uses a converging lens to produce an image of an object. Fig. 8.3 shows the arrangement.

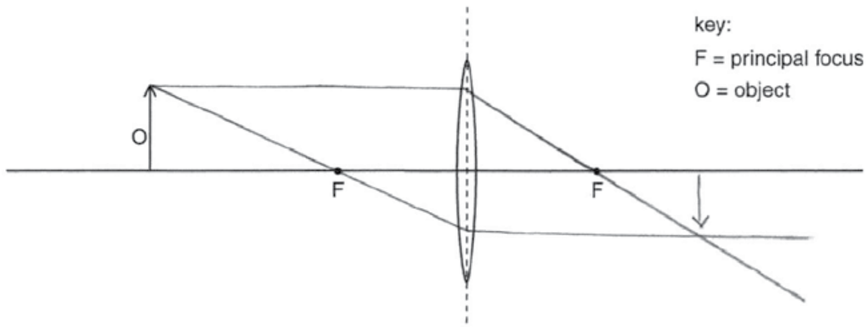

Fig. 8.3

On Fig. 8.3, using a ruler, carefully draw two rays from the object O to locate the position of the image. Use an arrow to represent the image. [3]

[Total: 9]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme
(a)(i)	<u>normal</u>
(a)(ii)	20°
(b)	d g f R OR S
(c)	any two rays correctly drawn from top of O: ray parallel to axis, through lens, and beyond F ray undeviated through centre of lens and beyond ray through F, through lens, then parallel to axis inverted image correctly drawn and positioned at intersection of two rays

8 A student directs a ray of light towards a plane mirror, as shown in Fig. 8.1.

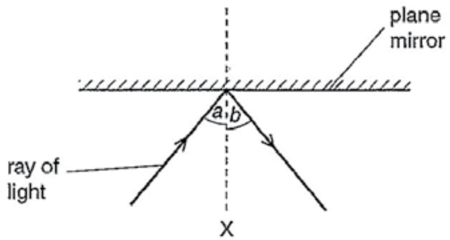

Fig. 8.1

(a) (i) Name the line labelled X.

~~Angle of~~ reflection .... [1]

(ii) When angle *a* is 45°, angle *b* is also 45°.

Angle *a* is changed to 20°.

What is the new value of angle *b*? Tick **one** box.

20° ☑ 25° ☐ 45° ☐ 65° ☐ 80° ☐ [1]

Select page

Your Mark

8(a)(i) ☐

8(a)(ii) ☐

8(b) ☐

8(c) ☐

Q8	Mark scheme
(a)(i)	normal
(a)(ii)	20°
(b)	d g f R OR S
(c)	any two rays correctly drawn from top of O: ray parallel to axis, through lens, and beyond F ray undeviated through centre of lens and beyond ray through F, through lens, then parallel to axis inverted image correctly drawn and positioned at intersection of two rays

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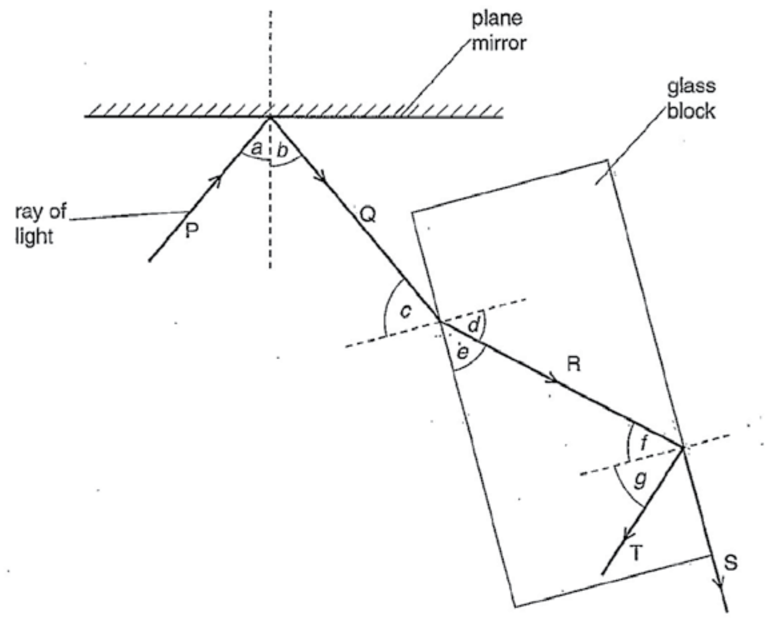

Fig. 8.2

Complete the table, using the labels from Fig. 8.2. The first label is done for you.

description	label
an angle of incidence	*a*
an angle of refraction	c
an internally reflected angle	e
a critical angle	~~x~~ f.
a refracted ray	g

[4]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme
(a)(i)	normal
(a)(ii)	20°
(b)	d g f R OR S
(c)	any two rays correctly drawn from top of O: ray parallel to axis, through lens, and beyond F ray undeviated through centre of lens and beyond ray through F, through lens, then parallel to axis inverted image correctly drawn and positioned at intersection of two rays

(c) The student uses a converging lens to produce an image of an object. Fig. 8.3 shows the arrangement.

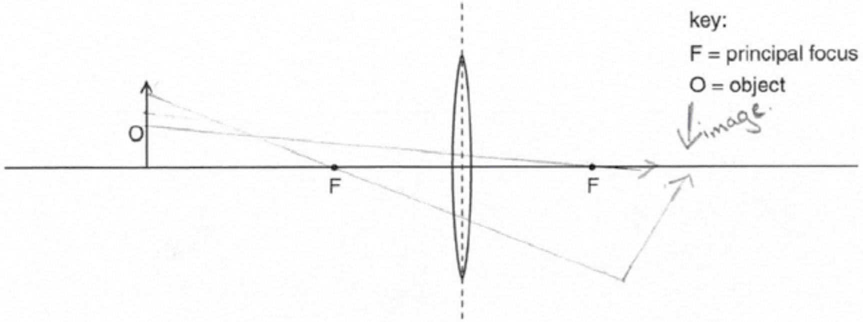

Fig. 8.3

On Fig. 8.3, using a ruler, carefully draw two rays from the object O to locate the position of the image. Use an arrow to represent the image. [3]

[Total: 9]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)

8(c)

Q8	Mark scheme
(a)(i)	normal
(a)(ii)	20°
(b)	d g f R OR S
(c)	any two rays correctly drawn from top of O: ray parallel to axis, through lens, and beyond F ray undeviated through centre of lens and beyond ray through F, through lens, then parallel to axis inverted image correctly drawn and positioned at intersection of two rays

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9 Fig. 9.1 represents the regions of the electromagnetic spectrum.

radio waves	micro-waves	infra-red	visible light	ultraviolet waves	X-rays	gamma rays

→

increasing .... decreasing

Fig. 9.1

(a) Complete Fig. 9.1:

(i) Add the label of the missing region. [1]

(ii) Complete the label under the arrow. [1]

(b) (i) State **two** uses of X-rays.

1. They are used to kill cancer cells.

2. They are used for scanning human body in hospitals.

[2]

(ii) Describe **two** safety precautions taken by people using X-rays.

1. They should not be used for a long time.

2. People using X-rays should wear protective clothes

[2]

(iii) X-rays and light waves can both travel through a vacuum.

Identify the correct statement. Tick **one** box.

☐ X-rays travel at a slower speed than light waves.

☐ X-rays travel at the same speed as light waves.

☑ X-rays travel at a faster speed than light waves.

[1]

[Total: 7]

Select page

Your Mark

9(a)(i) ☐

9(a)(ii) ☐

9(b)(i) ☐

9(b)(ii) ☐

9(b)(iii) ☐

Q9	Mark scheme
(a)(i)	infra-red
(a)(ii)	frequency
(b)(i)	any two different applications from: • (medical) imaging OR detecting fractures in bone OR specific example e.g. CT scan/imaging teeth at dentist • detecting faults in metal • security imaging e.g. airport security checks of bags • cancer treatment
(b)(ii)	any two from: • behind a screen OR lead apron • large distance from X-ray beam • monitoring of OR restricting exposure • low dosage OR limit exposure time • monitor frequency of x-ray sessions • other people not allowed in room when X-ray being taken • avoid when pregnant
(b)(iii)	same speed

9 Fig. 9.1 represents the regions of the electromagnetic spectrum.

radio waves	micro-waves	light waves	visible light	ultraviolet waves	X-rays	gamma rays

increasing Speed

Fig. 9.1

(a) Complete Fig. 9.1:

(i) Add the label of the missing region. [1]

(ii) Complete the label under the arrow. [1]

(b) **(i)** State **two** uses of X-rays.

1. To check your skeleton (~~Medicinal~~ Hospital use)

2. ....

[2]

(ii) Describe **two** safety precautions taken by people using X-rays.

1. Safety goggles

2. gloves

[2]

(iii) X-rays and light waves can both travel through a vacuum.

Identify the correct statement. Tick **one** box.

- [ ] X-rays travel at a slower speed than light waves.
- [x] X-rays travel at the same speed as light waves.
- [ ] X-rays travel at a faster speed than light waves.

[1]

[Total: 7]

Select page

Your Mark

9(a)(i)

9(a)(ii)

9(b)(i)

9(b)(ii)

9(b)(iii)

Q9	Mark scheme
(a)(i)	infra-red
(a)(ii)	frequency
(b)(i)	any two different applications from: • (medical) imaging OR detecting fractures in bone OR specific example e.g. CT scan/imaging teeth at dentist • detecting faults in metal • security imaging e.g. airport security checks of bags • cancer treatment
(b)(ii)	any two from: • behind a screen OR lead apron • large distance from X-ray beam • monitoring of OR restricting exposure • low dosage OR limit exposure time • monitor frequency of x-ray sessions • other people not allowed in room when X-ray being taken • avoid when pregnant
(b)(iii)	same speed

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10 A student makes the circuit shown in Fig. 10.1 using a 12V battery.

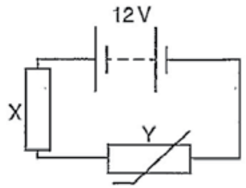

Fig. 10.1

(a) Complete the sentences about the circuit. Use words from the box.

fixed resistor	lamp	light-dependent resistor	parallel	series	thermistor

(i) Components X and Y are connected in ......Series...... [1]

(ii) The component Y is a ......fixed resistor...... [1]

(b) Fig. 10.2 shows how the resistance of Y varies with temperature.

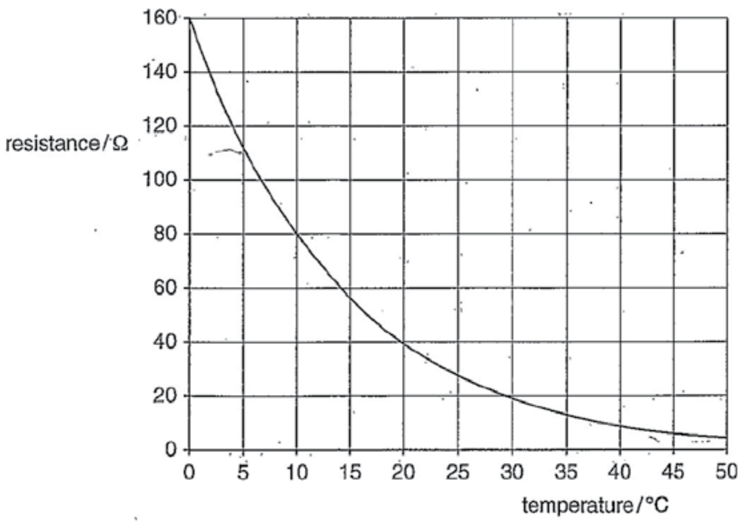

Fig. 10.2

(i) Describe how the resistance of Y varies with temperature.

The lesser the ~~resistance~~ temprature the
the higher the resistance
.... [2]

Select page

Your Mark

10(a)(i)

10(a)(ii)

10(b)(i)

10(b)(ii)

10(b)(iii)

Q10	Mark scheme
(a)(i)	<u>series</u>
(a)(ii)	<u>thermistor</u>
(b)(i)	resistance decreases as temp increases at decreasing rate OR not proportional OR not linear
(b)(ii)	resistance of Y = 80 Ω $R_t = R_1 + R_2$ in any form 100 (Ω)
(b)(iii)	$V = IR$ in any form 12 ÷ 100 OR 12 ÷ candidates (b)(ii) 0.12 (A) OR ECF from (b)(ii)

(ii) The temperature of Y is 10 °C. The resistance of X is 20 Ω.

Calculate the combined resistance of Y and X.

$80 + 20 = 100$

resistance = ...100...... Ω [3]

(iii) Calculate the current in the circuit.

$I = \frac{V}{R}$

~~160+140+120+100+80+60+40+20~~

10

current = ...0.02...... A [3]

[Total: 10]

$I = \frac{12}{160+140+120+100+80+60+40+20} = \frac{12}{720}$

Select page

Your Mark

10(a)(i)

10(a)(ii)

10(b)(i)

10(b)(ii)

10(b)(iii)

Q10	Mark scheme
(a)(i)	<u>series</u>
(a)(ii)	<u>thermistor</u>
(b)(i)	resistance decreases as temp increases at decreasing rate OR not proportional OR not linear
(b)(ii)	resistance of Y = 80 Ω $R_t = R_1 + R_2$ in any form 100 (Ω)
(b)(iii)	$V = IR$ in any form 12 ÷ 100 OR 12 ÷ candidates (b)(ii) 0.12 (A) OR ECF from (b)(ii)

10 A student makes the circuit shown in Fig. 10.1 using a 12V battery.

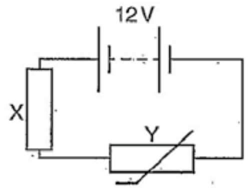

Fig. 10.1

(a) Complete the sentences about the circuit. Use words from the box.

fixed resistor	lamp	light-dependent resistor	parallel	series	thermistor

(i) Components X and Y are connected in ...parallel....................................[1]

(ii) The component Y is a ....fixed resistor...[1]

(b) Fig. 10.2 shows how the resistance of Y varies with temperature.

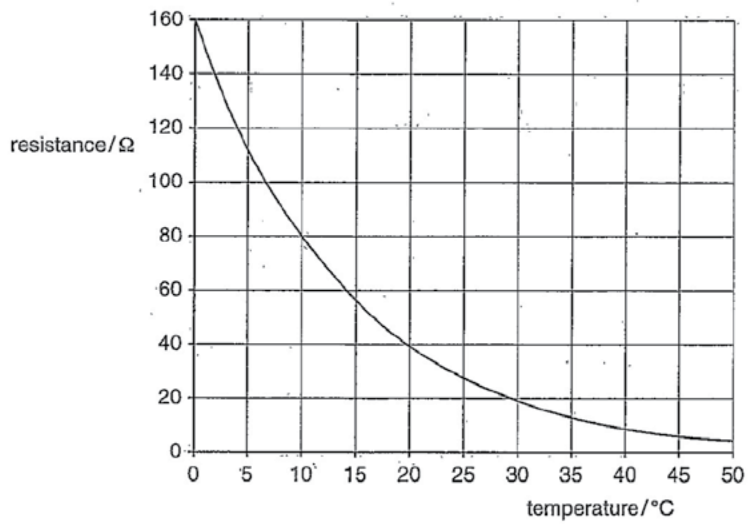

Fig. 10.2

(i) Describe how the resistance of Y varies with temperature.

As the resistance of y decreases the
temperature of y increases.
....[2]

Select page

Your Mark

10(a)(i)

10(a)(ii)

10(b)(i)

10(b)(ii)

10(b)(iii)

Q10	Mark scheme
(a)(i)	<u>series</u>
(a)(ii)	<u>thermistor</u>
(b)(i)	resistance decreases as temp increases at decreasing rate OR not proportional OR not linear
(b)(ii)	resistance of Y = 80 Ω $R_t = R_1 + R_2$ in any form 100 (Ω)
(b)(iii)	V = IR in any form 12 ÷ 100 OR 12 ÷ candidates (b)(ii) 0.12 (A) OR ECF from (b)(ii)

(ii) The temperature of Y is 10 °C. The resistance of X is 20 Ω.

Calculate the combined resistance of Y and X.

$r = y \times X\,\Omega$

$r = 80\,\Omega \times 20\,\Omega = 1600\,\Omega$

resistance = ...1600.................................... Ω [3]

(iii) Calculate the current in the circuit.

$\text{Current} = \frac{r}{V} = \frac{1600\,\Omega}{12\,V} = 133.3\,A$

current = ...133.3.................................... A [3]

[Total: 10]

Select page

Your Mark

10(a)(i)

10(a)(ii)

10(b)(i)

10(b)(ii)

10(b)(iii)

Q10	Mark scheme
(a)(i)	series
(a)(ii)	thermistor
(b)(i)	resistance decreases as temp increases at decreasing rate OR not proportional OR not linear
(b)(ii)	resistance of Y = 80 Ω $R_t = R_1 + R_2$ in any form 100 (Ω)
(b)(iii)	$V = IR$ in any form 12 ÷ 100 OR 12 ÷ candidates (b)(ii) 0.12 (A) OR ECF from (b)(ii)

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Select page

11 (a) Put a ring around the names of the metals which are attracted to magnets.

aluminium copper iron mercury magnesium steel tin

[2]

(b) Fig. 11.1 and Fig. 11.2 show magnetic field patterns for bar magnets.

On each diagram, correctly label the poles. Write **N** or **S**.

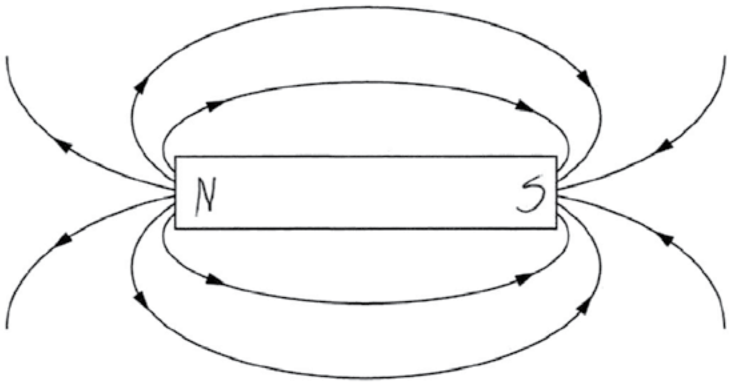


Fig. 11.1

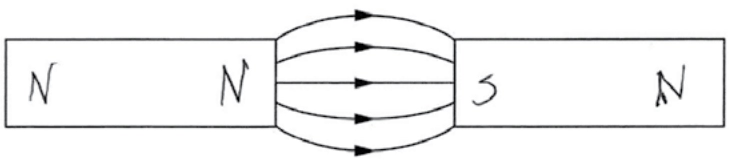


Fig. 11.2

[2]

Your Mark

11(a)

11(b)

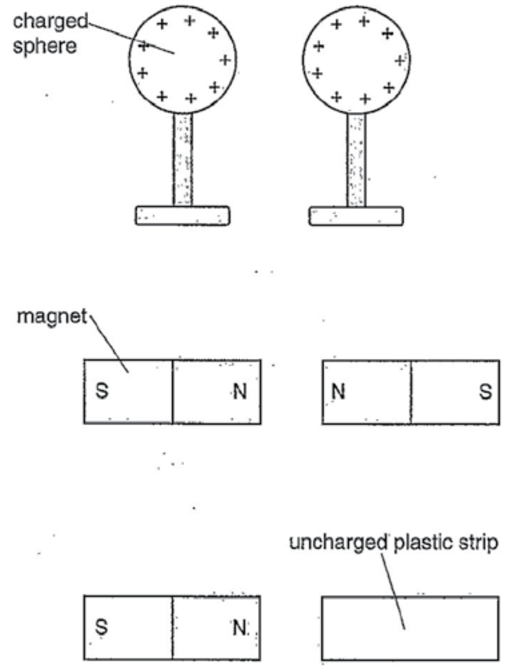
11(c)(i)

11(c)(ii)

11(c)(iii)

Q11	Mark scheme
(a)	iron, steel
(b)	N and S correctly labelled on Fig. 11.1 N and S correctly labelled on Fig. 11.2
(c)(i)	repulsion
(c)(ii)	repulsion
(c)(iii)	no force

(c) For each diagram in Fig. 11.3, describe the force acting, if any. Use the words *attraction*, *repulsion*, or *no force*.



Repaltion
no force

Repulsion

no force

Fig. 11.3

[3]

[Total: 7]

Select page

Your Mark

11(a)

11(b)

11(c)(i)

11(c)(ii)

11(c)(iii)

Q11	Mark scheme
(a)	iron, steel
(b)	N and S correctly labelled on Fig. 11.1 N and S correctly labelled on Fig. 11.2
(c)(i)	repulsion
(c)(ii)	repulsion
(c)(iii)	<u>no force</u>

Select page

11 **(a)** Put a ring around the names of the metals which are attracted to magnets.

aluminium copper iron mercury magnesium steel tin

[2]

(b) Fig. 11.1 and Fig. 11.2 show magnetic field patterns for bar magnets.

On each diagram, correctly label the poles. Write **N** or **S**.

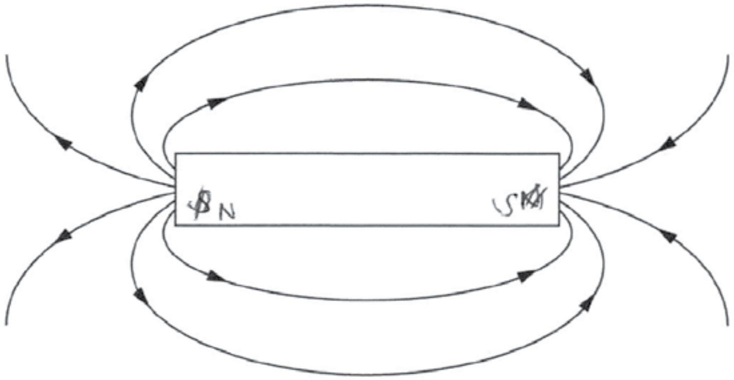


Fig. 11.1

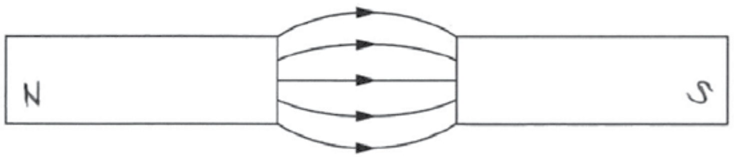


Fig. 11.2

[2]

Your Mark

11(a)

11(b)

11(c)(i)

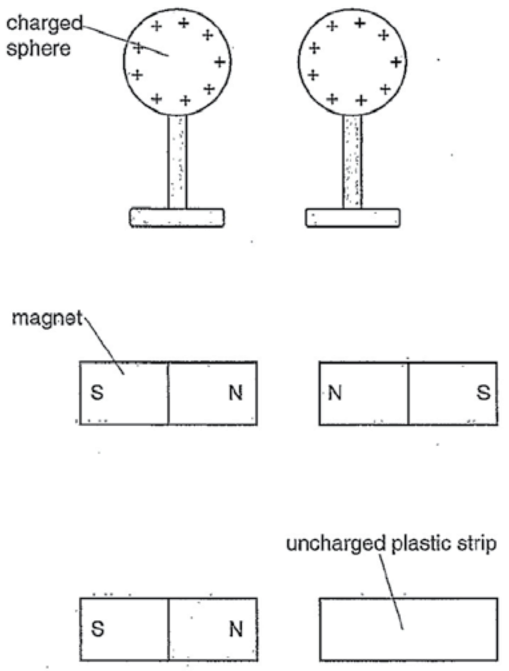
11(c)(ii)

11(c)(iii)

Q11	Mark scheme
(a)	iron, steel
(b)	N and S correctly labelled on Fig. 11.1 N and S correctly labelled on Fig. 11.2
(c)(i)	repulsion
(c)(ii)	repulsion
(c)(iii)	<u>no force</u>

Select page

(c) For each diagram in Fig. 11.3, describe the force acting, if any. Use the words *attraction*, *repulsion*, or *no force*.



Attraction.

Repulsion.

no force.

Fig. 11.3

[3]

[Total: 7]

Your Mark

11(a)

11(b)

11(c)(i)

11(c)(ii)

11(c)(iii)

Q11	Mark scheme
(a)	iron, steel
(b)	N and S correctly labelled on Fig. 11.1 N and S correctly labelled on Fig. 11.2
(c)(i)	repulsion
(c)(ii)	repulsion
(c)(iii)	no force

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12 Two radioactive sources are used by a teacher. One source emits only alpha particles and the other source emits only beta particles.

(a) Suggest how the sources can be identified.

By the matrial which they can go through. ~~Alpha~~ Beta particles can go through more ~~maters~~ materials than Alpha particles. The one which goes through the most is beta, the least Alpha [2]

(b) The teacher also has a source that emits gamma rays.

State **two** ways in which gamma rays are different from alpha particles.

1. only ~~the~~ ~~materials~~ metals like lead can block gamma ray
2. gamma is green

[2]

(c) State an effect of ionising radiation on living things.

Mutaition of cells. ~~Cancer~~ [1]

[Total: 5]

Select page

Your Mark

12(a)

12(b)

12(c)

Q12	Mark scheme
(a)	idea of paper between source and detector OR measuring range (in air) OR pass through an electric or magnetic field alpha stopped by paper OR larger range in air for beta OR identify deflection when in field
(b)	any two from: • gamma travel at the speed of light • gamma rays have no charge • gamma rays have no mass • gamma is a wave OR part of the electromagnetic spectrum • gamma less ionising • greater penetration • not deflected by electric or magnetic fields
(c)	damages cells/tissues/DNA OR causes (cell) mutations OR radiation sickness

12 Two radioactive sources are used by a teacher. One source emits only alpha particles and the other source emits only beta particles.

(a) Suggest how the sources can be identified.

The sources can be identified by taking each one of them and identifying which radioactive source emits ~~Aph~~ Alpha or beta particles but by identifying them one at a time. [2]

(b) The teacher also has a source that emits gamma rays.

State **two** ways in which gamma rays are different from alpha particles.

1. Gamma rays are neutral
2. Gamma rays have a charge of ~~0~~ Zero. [2]

(c) State an effect of ionising radiation on living things.

It destroys living things. [1]

[Total: 5]

Select page

Your Mark

12(a)

12(b)

12(c)

Q12	Mark scheme
(a)	idea of paper between source and detector OR measuring range (in air) OR pass through an electric or magnetic field alpha stopped by paper OR larger range in air for beta OR identify deflection when in field
(b)	any two from: • gamma travel at the speed of light • gamma rays have no charge • gamma rays have no mass • gamma is a wave OR part of the electromagnetic spectrum • gamma less ionising • greater penetration • not deflected by electric or magnetic fields
(c)	damages cells/tissues/DNA OR causes (cell) mutations OR radiation sickness

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Interactive

Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 1

Cambridge IGCSE™
Physics 0625

Version 2.0

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1 A driving instructor gives a student a sudden order to stop the car in the shortest possible time.

Fig. 1.1 shows the speed-time graph of the motion of the car from the moment the order is given.

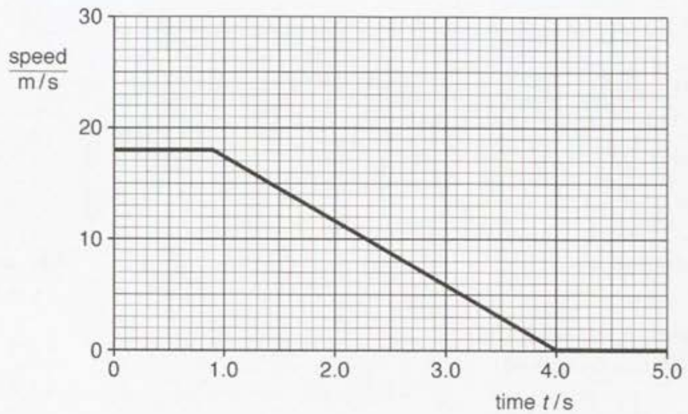

Fig. 1.1

(a) The order to stop is given at time $t = 0$ s.

(i) State the speed of the car at $t = 0$ s.

speed = 18 m/s [1]

(ii) Suggest why the car continues to travel at this speed for 0.9 s.

It takes some time before the car decelerates after the breaks are ~~pressed~~ pushed due to the hydraulic system. [1]

(b) Calculate

(i) the deceleration of the car between $t = 0.9$ s and $t = 4.0$ s,

deceleration = Gradient

Gradient $= \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{0 - 18}{4 - 0.9}$

$= \frac{-18}{3.1} = -5.81$ m/s²

∴ deceleration = 5.8

deceleration = 5.81 m/s² [2]

(ii) the total distance travelled by the car from $t = 0$ s.

d: A under graph

$= \frac{1}{2}(a+b)h$

$= \frac{1}{2}(0.9 + 4)\,18$

$= 44.1$ m

distance = 44.1 m [3]

Select page

Your Mark	
1(a)(i)	
1(a)(ii)	
1(b)(i)	
1(b)(ii)	
1(c)	

Q1	Mark scheme
(a)(i)	18 m/s
(a)(ii)	(0.90 s is) the driver's time to react
(b)(i)	(a =) (v – u)/t OR Δv/t OR either in words OR (18 – 0)/3.1 OR 18/3.1 5.8 m/s² OR Values from any correct points on graph Answer dependent on accuracy of chosen points
(b)(ii)	Evidence of use of: (distance =) area under graph e.g. 1/2bh (18 × 0.9) + (0.5 × 3.1 × 18) 44 m
(c)	(Without seat belt, driver:) e.g. keeps moving (forwards)/does not stop/has inertia/has momentum (Driver) hits steering wheel/windscreen/dashboard

(c) Describe and explain a danger to a driver of not wearing a safety belt during a sudden stop.

The sudden decrease in motion of the car will cause the driver to be ~~be~~ thrusted ~~[illegible]~~ out of his seat and hit ~~[illegible]~~ the ~~[illegible]~~ glass of ~~o~~ the car if he is not wearing a seat belt.

[2]

[Total: 9]

Select page

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

1(c)

Q1	Mark scheme
(a)(i)	18 m/s
(a)(ii)	(0.90 s is) the driver's time to react
(b)(i)	(a =) (v – u)/t OR Δv/t OR either in words OR (18 – 0)/3.1 OR 18/3.1 5.8 m/s^2 OR Values from any correct points on graph Answer dependent on accuracy of chosen points
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Select page

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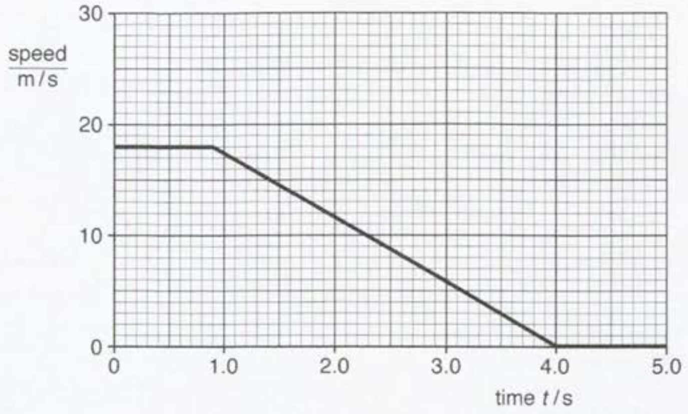

Fig. 1.1

(a) The order to stop is given at time $t = 0$ s.

(i) State the speed of the car at $t = 0$ s.

speed = ...18m/s....[1]

(ii) Suggest why the car continues to travel at this speed for 0.9 s.

Due to a sudden break, the car travelled for more 0.9 seconds because the ~~as the its speed was~~ stopped accelerating ....[1]

(b) Calculate

(i) the deceleration of the car between $t = 0.9$ s and $t = 4.0$ s,

gradient = deceleration

$\frac{Y_2 - Y_1}{X_2 - X_1} = x$

$\frac{0-18}{4-0.9} = x$

$\frac{-18}{3.1} = x$

$-5.806 = x$

$-5.81 = x$

deceleration = ...$-5.81\ m/s^2$....[2]

(ii) the total distance travelled by the car from $t = 0$ s.

distance = A under graph.

$\therefore \frac{1}{2} \times (a+b) \times h = A$

$\frac{1}{2} \times (1+4) \times 18 = A$

$45 = A$

distance = ...45m....[3]

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

1(c)

Q1	Mark scheme
(a)(i)	18 m/s
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(c)	(Without seat belt, driver:) e.g. keeps moving (forwards)/ does not stop/has inertia/has momentum (Driver) hits steering wheel/windscreen/dashboard

(c) Describe and explain a danger to a driver of not wearing a safety belt during a sudden stop.

The sudden stop caused the darvers body to lean forward. If no belt is worn, darver can crash is forehead on the stearing.

[2]

[Total: 9]

Select page

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

1(c)

Q1	Mark scheme
(a)(i)	18 m/s
(a)(ii)	(0.90 s is) the driver's time to react
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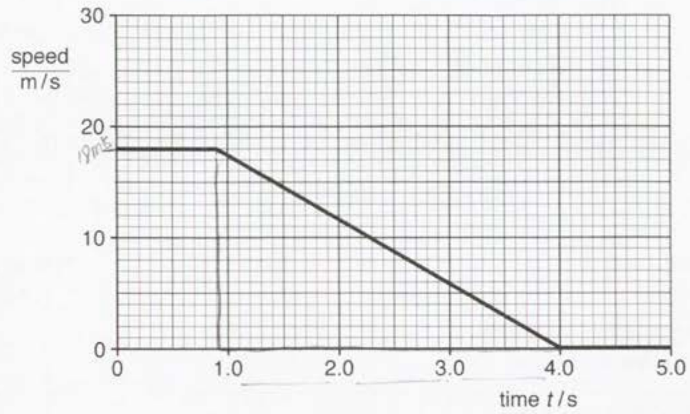

Fig. 1.1

(a) The order to stop is given at time $t = 0$ s.

(i) State the speed of the car at $t = 0$ s.

speed = 18 m/s ...[1]

(ii) Suggest why the car continues to travel at this speed for 0.9 s.

The car travels at the constant speed.

...[1]

(b) Calculate

(i) the deceleration of the car between $t = 0.9$ s and $t = 4.0$ s,

$$\text{deceleration} = \frac{(v-u)}{t} = \frac{20}{-3.1} = -6.45$$

$$= \frac{20-0}{0.9-4.0}$$

deceleration = −6.45 ...[2]

(ii) the total distance travelled by the car from $t = 0$ s.

① $18 \times 0.9 = 16.2$

② $18 \times 3.1 = 55.8$

$16.2 + 55.8 = 72$

distance = 72 m ...[3]

Select page

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

1(c)

Q1	Mark scheme
(a)(i)	18 m/s
(a)(ii)	(0.90 s is) the driver's time to react
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(b)(ii)	Evidence of use of: (distance =) area under graph e.g. 1/2bh (18 × 0.9) + (0.5 × 3.1 × 18) 44 m
(c)	(Without seat belt, driver:) e.g. keeps moving (forwards)/ does not stop/has inertia/has momentum (Driver) hits steering wheel/windscreen/dashboard

(c) Describe and explain a danger to a driver of not wearing a safety belt during a sudden stop.

The driver may injour himself because he is not wearing ~~a the~~ safetybelt. When the car suddenly stop, ~~the~~ driver may get a jerk or the body may come forward very rapidly and hit the stering. As the break is **[2]**

Pressed hardly so the car has to stop immediately. **[Total: 9]**

Select page

Your Mark

1(a)(i)

1(a)(ii)

1(b)(i)

1(b)(ii)

1(c)

Q1	Mark scheme
(a)(i)	18 m/s
(a)(ii)	(0.90 s is) the driver's time to react
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Paper 4 (May / June 2016), Question 2

Cambridge IGCSE™
Physics 0625

Version 2.0

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2 Fig. 2.1 shows a hammer being used to drive a nail into a piece of wood.

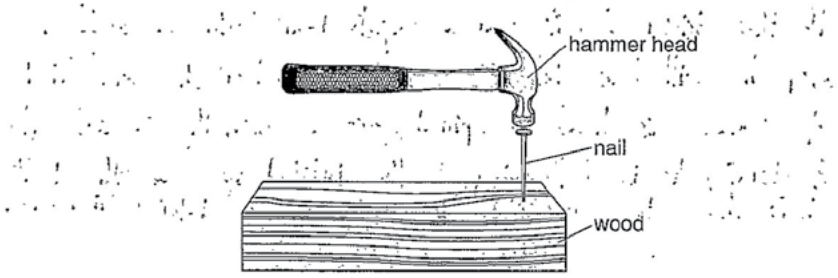

Fig. 2.1

The mass of the hammer head is 0.15 kg.
The speed of the hammer head when it hits the nail is 8.0 m/s.
The time for which the hammer head is in contact with the nail is 0.0015 s.

The hammer head stops after hitting the nail.

(a) Calculate the change in momentum of the hammer head.

mass × velocity − mass × velocity
0.15 × 8   0.15 × 0
1.2 kg m/s   0 kg m/s
1.2 − 0 = 1.2 kg m/s

change in momentum = 1.2 kg m/s ....[2]

(b) State the impulse given to the nail.

impulse = 1.2 Ns ....[1]

(c) Calculate the average force between the hammer and the nail.

$$\text{average force} = \frac{2 \times \text{mass} \times \text{speed}}{\text{time}} = \frac{2 \times 0.15 \times 8}{0.0015}$$

$$= \frac{2.4}{0.0015} = 1600\,N$$

average force = 1600 N ....[2]

[Total: 5]

Select page

Your Mark

2(a)

2(b)

2(c)

Q2	Mark scheme
(a)	mv – mu OR m(v – u) OR mv OR 0.15 × 8.0 1.2 N s or kg m/s
(b)	12 N s or kg m/s
(c)	F = (mv – mu)/t OR F = mv/t OR impulse/t OR 1.2/0.0015 800 N OR (F =) ma OR m[(v – u)/t] OR 0.15 × 8/0.0015 800 N

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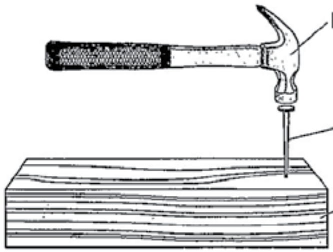

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The speed of the hammer head when it hits the nail is 8.0 m/s.
The time for which the hammer head is in contact with the nail is 0.0015 s.

The hammer head stops after hitting the nail.

(a) Calculate the change in momentum of the hammer head.

momentum = ~~0.15x~~ mass × speed
= 0.15 × 8 = 1.2 ~~Nm~~ N/s

kg m/s

change in momentum = 1.2 ~~Nm~~ kg m/s [2]

(b) State the impulse given to the nail.

impulse =

impulse = 0.0015 s [1]

(c) Calculate the average force between the hammer and the nail.

F = ma
= 0.15 × 10
= 1.5 N

average force = 1.5 N [2]

[Total: 5]

Select page

Your Mark

2(a)

2(b)

2(c)

Q2	Mark scheme
(a)	mv – mu OR m(v – u) OR mv OR 0.15 × 8.0 1.2 N s or kg m/s
(b)	12 N s or kg m/s
(c)	F = (mv – mu)/t OR F = mv/t OR impulse/t OR 1.2/0.0015 800 N OR (F =) ma OR m[(v – u)/t] OR 0.15 × 8/0.0015 800 N

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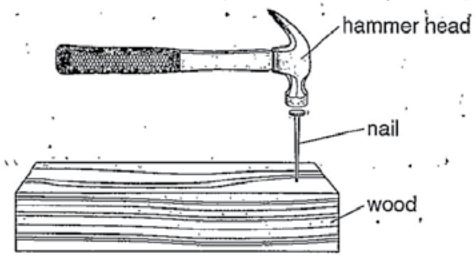

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The mass of the hammer head is 0.15 kg.
The speed of the hammer head when it hits the nail is 8.0 m/s.
The time for which the hammer head is in contact with the nail is 0.0015 s.

The hammer head stops after hitting the nail.

(a) Calculate the change in momentum of the hammer head.

Momentum = Mass x Velocity.
= 0·15 x 8·0
= 1·2

change in momentum = 1·2 .....[2]

(b) State the impulse given to the nail.

impulse = 0·0018 .....[1]

(c) Calculate the average force between the hammer and the nail.

Force = Mass x acceleration.

average force = ...[2]

[Total: 5]

Select page

Your Mark

2(a)

2(b)

2(c)

Q2	Mark scheme
(a)	mv – mu OR m(v – u) OR mv OR 0.15 × 8.0 1.2 N s or kg m/s
(b)	12 N s or kg m/s
(c)	F = (mv – mu)/t OR F = mv/t OR impulse/t OR 1.2/0.0015 800 N OR (F =) ma OR m[(v – u)/t] OR 0.15 × 8/0.0015 800 N

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Paper 4 (May / June 2016), Question 3

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3 **(a)** **(i)** On Fig. 3.1, draw a graph of extension against load for a spring which obeys Hooke's law. [1]

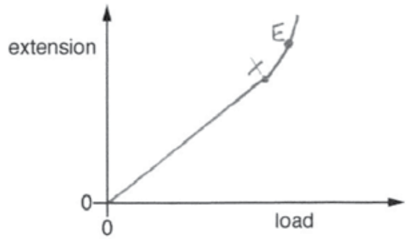

Fig. 3.1

(ii) State the word used to describe the energy stored in a spring that has been stretched or compressed.

Strain ~~elas~~ ~~elas~~ energy or elastic potential energy [1]

(b) Fig. 3.2 shows a model train, travelling at speed *v*, approaching a buffer.

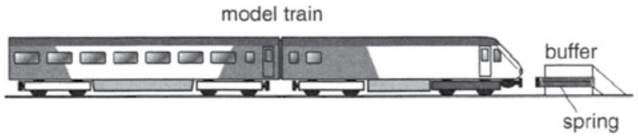

Fig. 3.2

The train, of mass 2.5 kg, is stopped by compressing a spring in the buffer. After the train has stopped, the energy stored in the spring is 0.48 J.

Calculate the initial speed *v* of the train.

$KE = \frac{1}{2} \times m \times v^2$

$0.48 = \frac{1}{2} \times 2.5 \times v^2$

$v^2 = 0.384$

$v = \sqrt{0.384}$

$v = 0.62$ m/s

v = 0.62 m/s [4]

[Total: 6]

Select page

Your Mark

3(a)(i)

3(a)(ii)

3(b)

Q3	Mark scheme
(a)(i)	Straight line through origin
(a)(ii)	Strain (energy) OR elastic (energy)
(b)	Use of $1/2mv^2$ $0.5 \times 2.5 \times v^2 = 0.48$ $v2 = 0.48/(0.5 \times 2.5)$ OR $v2 = 0.384$ $v = 0.62$ m/s

3 (a) (i) On Fig. 3.1, draw a graph of extension against load for a spring which obeys Hooke's law. [1]

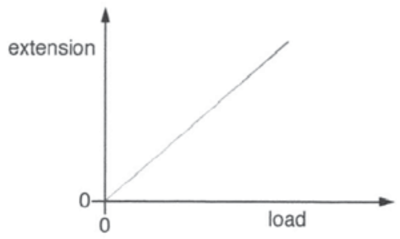

Fig. 3.1

(ii) State the word used to describe the energy stored in a spring that has been stretched or compressed.

Static energy ....[1]

(b) Fig. 3.2 shows a model train, travelling at speed v, approaching a buffer.

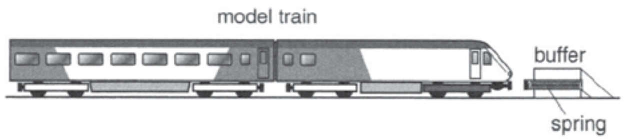

Fig. 3.2

The train, of mass 2.5 kg, is stopped by compressing a spring in the buffer. After the train has stopped, the energy stored in the spring is 0.48 J.

Calculate the initial speed v of the train.

Mass: m = 2.5 kg   Energy stored in spring = 0.48 J

Potential energy = Kinetic energy

$0.48 = \frac{1}{2} mv^2$

$0.48 = \frac{1}{2} \times 0.48 \times v^2$

$0.96 = 0.48 \times v^2$

$\frac{0.96}{0.48} = v^2$

$v^2 = 2$

$v = \sqrt{2}$

v = 1.4 m/s

v = ...1.4 m/s.................................[4]

[Total: 6]

Select page

Your Mark

3(a)(i)

3(a)(ii)

3(b)

Q3	Mark scheme
(a)(i)	Straight line through origin
(a)(ii)	Strain (energy) OR elastic (energy)
(b)	Use of $1/2mv^2$ $0.5 \times 2.5 \times v^2 = 0.48$ v2 = 0.48/(0.5 × 2.5) OR v2 = 0.384 v = 0.62 m/s

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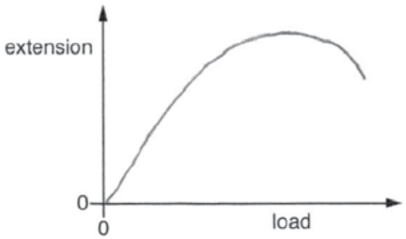

Fig. 3.1

(ii) State the word used to describe the energy stored in a spring that has been stretched or compressed.

Elastic energy ....[1]

(b) Fig. 3.2 shows a model train, travelling at speed *v*, approaching a buffer.

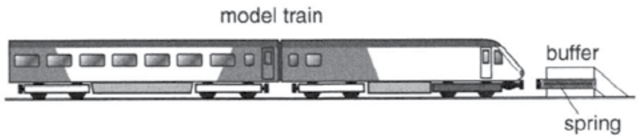

Fig. 3.2

The train, of mass 2.5 kg, is stopped by compressing a spring in the buffer. After the train has stopped, the energy stored in the spring is 0.48 J.

Calculate the initial speed *v* of the train.

$= \frac{1}{2} m v^2$

$= \frac{1}{2}\ 2.5 \times 0.48^2$

$= 0.288$

v = 0.288 ....[4]

[Total: 6]

Select page

Your Mark

3(a)(i)

3(a)(ii)

3(b)

Q3	Mark scheme
(a)(i)	Straight line through origin
(a)(ii)	Strain (energy) OR elastic (energy)
(b)	Use of $1/2mv^2$ $0.5 \times 2.5 \times v^2 = 0.48$ $v2 = 0.48/(0.5 \times 2.5)$ OR $v2 = 0.384$ v = 0.62 m/s

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Paper 4 (May / June 2016), Question 4

Cambridge IGCSE™ Physics 0625

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4 **(a)** The source of solar energy is the Sun.

Tick the box next to those resources for which the Sun is also the source of energy.

- [x] coal
- [ ] geothermal
- [x] hydroelectric
- [ ] nuclear
- [x] wind

[2]

(b) Fig. 4.1 shows a solar water-heating panel on the roof of a house.

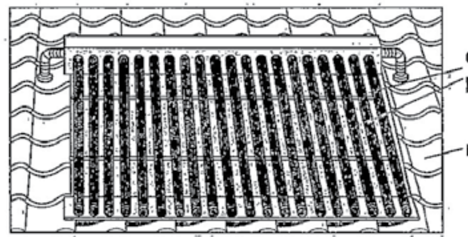

Fig. 4.1

Cold water flows into the copper tubes, which are heated by solar radiation. Hot water flows out of the tubes and is stored in a tank.

(i) Explain why the tubes are made of copper and are painted black.

The tubes are made of copper because copper is a good conductor of heat, so it will be heated easily. It is painted black because black objects are good absorbers of heat. [2]

(ii) In 5.0 s, 0.019 kg of water flows through the tubes. The temperature of the water increases from 20 °C to 72 °C. The specific heat capacity of water is 4200 J/(kg °C).

Calculate the thermal energy gained by the water in 5.0 s.

energy = $mc\Delta T$

energy = $0.019 \times 4200 \times (72° - 20°)$

$= 79.8 \times 52$

$= 4149.6$ J

thermal energy = 4149.6 J [3]

Select page

HIGH MIDDLE LOW

Your Mark

4(a)

4(b)(i)

4(b)(ii)

4(b)(iii)

Q4	Mark scheme
(a)	Coal, hydroelectric and wind boxes ticked
(b)(i)	Copper is a good conductor of thermal energy/heat Black surface is a good/the best absorber <u>of radiation/ infra-red</u>
(b)(ii)	(Temp rise =) 72 – 20 = 52 (°C) (Q =) $mc\Delta\theta$ OR $0.019 \times 4200 \times 52$ 4100 J
(b)(iii)	Efficiency = (power) output/(power) input (× 100) OR $\dfrac{\left(\dfrac{4100}{5}\right)\times 100}{\text{power input}}$ OR $\dfrac{(4100\times 100)}{\text{power input}}$ OR rearranged Power input = 1200W

EXAMINER COMMENTS

MARK SCHEME

(iii) The efficiency of the solar panel is 70%.

Calculate the power of the solar radiation incident on the panel.

~~100~~ 70% → 4149.6
100% → $\frac{4149.6}{70} \times 100 = 5928$

power = 5928 W [2]

[Total: 9]

Select page

HIGH MIDDLE LOW

Your Mark

4(a)

4(b)(i)

4(b)(ii)

4(b)(iii)

Q4	Mark scheme
(a)	Coal, hydroelectric and wind boxes ticked
(b)(i)	Copper is a good conductor of thermal energy/heat Black surface is a good/the best absorber <u>of radiation/ infra-red</u>
(b)(ii)	(Temp rise =) 72 – 20 = 52 (°C) (Q =) $mc\Delta\theta$ OR 0.019 × 4200 × 52 4100 J
(b)(iii)	Efficiency = (power) output/(power) input (× 100) OR $\frac{\left(\frac{4100}{5}\right)\times 100}{\text{power input}}$ OR $\frac{(4100\times 100)}{\text{power input}}$ OR rearranged Power input = 1200W

EXAMINER COMMENTS

MARK SCHEME

Select page

HIGH MIDDLE LOW

4 **(a)** The source of solar energy is the Sun.

Tick the box next to those resources for which the Sun is also the source of energy.

- [ ] coal
- [ ] geothermal
- [x] hydroelectric
- [ ] nuclear
- [x] wind [2]

(b) Fig. 4.1 shows a solar water-heating panel on the roof of a house.

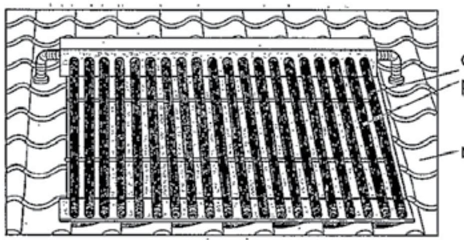

Fig. 4.1

Cold water flows into the copper tubes, which are heated by solar radiation. Hot water flows out of the tubes and is stored in a tank.

(i) Explain why the tubes are made of copper and are painted black.

• Copper tubes conduct heat and can easily pass heat to the water flowing.
• Black painted tube [2]

(ii) In 5.0 s, 0.019 kg of water flows through the tubes. The temperature of the water increases from 20 °C to 72 °C. The specific heat capacity of water is 4200 J/(kg °C).

Calculate the thermal energy gained by the water in 5.0 s.

$H = mc\Delta t$

$H = 0.019 \times 4200 \times 52 = 4149.6 \times 5 = 20748$

thermal energy = 20748 J [3]

Your Mark

4(a)

4(b)(i)

4(b)(ii)

4(b)(iii)

Q4	Mark scheme
(a)	Coal, hydroelectric and wind boxes ticked
(b)(i)	Copper is a good conductor of thermal energy/heat Black surface is a good/the best absorber of radiation/ infra-red
(b)(ii)	(Temp rise =) 72 – 20 = 52 (°C) (Q =) $mc\Delta\theta$ OR 0.019 × 4200 × 52 4100 J
(b)(iii)	Efficiency = (power) output/(power) input (× 100) OR $\dfrac{\left(\dfrac{4100}{5}\right)\times 100}{\text{power input}}$ OR $\dfrac{(4100\times 100)}{\text{power input}}$ OR rearranged Power input = 1200W

EXAMINER COMMENTS

MARK SCHEME

(iii) The efficiency of the solar panel is 70%.

Calculate the power of the solar radiation incident on the panel.

$\frac{4149.6 \times 100}{1 \times 70} = 5928$

power = 5928 W/s [2]

[Total: 9]

Select page

HIGH MIDDLE LOW

Your Mark

4(a)

4(b)(i)

4(b)(ii)

4(b)(iii)

Q4	Mark scheme
(a)	Coal, hydroelectric and wind boxes ticked
(b)(i)	Copper is a good conductor of thermal energy/heat Black surface is a good/the best absorber <u>of radiation/ infra-red</u>
(b)(ii)	(Temp rise =) 72 – 20 = 52 (°C) (Q =) $mc\Delta\theta$ OR 0.019 × 4200 × 52 4100 J
(b)(iii)	Efficiency = (power) output/(power) input (× 100) OR $\frac{\left(\frac{4100}{5}\right) \times 100}{\text{power input}}$ OR $\frac{(4100 \times 100)}{\text{power input}}$ OR rearranged Power input = 1200W

EXAMINER COMMENTS

MARK SCHEME

Select page

HIGH | MIDDLE | LOW

4 **(a)** The source of solar energy is the Sun.

Tick the box next to those resources for which the Sun is also the source of energy.

- [ ] coal
- [x] geothermal
- [ ] hydroelectric
- [x] nuclear
- [ ] wind

[2]

(b) Fig. 4.1 shows a solar water-heating panel on the roof of a house.

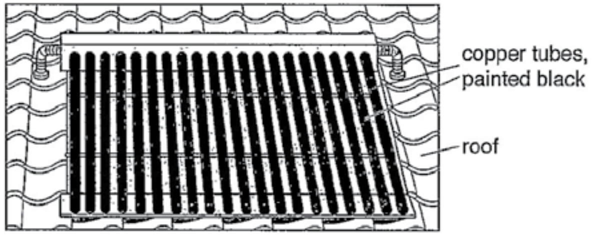

Fig. 4.1

Cold water flows into the copper tubes, which are heated by solar radiation. Hot water flows out of the tubes and is stored in a tank.

(i) Explain why the tubes are made of copper and are painted black.

Copper is a good conductor of heat and colour black is a good absorber of heat.

[2]

(ii) In 5.0 s, 0.019 kg of water flows through the tubes. The temperature of the water increases from 20 °C to 72 °C. The specific heat capacity of water is 4200 J/(kg °C).

Calculate the thermal energy gained by the water in 5.0 s.

$Q = m \times \Delta\theta \times c$

$Q = 0.019 \times 52 \times 4200\ J/kg°C$

$= 4149.6\ J \times 5 = 20748\ J$

thermal energy = ~~4149.6 J~~ 20748 J [3]

Your Mark

4(a)

4(b)(i)

4(b)(ii)

4(b)(iii)

Q4	Mark scheme
(a)	Coal, hydroelectric and wind boxes ticked
(b)(i)	Copper is a good conductor of thermal energy/heat Black surface is a good/the best absorber <u>of radiation/ infra-red</u>
(b)(ii)	(Temp rise =) 72 – 20 = 52 (°C) (Q =) mc$\Delta\theta$ OR 0.019 × 4200 × 52 4100 J
(b)(iii)	Efficiency = (power) output/(power) input (× 100) OR $\dfrac{\left(\dfrac{4100}{5}\right)\times 100}{\text{power input}}$ OR $\dfrac{(4100\times 100)}{\text{power input}}$ OR rearranged Power input = 1200W

EXAMINER COMMENTS

MARK SCHEME

(iii) The efficiency of the solar panel is 70%.

Calculate the power of the solar radiation incident on the panel.

$\frac{x}{4149.6} \times 100 = 70 \quad : \quad 2904.72J$

power = 2905.72 J ...[2]

[Total: 9]

Select page

HIGH | MIDDLE | LOW

Your Mark

4(a)

4(b)(i)

4(b)(ii)

4(b)(iii)

Q4	Mark scheme
(a)	Coal, hydroelectric and wind boxes ticked
(b)(i)	Copper is a good conductor of thermal energy/heat Black surface is a good/the best absorber of radiation/ infra-red
(b)(ii)	(Temp rise =) 72 – 20 = 52 (°C) (Q =) $mc\Delta\theta$ OR 0.019 × 4200 × 52 4100 J
(b)(iii)	Efficiency = (power) output/(power) input (× 100) OR $\frac{\left(\frac{4100}{5}\right)\times 100}{\text{power input}}$ OR $\frac{(4100\times 100)}{\text{power input}}$ OR rearranged Power input = 1200W

EXAMINER COMMENTS

MARK SCHEME

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Paper 4 (May / June 2016), Question 5

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5 (a) A student carries out an experiment to find the relationship between the pressure p and the volume V of a fixed mass of gas. The table contains four of her sets of measurements.

p/kPa	250	500	750	1000
V/cm^3	30.0	15.2	9.8	7.6

(i) Use the data in the table to suggest the relationship between the pressure and the volume in this experiment. Explain how you reach your conclusion.

as the ~~presn~~ pressure ~~decreases~~ increases the volume ~~increases~~ decreases. therefore therefore pressure is inversly propotional to volume

....[2]

(ii) State the property of the gas, apart from the mass, that remains constant during the experiment.

temperature ....[1]

(b) A lake is 5.0 m deep. The density of the water is 1000 kg/m^3.

(i) Calculate the pressure at the bottom of the lake due to this depth of water.

$P = \rho g h$

$P = 1000 \times 10 \times 5 = 50000$

pressure = 50000 Pa ....[2]

(ii) A bubble of gas escapes from the mud at the bottom of the lake and rises to the surface.

Place one tick in each row of the table to indicate what happens to the volume, the mass and the density of the gas in the bubble. Assume that no gas or water vapour enters or leaves the bubble.

	increases	stays the same	decreases
volume of bubble	✓		
mass of gas in bubble		✓	
density of gas in bubble	✓		

[2]

[Total: 7]

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

Q5	Mark scheme
(a)(i)	P × V values are 7500 or about 7500 OR If P/pressure doubles, V/volume halves OR vice versa (so) PV = constant OR P α 1/V OR either in words
(a)(ii)	temperature
(b)(i)	P = hdg OR 5.0 × 10 × 1000 50 000 Pa or 50 kPa
(b)(ii)	Volume of bubble increases Mass of gas stays the same Density of gas decreases

Select page

5 **(a)** A student carries out an experiment to find the relationship between the pressure *p* and the volume *V* of a fixed mass of gas. The table contains four of her sets of measurements.

p/kPa	250	500	750	1000
V/cm^3	30.0	15.2	9.8	7.6

(i) Use the data in the table to suggest the relationship between the pressure and the volume in this experiment. Explain how you reach your conclusion.

Pressure is inversly propostional to volume. This is because ~~the~~ when the volume decreases the pressure increases.

[2]

(ii) State the property of the gas, apart from the mass, that remains constant during the experiment.

Energy [1]

(b) A lake is 5.0 m deep. The density of the water is 1000 kg/m^3.

(i) Calculate the pressure at the bottom of the lake due to this depth of water.

$p = \rho g h$

$= 1000 \times 10 \times 5$

$= 50{,}000$

pressure = 50,000 Pa [2]

(ii) A bubble of gas escapes from the mud at the bottom of the lake and rises to the surface.

Place one tick in each row of the table to indicate what happens to the volume, the mass and the density of the gas in the bubble. Assume that no gas or water vapour enters or leaves the bubble.

	increases	stays the same	decreases
volume of bubble	✓		
mass of gas in bubble			✓
density of gas in bubble			✓

[2]

[Total: 7]

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

Q5	Mark scheme
(a)(i)	P × V values are 7500 or about 7500 OR If P/pressure doubles, V/volume halves OR vice versa (so) PV = constant OR P α 1/V OR either in words
(a)(ii)	temperature
(b)(i)	P = hdg OR 5.0 × 10 × 1000 50 000 Pa or 50 kPa
(b)(ii)	Volume of bubble <u>increases</u> Mass of gas <u>stays the same</u> Density of gas <u>decreases</u>

$P = \frac{m=}{volume}$

8

5 (a) A student carries out an experiment to find the relationship between the pressure *p* and the volume *V* of a fixed mass of gas. The table contains four of her sets of measurements.

P p/kPa	250	500	750	1000
∝ V/cm^3	30.0	15.2	9.8	7.6

(i) Use the data in the table to suggest the relationship between the pressure and the volume in this experiment. Explain how you reach your conclusion.

Pressure is inversely proportion to Volume

As Pressure increases then Volume ~~also~~ decreases.

[2]

mass ∝ volume

shape volume.

(ii) State the property of the gas, apart from the mass, that remains constant during the experiment.

~~Weight~~ Density [1]

(b) A lake is 5.0 m deep. The density of the water is 1000 kg/m^3.

(i) Calculate the pressure at the bottom of the lake due to this depth of water.

pressure $= \frac{5}{1000}$ 5 x 1000

5000

pressure = ~~0.005~~ [2]

Pdg

(ii) A bubble of gas escapes from the mud at the bottom of the lake and rises to the surface.

Place one tick in each row of the table to indicate what happens to the volume, the mass and the density of the gas in the bubble. Assume that no gas or water vapour enters or leaves the bubble.

	increases	stays the same	decreases
volume of bubble		✓	
mass of gas in bubble			✓
density of gas in bubble			✓

[2]

Density = mass / volume

[Total: 7]

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

Q5	Mark scheme
(a)(i)	P × V values are 7500 or about 7500 OR If P/pressure doubles, V/volume halves OR vice versa (so) PV = constant OR P α 1/V OR either in words
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(b)(i)	P = hdg OR 5.0 × 10 × 1000 50 000 Pa or 50 kPa
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6 **(a)** Fig. 6.1 represents the waveform of a sound wave. The wave is travelling at constant speed.

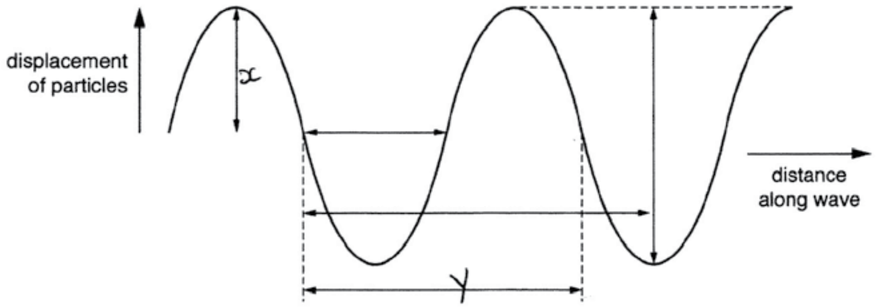

Fig. 6.1

(i) On Fig. 6.1,

1. label with the letter X the marked distance corresponding to the amplitude of the wave, [1]

2. label with the letter Y the marked distance corresponding to the wavelength of the wave. [1]

(ii) State what happens to the amplitude and the wavelength of the wave if

1. the loudness of the sound is increased at constant pitch,

amplitude ....increases..........

wavelength ....increases.......... [1]

2. the pitch of the sound is increased at constant loudness.

amplitude ....decreases..........

wavelength ....decreases.......... [1]

(b) A ship uses pulses of sound to measure the depth of the sea beneath the ship. A sound pulse is transmitted into the sea and the echo from the sea-bed is received after 54 ms. The speed of sound in seawater is 1500 m/s.

0.054 s

Calculate the depth of the sea beneath the ship.

$S = f \times \lambda$

$S = \frac{2d}{t}$ $d = 40.5$

$1500 \times 0.054 = 2d$

$\frac{81}{2} = d$

depth = ...40.5 m.......... [3]

[Total: 7]

Select page

Your Mark

6(a)(i)

6(a)(ii)

6(b)

Q6	Mark scheme
(a)(i)	1. Mark amplitude with X 2. Mark wavelength with Y
(a)(ii)	1. Amplitude increases <u>and</u> wavelength stays the same 2. Amplitude stays the same <u>and</u> wavelength decreases
(b)	v = (total) distance/time OR d/t OR 2d/t in any form d = 1500 × 0.054/2 40 m OR 41 m

6 (a) Fig. 6.1 represents the waveform of a sound wave. The wave is travelling at constant speed.

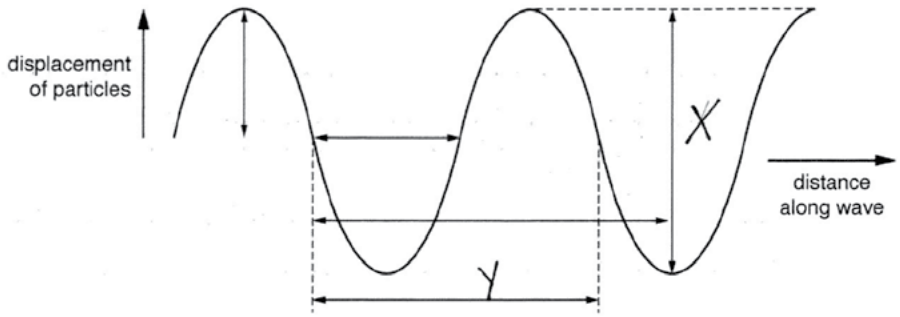

Fig. 6.1

(i) On Fig. 6.1,

1. label with the letter X the marked distance corresponding to the amplitude of the wave, [1]

2. label with the letter Y the marked distance corresponding to the wavelength of the wave. [1]

(ii) State what happens to the amplitude and the wavelength of the wave if

1. the loudness of the sound is increased at constant pitch,

amplitude .... becomes larger ....

wavelength .... becomes shorter .... [1]

2. the pitch of the sound is increased at constant loudness.

amplitude .... Stays the same ....

wavelength .... becomes Shorter .... [1]

(b) A ship uses pulses of sound to measure the depth of the sea beneath the ship. A sound pulse is transmitted into the sea and the echo from the sea-bed is received after 54 ms. The speed of sound in seawater is 1500 m/s.

Calculate the depth of the sea beneath the ship.

$v = \frac{2d}{t}$

$\Rightarrow 1500 = \frac{2 \times d}{54}$

$\Rightarrow 81{,}000 = 2d$

$\Rightarrow 40{,}500 = d$

depth = ... 40,500 m .... [3]

[Total: 7]

Select page

Your Mark

6(a)(i)

6(a)(ii)

6(b)

Q6	Mark scheme
(a)(i)	1. Mark amplitude with X 2. Mark wavelength with Y
(a)(ii)	1. Amplitude increases <u>and</u> wavelength stays the same 2. Amplitude stays the same <u>and</u> wavelength decreases
(b)	v = (total) distance/time OR d/t OR 2d/t in any form d = 1500 × 0.054/2 40 m OR 41 m

6 (a) Fig. 6.1 represents the waveform of a sound wave. The wave is travelling at constant speed.

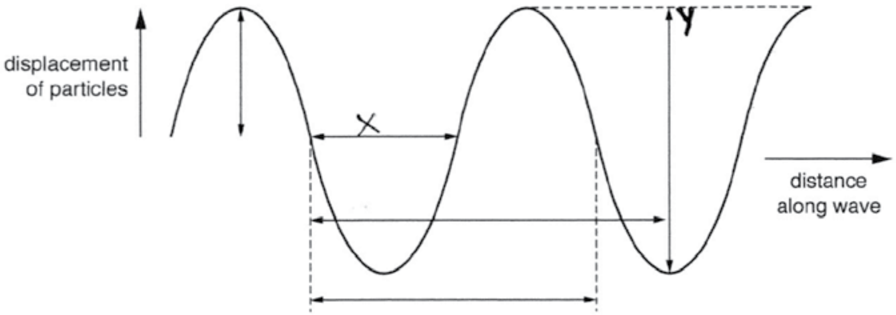

Fig. 6.1

(i) On Fig. 6.1,

1. label with the letter X the marked distance corresponding to the amplitude of the wave, [1]

2. label with the letter Y the marked distance corresponding to the wavelength of the wave. [1]

(ii) State what happens to the amplitude and the wavelength of the wave if

1. the loudness of the sound is increased at constant pitch,

amplitude ..... Stays the Same .....

wavelength ..... increase ..... [1]

2. the pitch of the sound is increased at constant loudness.

amplitude ..... ~~it~~ decrease .....

wavelength ..... St increase ..... [1]

(b) A ship uses pulses of sound to measure the depth of the sea beneath the ship. A sound pulse is transmitted into the sea and the echo from the sea-bed is received after 54 ms. The speed of sound in seawater is 1500 m/s.

Calculate the depth of the sea beneath the ship.

$S = \frac{D}{t}$

$\frac{54}{60} = 0.93333\ S$

$= 1500 = \frac{D}{\cancel{0.54}\ 0.93}$

$D = 1500 \times 0.93$

$= \frac{1395m}{2}$

$= D = 697.5m$

depth = ... 697.5 m ..... [3]

[Total: 7]

Select page

Your Mark

6(a)(i)

6(a)(ii)

6(b)

Q6	Mark scheme
(a)(i)	1. Mark amplitude with X 2. Mark wavelength with Y
(a)(ii)	1. Amplitude increases <u>and</u> wavelength stays the same 2. Amplitude stays the same <u>and</u> wavelength decreases
(b)	v = (total) distance/time OR d/t OR 2d/t in any form d = 1500 × 0.054/2 40 m OR 41 m

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7 (a) Explain what is meant by

(i) *total internal reflection,*

All of the light is reflected inside the glass prism/block without any (continue below) refraction of light [1]

(ii) *critical angle.*

The angle at which the refracted ray is perpendicular to the normal and (continue below) parallel to the surface of the block [1]

(b) Fig. 7.1 shows a ray of light, travelling in air, incident on a glass prism.

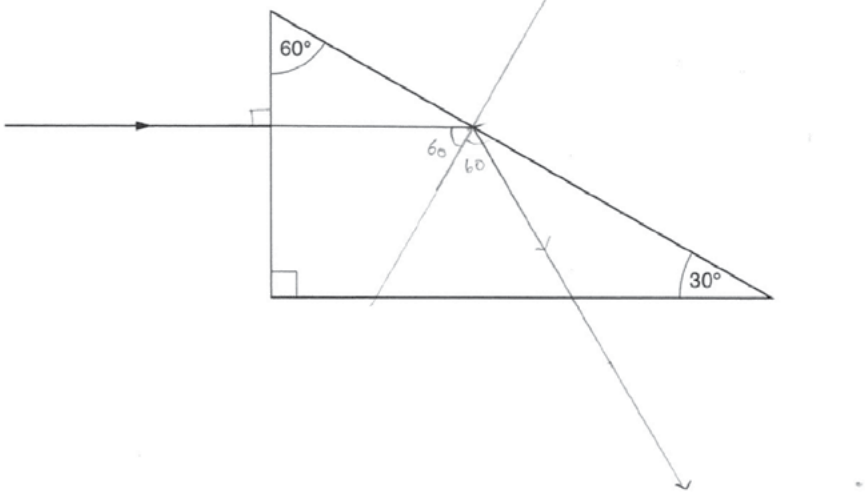

Fig. 7.1

(i) The speed of light in air is 3.0×10^8 m/s. Its speed in the glass is 2.0×10^8 m/s.

Calculate the refractive index of the glass.

$$\text{refractive index} = \frac{\text{speed of light in air}}{\text{speed of light in object}}$$

$$= \frac{3 \times 10^8}{2 \times 10^8} = 1.5$$

refractive index = 1.5 [2]

	Your Mark
7(a)(i)	
7(a)(ii)	
7(b)(i)	
7(b)(ii)	
7(b)(iii)	

Q7	Mark scheme
(a)(i)	Reflection in a more dense material where there is no refracted ray owtte OR All light in a more dense material is reflected owtte
(a)(ii)	e.g. The greatest angle of incidence (in the material) at which refraction occurs OR The angle of incidence (in the material) at which the refracted ray travels along the boundary/angle of refraction is 90° OR The angle of incidence/(in the material) above which total internal reflection occurs
(b)(i)	(refractive index =) speed of light in air/speed of light in glass OR $3.0 \times 10^8/2.0 \times 10^8$ = 1.5
(b)(ii)	sin c = 1/n OR 1/1.5 seen (c = 42°)
(b)(iii)	No change of direction at first face Total internal reflection at hypotenuse with i = r by eye Refraction with r greater than i at lower face

(ii) Show that the critical angle for the glass-air boundary is 42°.

Refractive index $= \frac{1}{\sin C}$ | $C = \sin^{-1}\left(\frac{1}{1.5}\right)$

$1.5 = \frac{1}{\sin C}$ | $= 41.8$

$\sin C = \frac{1}{1.5}$ | $= 42°$

[1]

(iii) On Fig. 7.1, draw carefully, without calculation, the continuation of the ray through the prism and into the air. [3]

[Total: 8]

Select page

Your Mark

7(a)(i)

7(a)(ii)

7(b)(i)

7(b)(ii)

7(b)(iii)

Q7	Mark scheme
(a)(i)	Reflection in a more dense material where there is no refracted ray owtte OR All light in a more dense material is reflected owtte
(a)(ii)	e.g. The greatest angle of incidence (in the material) at which refraction occurs OR The angle of incidence (in the material) at which the refracted ray travels along the boundary/angle of refraction is 90° OR The angle of incidence/(in the material) above which total internal reflection occurs
(b)(i)	(refractive index =) speed of light in air/speed of light in glass OR $3.0 \times 10^8/2.0 \times 10^8$ = 1.5
(b)(ii)	sin c = 1/n OR 1/1.5 seen (c = 42°)
(b)(iii)	No change of direction at first face Total internal reflection at hypotenuse with i = r by eye Refraction with r greater than i at lower face

7 **(a)** Explain what is meant by

(i) *total internal reflection,*

~~when angle~~ Angle of incident more than critical angle. ....[1]

(ii) *critical angle.*

~~Refraction~~ Angle of refraction equal to 90°. ....[1]

(b) Fig. 7.1 shows a ray of light, travelling in air, incident on a glass prism.

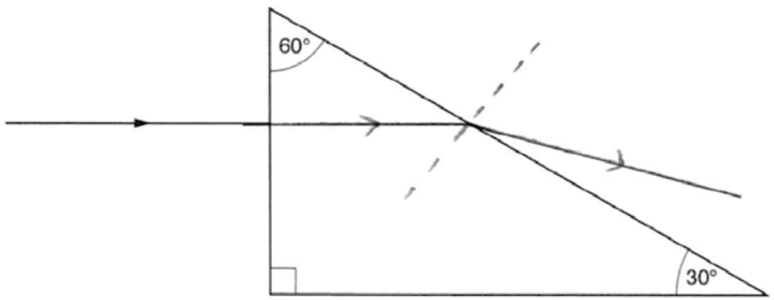

Fig. 7.1

(i) The speed of light in air is 3.0×10^8 m/s. Its speed in the glass is 2.0×10^8 m/s.

Calculate the refractive index of the glass.

$n = \frac{3 \times 10^8}{2 \times 10^8}$

$= 1.5$

refractive index = ...1.5........[2]

Select page

Your Mark

7(a)(i) ☐

7(a)(ii) ☐

7(b)(i) ☐

7(b)(ii) ☐

7(b)(iii) ☐

Q7	Mark scheme
(a)(i)	Reflection in a more dense material where there is no refracted ray owtte OR All light in a more dense material is reflected owtte
(a)(ii)	e.g. The greatest angle of incidence (in the material) at which refraction occurs OR The angle of incidence (in the material) at which the refracted ray travels along the boundary/angle of refraction is 90° OR The angle of incidence/(in the material) above which total internal reflection occurs
(b)(i)	(refractive index =) speed of light in air/speed of light in glass OR $3.0 \times 10^8/2.0 \times 10^8$ = 1.5
(b)(ii)	sin c = 1/n OR 1/1.5 seen (c = 42°)
(b)(iii)	No change of direction at first face Total internal reflection at hypotenuse with i = r by eye Refraction with r greater than i at lower face

(ii) Show that the critical angle for the glass-air boundary is 42°.

Sin c = $\frac{1}{1.5}$

c = 41.8

c = 42°.

[1]

(iii) On Fig. 7.1, draw carefully, without calculation, the continuation of the ray through the prism and into the air. [3]

[Total: 8]

Select page

Your Mark

7(a)(i)

7(a)(ii)

7(b)(i)

7(b)(ii)

7(b)(iii)

Q7	Mark scheme
(a)(i)	Reflection in a more dense material where there is no refracted ray owtte OR All light in a more dense material is reflected owtte
(a)(ii)	e.g. The greatest angle of incidence (in the material) at which refraction occurs OR The angle of incidence (in the material) at which the refracted ray travels along the boundary/angle of refraction is 90° OR The angle of incidence/(in the material) above which total internal reflection occurs
(b)(i)	(refractive index =) speed of light in air/speed of light in glass OR $3.0 \times 10^8/2.0 \times 10^8$ = 1.5
(b)(ii)	sin c = 1/n OR 1/1.5 seen (c = 42°)
(b)(iii)	No change of direction at first face Total internal reflection at hypotenuse with i = r by eye Refraction with r greater than i at lower face

7 **(a)** Explain what is meant by

(i) *total internal reflection,*

When the incident ray from a denser medium reflects back into the medium itself [1]

(ii) *critical angle.*

When the incident ray travels exactly below the surface of the medium [1]

(b) Fig. 7.1 shows a ray of light, travelling in air, incident on a glass prism.

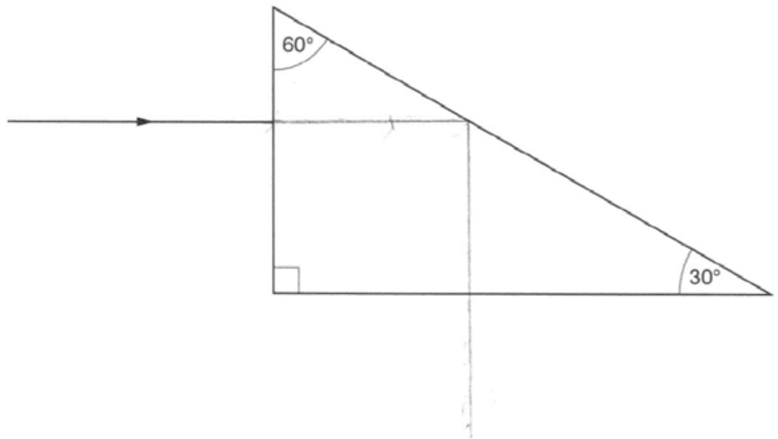

Fig. 7.1

(i) The speed of light in air is 3.0×10^8 m/s. Its speed in the glass is 2.0×10^8 m/s.

Calculate the refractive index of the glass.

$n_1 \sin i = n_2 \sin R$

refractive index = $\frac{3}{2}$ [2]

Select page

Your Mark

7(a)(i)

7(a)(ii)

7(b)(i)

7(b)(ii)

7(b)(iii)

Q7	Mark scheme
(a)(i)	Reflection in a more dense material where there is no refracted ray owtte OR All light in a more dense material is reflected owtte
(a)(ii)	e.g. The greatest angle of incidence (in the material) at which refraction occurs OR The angle of incidence (in the material) at which the refracted ray travels along the boundary/angle of refraction is 90° OR The angle of incidence/(in the material) above which total internal reflection occurs
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(ii) Show that the critical angle for the glass-air boundary is 42°.

[1]

(iii) On Fig. 7.1, draw carefully, without calculation, the continuation of the ray through the prism and into the air. [3]

[Total: 8]

Select page

Your Mark

7(a)(i)

7(a)(ii)

7(b)(i)

7(b)(ii)

7(b)(iii)

Q7	Mark scheme
(a)(i)	Reflection in a more dense material where there is no refracted ray owtte OR All light in a more dense material is reflected owtte
(a)(ii)	e.g. The greatest angle of incidence (in the material) at which refraction occurs OR The angle of incidence (in the material) at which the refracted ray travels along the boundary/angle of refraction is 90° OR The angle of incidence/(in the material) above which total internal reflection occurs
(b)(i)	(refractive index =) speed of light in air/speed of light in glass OR $3.0 \times 10^8/2.0 \times 10^8$ = 1.5
(b)(ii)	sin c = 1/n OR 1/1.5 seen (c = 42°)
(b)(iii)	No change of direction at first face Total internal reflection at hypotenuse with i = r by eye Refraction with r greater than i at lower face

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Paper 4 (May / June 2016), Question 8

Cambridge IGCSE™ Physics 0625

Version 2.0

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8 (a) Fig. 8.1 shows 3 lamps and a fuse connected to a power supply.

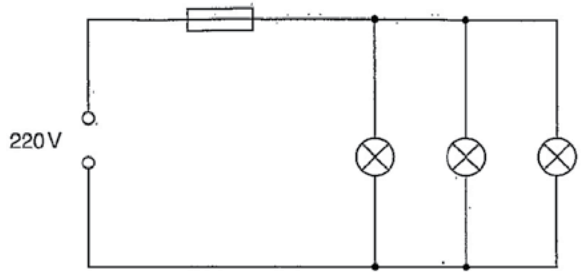

Fig. 8.1

The e.m.f. of the supply is 220V. Each lamp is labelled 220V, 40W. The rating of the fuse is 2.0 A.

Calculate

(i) the current in each lamp,

Current = Power / Voltage

$I = \frac{P}{V}$

$= \frac{40}{220}$

$= 0.18$

current = 0.18A [2]

(ii) the current in the fuse,

Total current in circuit: ~~$\frac{120}{220}$~~

~~= 0.55A~~

Fuse current = ~~total - lamps~~

~~= 0.55 - (3×0.18)~~

~~= 0.55 - 0.54~~

~~= 0.01~~

current = ~~0.01A~~ 2A [1]

(iii) the total number of lamps, all in parallel, that could be connected without blowing the fuse.

Total number of lamps = Current in fuse / current of lamp

$= \frac{2}{0.18} = 11.11$

number = 11 [2]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)(i)

8(b)(ii)

8(b)(iii)

Q8	Mark scheme
(a)(i)	P = IV OR 40 = 220 × I OR (I =) P/V OR 40/220 0.18 A
(a)(ii)	[3 × 0.18(2)] = 0.54 A OR 0.55 A
(a)(iii)	2/0.182 = 10.99 OR 2/0.18 = 11.1 10 lamps OR 11 lamps
(b)(i)	resistance increases
(b)(ii)	Power (of lamp) decreases P = IV and current in lamp decreases. OR P = V^2/R

(b) After a very long period of use, the wire filament of one of the lamps becomes thinner.

(i) Underline the effect of this change on the resistance of the filament.

resistance increases   resistance remains the same   resistance decreases   [1]

(ii) State and explain the effect of this change on the power of the lamp.

The power of the lamp would decrease. This is due to decrease in current. The current is decreased due to the increase in resistance. [2]

[Total: 8]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)(i)

8(b)(ii)

8(b)(iii)

Q8	Mark scheme
(a)(i)	P = IV OR 40 = 220 × I OR (I =) P/V OR 40/220 0.18 A
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Select page

8 (a) Fig. 8.1 shows 3 lamps and a fuse connected to a power supply.

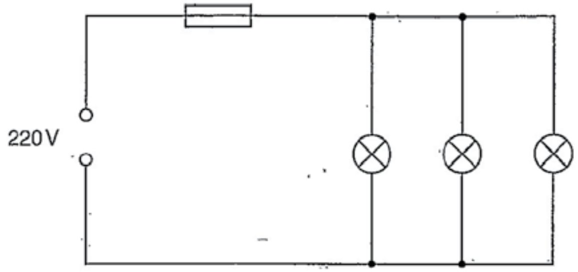

Fig. 8.1

The e.m.f. of the supply is 220 V. Each lamp is labelled 220 V, 40 W. The rating of the fuse is 2.0 A.

Calculate

(i) the current in each lamp,

$P = VI.$

$\frac{P}{V} = I.$

$\frac{40}{220} = 0.18$

current = ...0.18 A....[2]

(ii) the current in the fuse,

$I = \frac{P}{V}$

$I = \frac{440.}{40} = 11$

current = ...11 A....[1]

(iii) the total number of lamps, all in parallel, that could be connected without blowing the fuse.

number = ...61....[2]

Your Mark

8(a)(i)

8(a)(ii)

8(b)(i)

8(b)(ii)

8(b)(iii)

Q8	Mark scheme
(a)(i)	P = IV OR 40 = 220 × I OR (I =) P/V OR 40/220 0.18 A
(a)(ii)	[3 × 0.18(2)] = 0.54 A OR 0.55 A
(a)(iii)	2/0.182 = 10.99 OR 2/0.18 = 11.1 10 lamps OR 11 lamps
(b)(i)	resistance <u>increases</u>
(b)(ii)	Power (of lamp) decreases P = IV and current in lamp decreases. OR P = V^2/R

(b) After a very long period of use, the wire filament of one of the lamps becomes thinner.

(i) Underline the effect of this change on the resistance of the filament.

resistance increases   resistance remains the same   resistance decreases [1]

(ii) State and explain the effect of this change on the power of the lamp.

$P = \frac{V^2}{R}$. This formula determines that resistance is inversely proportional to power so therefore if power P is doubled than ~~R~~ ciso Resistance is halved. [2]

[Total: 8]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)(i)

8(b)(ii)

8(b)(iii)

Q8	Mark scheme
(a)(i)	P = IV OR 40 = 220 × I OR (I =) P/V OR 40/220 0.18 A
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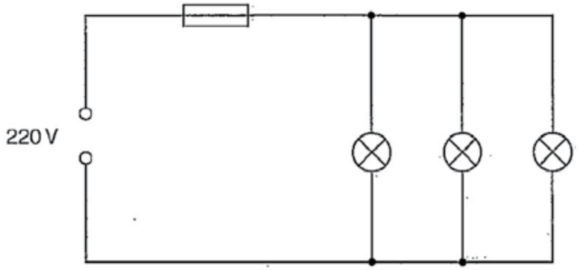

Fig. 8.1

The e.m.f. of the supply is 220 V. Each lamp is labelled 220 V, 40 W. The rating of the fuse is 2.0 A.

Calculate

(i) the current in each lamp,

$P = IV$

$40 = I \times 220$

$\therefore \frac{220}{40} = 5.5$

current = ...5.5.......... [2]

(ii) the current in the fuse,

2.79

current = ...110.......... [1]

(iii) the total number of lamps, all in parallel, that could be connected without blowing the fuse.

number = ...2.......... [2]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)(i)

8(b)(ii)

8(b)(iii)

Q8	Mark scheme
(a)(i)	$P = IV$ OR $40 = 220 \times I$ OR $(I =)$ P/V OR 40/220 0.18 A
(a)(ii)	[3 × 0.18(2)] = 0.54 A OR 0.55 A
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(b) After a very long period of use, the wire filament of one of the lamps becomes thinner.

(i) Underline the effect of this change on the resistance of the filament.

<u>resistance increases</u>   resistance remains the same   resistance decreases   [1]

(ii) State and explain the effect of this change on the power of the lamp.

The resistence increases ~~tot~~ so the

power of the lamp will decrease.

....[2]

[Total: 8]

Select page

Your Mark

8(a)(i)

8(a)(ii)

8(b)(i)

8(b)(ii)

8(b)(iii)

Q8	Mark scheme
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Paper 4 (May / June 2016), Question 9

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9 (a) (i) State what is meant by the *direction* of an electric field.

~~The direction of the force which arises from a charged particle. The direction of field lines which arise from a positive pos charged particle.~~ The direction of force experienced between two charged particles. [1]

(ii) Fig. 9.1 shows a pair of oppositely-charged horizontal metal plates with the top plate positive.

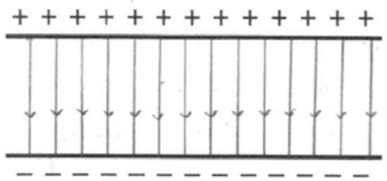

Fig. 9.1

The electric field between the plates in Fig. 9.1 is uniform.

Draw lines on Fig. 9.1 to represent this uniform field. Add arrows to these lines to show the direction of the field. [3]

(b) Fig. 9.2 shows a very small negatively-charged oil drop in the air between a pair of oppositely charged horizontal metal plates. The oil drop does not move up or down.

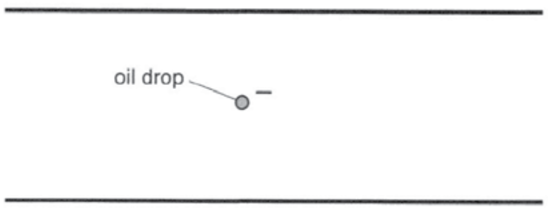

Fig. 9.2

(i) Suggest, in terms of forces, why the oil drop does not move up or down.

The net force acting on the drop is zero. The resultant ~~force is~~ moment is zero. The force due to gravity is equall to the force created by the electric field. [2]

(ii) Without losing any of its charge, the oil drop begins to evaporate.

State and explain what happens to the oil drop.

The most energitic molecules ~~eas~~ escape from the surface of the drop, this cools down the drop and the mass of drop ~~decreases~~ decreases. [2]

[Total: 8]

Select page

Your Mark

9(a)(i)

9(a)(ii)

9(b)(i)

9(b)(ii)

Q9	Mark scheme
(a)(i)	direction of the force on a positive charge
(a)(ii)	Straight parallel lines from upper to lower plate At least 3 lines drawn. All lines drawn equally spaced, approximately symmetrical with respect to plates Arrows downwards
(b)(i)	Upward force (on drop) due to electric field/charge on plates = weight of drop Upward force on drop = downward force on drop OR no resultant/net force on drop OR forces are balanced
(b)(ii)	Drop moves upwards Weight/mass of drop decreases OR downward force decreases OR Upward force (due to electric field) > weight of drop

9 (a) (i) State what is meant by the *direction* of an electric field.

The flow of current from positive to negative terminals. [1]

(ii) Fig. 9.1 shows a pair of oppositely-charged horizontal metal plates with the top plate positive.

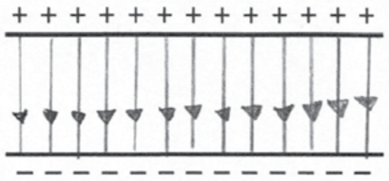

Fig. 9.1

The electric field between the plates in Fig. 9.1 is uniform.

Draw lines on Fig. 9.1 to represent this uniform field. Add arrows to these lines to show the direction of the field. [3]

(b) Fig. 9.2 shows a very small negatively-charged oil drop in the air between a pair of oppositely charged horizontal metal plates. The oil drop does not move up or down.

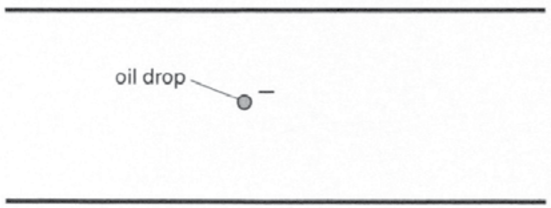

Fig. 9.2

(i) Suggest, in terms of forces, why the oil drop does not move up or down.

As it is not affected by the forces of the plates. They are not very strong. [2]

(ii) Without losing any of its charge, the oil drop begins to evaporate.

State and explain what happens to the oil drop.

It moves towards the positively charged plate. [2]

[Total: 8]

Select page

Your Mark

9(a)(i)

9(a)(ii)

9(b)(i)

9(b)(ii)

Q9	Mark scheme
(a)(i)	direction of the force on a positive charge
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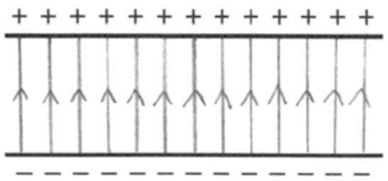
9 (a) (i) State what is meant by the *direction* of an electric field.

From negative to positive

[1]

(ii) Fig. 9.1 shows a pair of oppositely-charged horizontal metal plates with the top plate positive.



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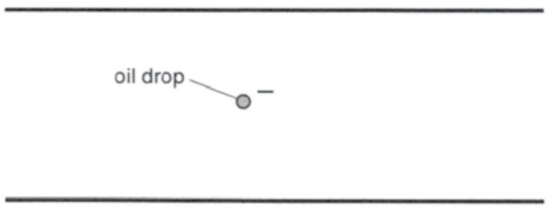

Fig. 9.2

(i) Suggest, in terms of forces, why the oil drop does not move up or down.

Because both the plates are negatively charged

[2]

(ii) Without losing any of its charge, the oil drop begins to evaporate.

State and explain what happens to the oil drop.

The size of the drop reduces because its molecules escape

[2]

[Total: 8]

Select page

Your Mark

9(a)(i)

9(a)(ii)

9(b)(i)

9(b)(ii)

Q9	Mark scheme
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Paper 4 (May / June 2016), Question 10

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10 (a) An iodine isotope $^{131}_{53}I$ decays by β-emission to an isotope of xenon (Xe).

(i) State the number of each type of particle in a neutral atom of $^{131}_{53}I$.

protons ......53......... neutrons ......78......... electrons ......53......... [2]

(ii) State the symbol, in nuclide notation, for the xenon nucleus.

$^{131}_{54}Xe$ ....[2]

(b) The background count rate of radioactivity in a laboratory is 30 counts/min.

A radioactive sample has a half-life of 50 minutes. The sample is placed at a fixed distance from a detector. The detector measures an initial count rate from the sample, including background, of 310 counts/min.

On Fig. 10.1, plot suitable points and draw a graph of the count rate from the sample, **corrected for background**, as it changes with time.

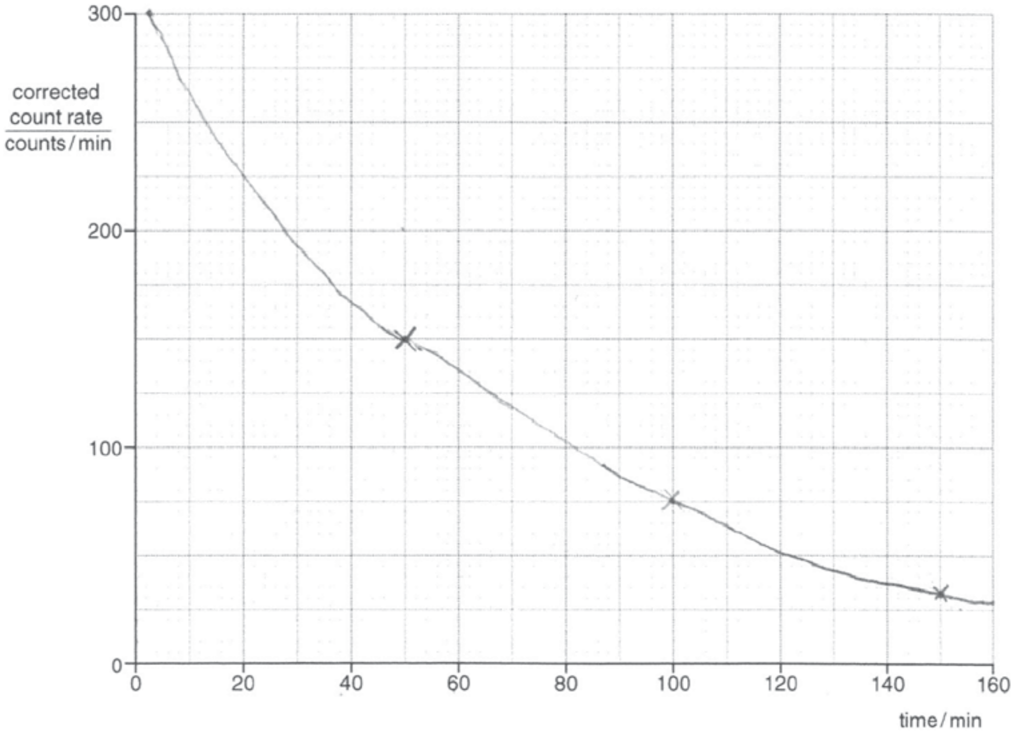

Fig. 10.1

[3]

[Total: 7]

Select page

Your Mark

10(a)(i)

10(a)(ii)

10(b)

Q10	Mark scheme
(a)(i)	Protons: 53 neutrons: 78 electrons: 53
(a)(ii)	$^{131}_{54}Xe$
(b)	Points plotted at 3 of: 0 s, 50 s, 100 s, 150 s 3 corrected counts/minute plotted at any from: • (0, 280) • (50, 140) • (100, 70) • (150, 35) Graph drawn as curve through correct points

10 (a) An iodine isotope $^{131}_{53}\mathrm{I}$ decays by β-emission to an isotope of xenon (Xe).

(i) State the number of each type of particle in a neutral atom of $^{131}_{53}\mathrm{I}$.

protons ......53......... neutrons ......78............ electrons ......~~78~~ 53....... [2]

(ii) State the symbol, in nuclide notation, for the xenon nucleus.

.... $^{131}_{53}\mathrm{Xe}$ .... [2]

(b) The background count rate of radioactivity in a laboratory is 30 counts/min.

A radioactive sample has a half-life of 50 minutes. The sample is placed at a fixed distance from a detector. The detector measures an initial count rate from the sample, including background, of 310 counts/min.

On Fig. 10.1, plot suitable points and draw a graph of the count rate from the sample, **corrected for background**, as it changes with time.

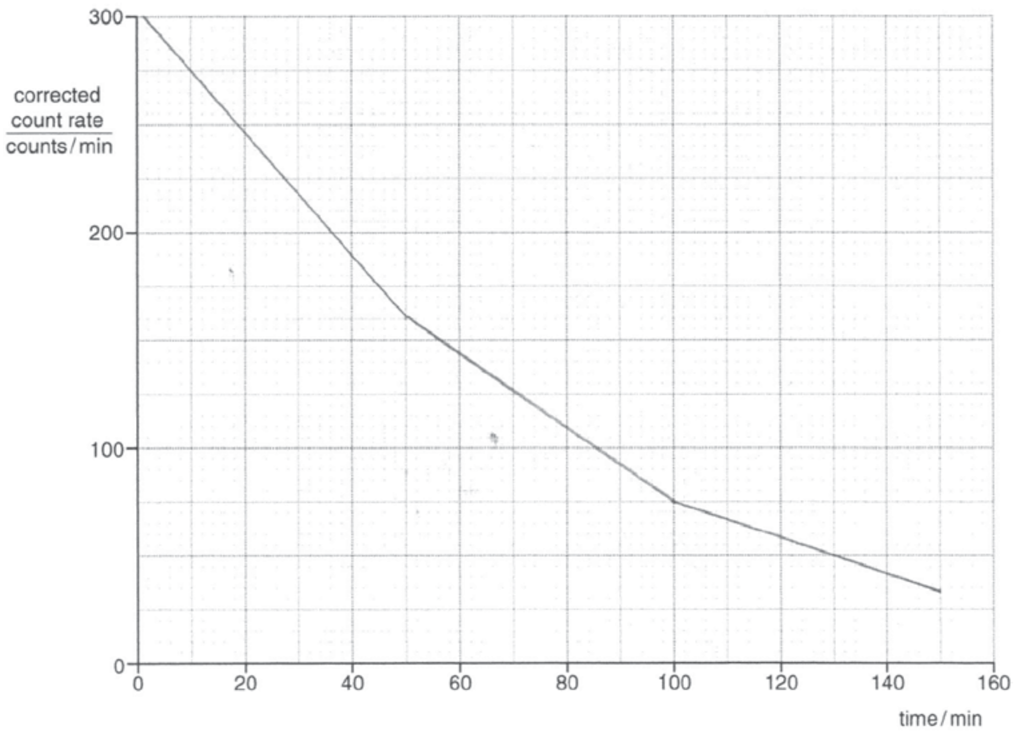

Fig. 10.1

[3]

[Total: 7]

Select page

Your Mark

10(a)(i)

10(a)(ii)

10(b)

Q10	Mark scheme
(a)(i)	Protons: 53 neutrons: 78 electrons: 53
(a)(ii)	$^{131}_{54}\mathrm{Xe}$
(b)	Points plotted at 3 of: 0 s, 50 s, 100 s, 150 s 3 corrected counts/minute plotted at any from: • (0, 280) • (50, 140) • (100, 70) • (150, 35) Graph drawn as curve through correct points

Select page

10 **(a)** An iodine isotope $^{131}_{53}I$ decays by β-emission to an isotope of xenon (Xe).

(i) State the number of each type of particle in a neutral atom of $^{131}_{53}I$.

protons ......~~78~~ 53.... neutrons ....78.......... electrons ....52.......... [2]

(ii) State the symbol, in nuclide notation, for the xenon nucleus.

......$^{131}_{52}Xe$..[2]

(b) The background count rate of radioactivity in a laboratory is 30 counts/min.

A radioactive sample has a half-life of 50 minutes. The sample is placed at a fixed distance from a detector. The detector measures an initial count rate from the sample, including background, of 310 counts/min.

On Fig. 10.1, plot suitable points and draw a graph of the count rate from the sample, **corrected for background**, as it changes with time.

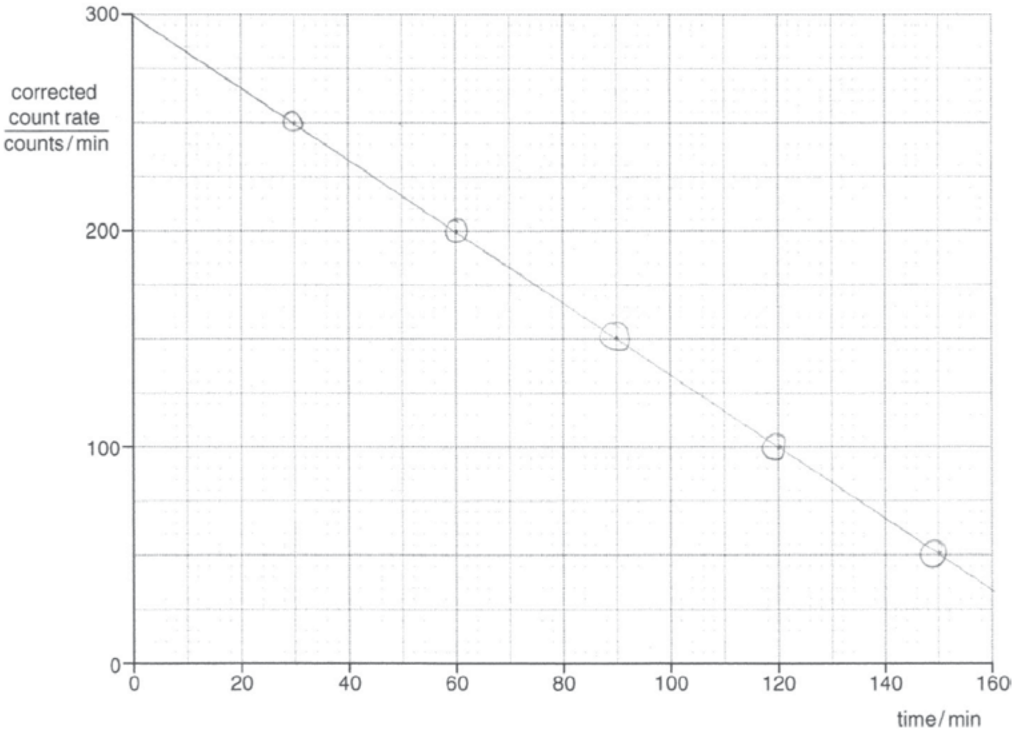

Fig. 10.1

[3]

[Total: 7]

Your Mark

10(a)(i)

10(a)(ii)

10(b)

Q10	Mark scheme
(a)(i)	Protons: 53 neutrons: 78 electrons: 53
(a)(ii)	$^{131}_{54}Xe$
(b)	Points plotted at 3 of: 0 s, 50 s, 100 s, 150 s 3 corrected counts/minute plotted at any from: • (0, 280) • (50, 140) • (100, 70) • (150, 35) Graph drawn as curve through correct points

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Interactive

Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 11

Cambridge IGCSE™
Physics 0625

Cambridge Pathway

Version 2.0

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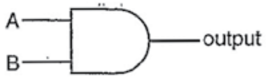
11 (a) (i) Fig. 11.1 shows the symbol for a logic gate and its truth table.

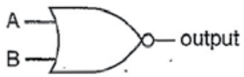


input A	input B	output
0	0	0
1	0	0
0	1	0
1	1	1

Fig. 11.1

State the name of this logic gate. ....AND Gate..........[1]

(ii) Complete the truth table for the logic gate shown in Fig. 11.2.



input A	input B	output
0	0	1
1	0	0
0	1	0
1	1	0

Fig. 11.2

[2]

(b) Fig. 11.3 shows the system of logic gates used to ensure the security of the strongroom of a bank.

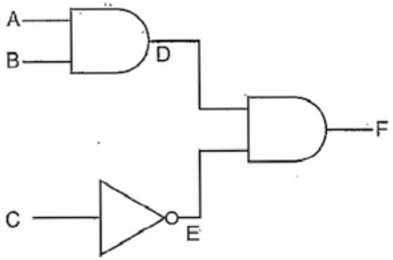


Fig. 11.3

The strongroom door will only open when the output F is logic 1.

Complete the table to show the logic states at A, B, C, D and E when the strongroom door can be opened.

input A	input B	input C	output D	output E	output F
1	1	1	1	1	1

[3]

[Total: 6]

Select page

Your Mark

11(a)(i)

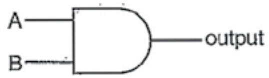
11(a)(ii)

11(b)

Q11	Mark scheme
(a)(i)	AND (gate)
(a)(ii)	001 100 010 110
(b)	

A	B	C	D	E	F
1	1	0	1	1	1

11 (a) (i) Fig. 11.1 shows the symbol for a logic gate and its truth table.

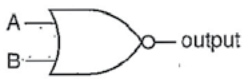


input A	input B	output
0	0	0
1	0	0
0	1	0
1	1	1

Fig. 11.1

State the name of this logic gate. ....AND........[1]

(ii) Complete the truth table for the logic gate shown in Fig. 11.2.



input A	input B	output
0	0	0
1	0	1
0	1	1
1	1	1

Fig. 11.2

[2]

(b) Fig. 11.3 shows the system of logic gates used to ensure the security of the strongroom of a bank.

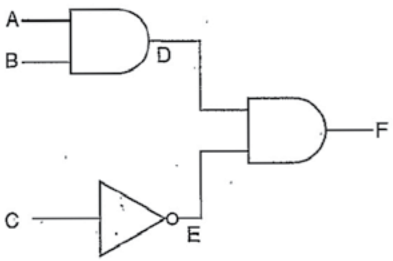


Fig. 11.3

The strongroom door will only open when the output F is logic 1.

Complete the table to show the logic states at A, B, C, D and E when the strongroom door can be opened.

input A	input B	input C	output D	output E	output F
1	1	1	1	1	1

[3]

[Total: 6]

Select page

Your Mark

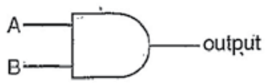
11(a)(i)

11(a)(ii)

11(b)

Q11	Mark scheme
(a)(i)	AND (gate)
(a)(ii)	001 100 010 110
(b)	A B C D E F 1 1 0 1 1 1

11 (a) (i) Fig. 11.1 shows the symbol for a logic gate and its truth table.

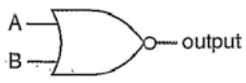


input A	input B	output
0	0	0
1	0	0
0	1	0
1	1	1

Fig. 11.1

State the name of this logic gate. ....AND..........[1]

(ii) Complete the truth table for the logic gate shown in Fig. 11.2.



input A	input B	output
0	0	1
1	0	1
0	1	1
1	1	0

Fig. 11.2

[2]

(b) Fig. 11.3 shows the system of logic gates used to ensure the security of the strongroom of a bank.

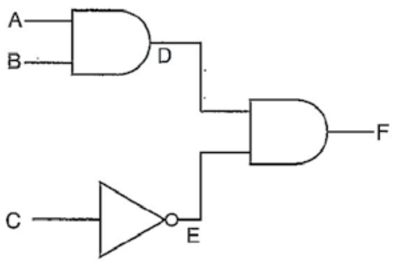


Fig. 11.3

The strongroom door will only open when the output F is logic 1.

Complete the table to show the logic states at A, B, C, D and E when the strongroom door can be opened.

input A	input B	input C	output D	output E	output F
1	1	1	0	0	1

[3]

[Total: 6]

Select page

Your Mark

11(a)(i)

11(a)(ii)

11(b)

Q11	Mark scheme
(a)(i)	AND (gate)
(a)(ii)	001 100 010 110
(b)	A B C D E F 1 1 0 1 1 1

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Paper 5 (May / June 2016), Question 1

Cambridge IGCSE™ Physics 0625

Version 2.0

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1 In this experiment, you will use a pendulum to determine a value for the acceleration of free fall g.

Carry out the following instructions, referring to Figs. 1.1 and 1.2.

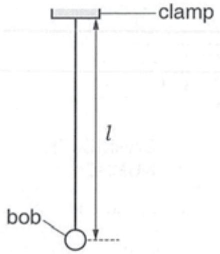

Fig. 1.1

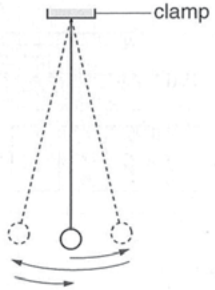

Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

(a) Adjust the pendulum until its length l = 50.0 cm. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

Place the meter rule vertically along the pendulum and horizontally level eye with the 50 cm mark and 0cm mark when measuring length of L. [1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time t for 20 complete oscillations.

t = 28.3 s [1]

(ii) Calculate the period T of the pendulum. The period is the time for one complete oscillation.

$\frac{28.3}{20} = 1.415$

$= 1.42s$

T = 1.42 s [2]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(b)(iii)

1(c)(i)

1(c)(ii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	t = 27.8 – 29.0 (s)
(b)(ii)	T correct Unit s
(b)(iii)	More likely to miscount/pendulum may stop swinging
(c)(i)	Correct calculation and unit s^2
(c)(ii)	g between 9 and 11 from correct T and working 2 or 3 significant figures
(d)(i)	Explanation of cause of inaccuracy in measurement of t or l. e.g. student did not react quickly enough when starting/stopping stopwatch OR difficulty in measuring accurately to centre of bob
(d)(ii)	Any two from: Use different length(s) Repeat timing Use of a fiducial mark Increased number of oscillations Plot a graph using length and time or time^2

(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

The number of oscillation may be too large and the speed may change after a while thus the result may not be accurate for T. [1]

(c) (i) Calculate T^2.

T^2 = 2.0164 s² [1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

$\frac{4\pi^2 \times 50}{2.0164} = 978.93\ldots$

$= 979$ ~~cm~~ m/s²

$= 9.79$ m/s²

g = 9.79 m/s² [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s².

(i) Suggest a practical reason why the result obtained from the experiment may be different.

Because we cannot exactly start and stop the timer during the oscillation period because of humans have a reaction rate of 0.04s. [1]

(ii) Suggest two improvements to the experiment.

1. ....

2. .... [2]

[Total: 11]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(b)(iii)

1(c)(i)

1(c)(ii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	t = 27.8 – 29.0 (s)
(b)(ii)	T correct Unit s
(b)(iii)	More likely to miscount/pendulum may stop swinging
(c)(i)	Correct calculation and unit s²
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1 In this experiment, you will use a pendulum to determine a value for the acceleration of free fall g.

Carry out the following instructions, referring to Figs. 1.1 and 1.2.

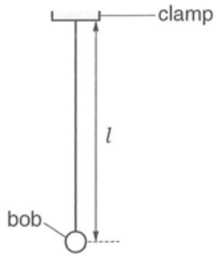

Fig. 1.1

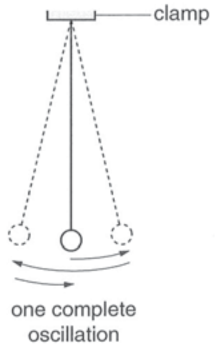

Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

(a) Adjust the pendulum until its length l = 50.0 cm. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

View the ruler at right angles

.... [1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time t for 20 complete oscillations.

t = ~~15~~ 28 seconds [1]

(ii) Calculate the period T of the pendulum. The period is the time for one complete oscillation.

$\cancel{\frac{26}{15}} = \cancel{1.333...}$

$\frac{28}{20} = 1.4$

T = ~~1.33~~ 1.4 seconds [2]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(b)(iii)

1(c)(i)

1(c)(ii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	t = 27.8 – 29.0 (s)
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(c)(i)	Correct calculation and unit s^2
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(d)(i)	Explanation of cause of inaccuracy in measurement of t or l. e.g. student did not react quickly enough when starting/stopping stopwatch OR difficulty in measuring accurately to centre of bob
(d)(ii)	Any two from: Use different length(s) Repeat timing Use of a fiducial mark Increased number of oscillations Plot a graph using length and time or time^2

(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

It will take too long ~~and~~ to measure the time for 200 oscillations ....[1]

(c) (i) Calculate T^2.

1.777....

T^2 = 1.96 ~~1.78 seconds~~ ....[1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

$\frac{4 \times \pi^2 \times \cancel{50}\ 0.5}{1.78^2}$ $= \cancel{110.356}\ \cancel{44.5}$ ~~11.10386~~ ~~108.44515~~

$= 10.07$

g = 10.1 ~~1109 11.1~~ .... m/s² [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s².

(i) Suggest a practical reason why the result obtained from the experiment may be different.

There was no air resistance accounted for in my results

....[1]

(ii) Suggest two improvements to the experiment.

1. Repeat the experiment to get the average

2. Measure the length from centre of bob

[2]

[Total: 11]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(b)(iii)

1(c)(i)

1(c)(ii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	t = 27.8 – 29.0 (s)
(b)(ii)	T correct Unit s
(b)(iii)	More likely to miscount/pendulum may stop swinging
(c)(i)	Correct calculation and unit s²
(c)(ii)	g between 9 and 11 from correct T and working 2 or 3 significant figures
(d)(i)	Explanation of cause of inaccuracy in measurement of t or l. e.g. student did not react quickly enough when starting/stopping stopwatch OR difficulty in measuring accurately to centre of bob
(d)(ii)	Any two from: Use different length(s) Repeat timing Use of a fiducial mark Increased number of oscillations Plot a graph using length and time or time²

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Carry out the following instructions, referring to Figs. 1.1 and 1.2.

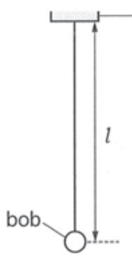

Fig. 1.1

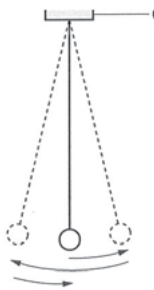

Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

(a) Adjust the pendulum until its length l = 50.0 cm. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

I used a ruler to align the middle of the bob to the rule of measurement as this would avoid error. [1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time t for 20 complete oscillations.

t = 37.0 seconds [1]

(ii) Calculate the period T of the pendulum. The period is the time for one complete oscillation.

$\frac{37.0 \text{ s}}{20}$

T = 1.85 [2]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(b)(iii)

1(c)(i)

1(c)(ii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	t = 27.8 – 29.0 (s)
(b)(ii)	T correct Unit s
(b)(iii)	More likely to miscount/pendulum may stop swinging
(c)(i)	Correct calculation and unit s^2
(c)(ii)	g between 9 and 11 from correct T and working 2 or 3 significant figures
(d)(i)	Explanation of cause of inaccuracy in measurement of t or l. e.g. student did not react quickly enough when starting/stopping stopwatch OR difficulty in measuring accurately to centre of bob
(d)(ii)	Any two from: Use different length(s) Repeat timing Use of a fiducial mark Increased number of oscillations Plot a graph using length and time or time^2

(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

It would be more accurate as a persons time delay needs to be countered for and it is difficult to count for [1] oscillations

(c) (i) Calculate T^2.

$(1.85)^2 = 3.4225$ (3 S.F)

$T^2 =$ 3.4225 [1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

$g = \frac{4\pi^2 \times 50.0}{3.4225} = 183.584$

3 (S.F)

$= 184$

$g =$ 184 m/s² [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s².

(i) Suggest a practical reason why the result obtained from the experiment may be different.

Because the value of accelaration of freefall may differ slightly fom place to place. [1]

(ii) Suggest two improvements to the experiment.

1. To get accurate results we could have made use of a sensor which starts and end time on pendulum crossing it.

2. ~~Dn~~ More number of oscillations should be taken.

[2]

[Total: 11]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(b)(iii)

1(c)(i)

1(c)(ii)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	Either suitable use of a horizontal straight edge Or holding rule close to pendulum Or line of sight perpendicular to rule
(b)(i)	t = 27.8 – 29.0 (s)
(b)(ii)	T correct Unit s
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(c)(i)	Correct calculation and unit s^2
(c)(ii)	g between 9 and 11 from correct T and working 2 or 3 significant figures
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Interactive

Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 2

Cambridge IGCSE™ Physics 0625

Version 2.0

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Select page

2 In this experiment, you will investigate the cooling of water.

(a) • Pour 100 cm³ of the hot water provided into beaker **A**.

• Measure the temperature θ_H of the water in beaker **A**.

θ_H = 86 °C

• Pour 100 cm³ of the cold water provided into beaker **B**.

• Measure the temperature θ_C of the water in beaker **B**.

θ_C = 30 °C

• Calculate the average temperature θ_{AV} using the equation $\theta_{AV} = \frac{\theta_H + \theta_C}{2}$.

$\frac{86 + 30}{2}$

θ_{AV} = 58 °C

[3]

(b) Add the water from beaker **B** to the hot water in beaker **A**. Stir briefly.

Measure the temperature θ_M of the mixture.

θ_M = 51 °C [1]

(c) State one precaution that you took to ensure that the temperature readings are as reliable as possible.

Make sure that I take ~~feel~~ the readings from eye level to prevent parallex error [1]

Your Mark

2(a) 2(b) 2(c) 2(d)(i) 2(d)(ii) 2(d)(iii) 2(d)(iv)

Q2	Mark scheme
(a)	θ_H 60 – 100 θ_C 10 – 40 and θAV correct Unit °C
(b)	θ_M between θ_H and θ_C
(c)	Perpendicular viewing of scale OR wait until temperature stops rising OR carry out without undue delay between parts
(d)(i)	Correct diagram with lid Insulation placed round beaker
(d)(ii)	Sensible series of values with θ_M between θ_H and θ_C
(d)(iii)	Statement and justification to match results
(d)(iv)	Two from: Room temperature (or other environmental condition) Temperature of cold water Temperature of hot water Volumes of water Size/shape/material/surface area of beaker

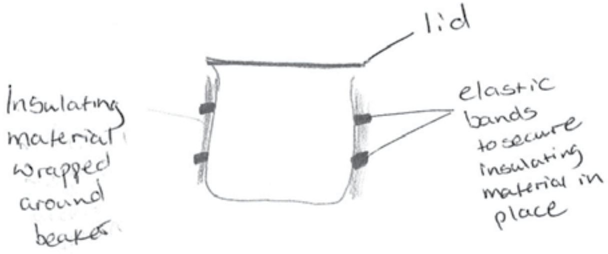
Select page

(d) Empty both beakers.

You are provided with

- a lid, with a hole for the thermometer,
- some insulating material,
- two elastic bands.

(i) In the space below, draw a labelled diagram to show how you will use these items to reduce the loss of thermal energy when the procedure is repeated.



[2]

(ii) Using the improvements shown in your diagram, repeat the procedure in parts **(a)** and **(b)**.

θ_H = ~~63°~~ 73°C

θ_C = 31°C

θ_{AV} = 52°C

θ_M = 50°C

[1]

(iii) Comment on whether the improvements made to the apparatus have significantly changed the value of the temperature θ_M. Use your results to justify your answer.

~~No~~ The value of θM has not significantly changed, because there is only a 1°C difference between both experiments [1]

(iv) Suggest two conditions that should be kept constant for all parts of this experiment.

1. The amount of water used
2. The ~~external~~ room ~~environment~~ temperature must be maintained

[2]

[Total: 11]

Your Mark

2(a)

2(b)

2(c)

2(d)(i)

2(d)(ii)

2(d)(iii)

2(d)(iv)

Q2	Mark scheme
(a)	θ_H 60 – 100 θ_C 10 – 40 and θAV correct Unit °C
(b)	θ_M between θ_H and θ_C
(c)	Perpendicular viewing of scale OR wait until temperature stops rising OR carry out without undue delay between parts
(d)(i)	Correct diagram with lid Insulation placed round beaker
(d)(ii)	Sensible series of values with θ_M between θ_H and θ_C
(d)(iii)	Statement and justification to match results
(d)(iv)	Two from: Room temperature (or other environmental condition) Temperature of cold water Temperature of hot water Volumes of water Size/shape/material/surface area of beaker

2 In this experiment, you will investigate the cooling of water.

(a) • Pour 100 cm^3 of the hot water provided into beaker **A**.

• Measure the temperature θ_H of the water in beaker **A**.

θ_H = 66 °C

• Pour 100 cm^3 of the cold water provided into beaker **B**.

• Measure the temperature θ_C of the water in beaker **B**.

θ_C = ~~33°C~~ 32 °C

• Calculate the average temperature θ_{AV} using the equation $\theta_{AV} = \frac{\theta_H + \theta_C}{2}$.

$\cancel{\frac{66+33}{2}}$ ~~≠~~

$\frac{66+32}{2} = 49$ θ_{AV} = 49 °C

[3]

(b) Add the water from beaker **B** to the hot water in beaker **A**. Stir briefly.

Measure the temperature θ_M of the mixture.

θ_M = 47 °C [1]

(c) State one precaution that you took to ensure that the temperature readings are as reliable as possible.

I tried to avoid parallex error when pouring water into the measuring cylinder [1]

X

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)(i)

2(d)(ii)

2(d)(iii)

2(d)(iv)

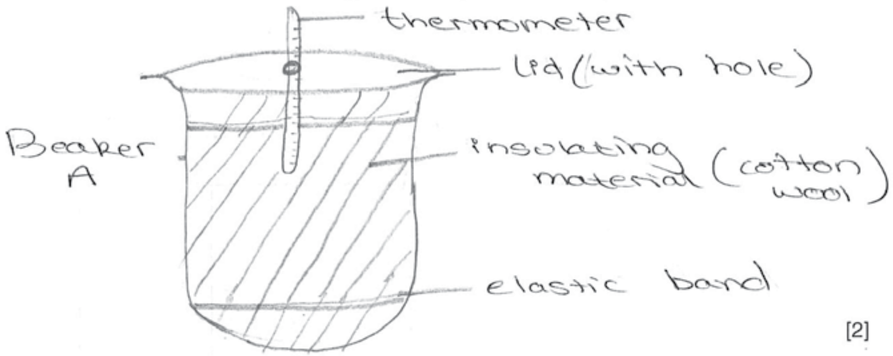
Q2	Mark scheme
(a)	θ_H 60 – 100 θ_C 10 – 40 and θAV correct Unit °C
(b)	θ_M between θ_H and θ_C
(c)	Perpendicular viewing of scale OR wait until temperature stops rising OR carry out without undue delay between parts
(d)(i)	Correct diagram with lid Insulation placed round beaker
(d)(ii)	Sensible series of values with θ_M between θ_H and θ_C
(d)(iii)	Statement and justification to match results
(d)(iv)	Two from: Room temperature (or other environmental condition) Temperature of cold water Temperature of hot water Volumes of water Size/shape/material/surface area of beaker

(d) Empty both beakers.

You are provided with

- a lid, with a hole for the thermometer,
- some insulating material,
- two elastic bands.

(i) In the space below, draw a labelled diagram to show how you will use these items to reduce the loss of thermal energy when the procedure is repeated.



[2]

(ii) Using the improvements shown in your diagram, repeat the procedure in parts **(a)** and **(b)**.

$\frac{69+33}{2} = 51$

θ_H = 69°C

θ_C = 33°C

θ_{AV} = 51°C

θ_M = 50°C

[1]

(iii) Comment on whether the improvements made to the apparatus have significantly changed the value of the temperature θ_M. Use your results to justify your answer.

Yes they have θ_M without insulation was 47°C and θ_M with insulation was 50°C. Heat loss with insulation is more.

[1]

(iv) Suggest two conditions that should be kept constant for all parts of this experiment.

1. The initial ~~tmr~~ room temperature

2. The volume of water added

[2]

[Total: 11]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)(i)

2(d)(ii)

2(d)(iii)

2(d)(iv)

Q2	Mark scheme
(a)	θ_H 60 – 100 θ_C 10 – 40 and θAV correct Unit °C
(b)	θ_M between θ_H and θ_C
(c)	Perpendicular viewing of scale OR wait until temperature stops rising OR carry out without undue delay between parts
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(d)(iii)	Statement and justification to match results
(d)(iv)	Two from: Room temperature (or other environmental condition) Temperature of cold water Temperature of hot water Volumes of water Size/shape/material/surface area of beaker

2 In this experiment, you will investigate the cooling of water.

(a) • Pour 100 cm^3 of the hot water provided into beaker **A**.

• Measure the temperature θ_H of the water in beaker **A**.

θ_H = ...78°......

• Pour 100 cm^3 of the cold water provided into beaker **B**.

• Measure the temperature θ_C of the water in beaker **B**.

θ_C = ...32°......

• Calculate the average temperature θ_{AV} using the equation $\theta_{AV} = \frac{\theta_H + \theta_C}{2}$.

$\theta_{AV} = \frac{78 + 32}{2}$

$\theta_{AV} = 55$

θ_{AV} = ...55°...... [3]

(b) Add the water from beaker **B** to the hot water in beaker **A**. Stir briefly.

Measure the temperature θ_M of the mixture.

θ_M = ...52°......[1]

(c) State one precaution that you took to ensure that the temperature readings are as reliable as possible.

keep room temperature constant. Use the same ~~of~~ volume of water for both hot and cold water ......[1]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)(i)

2(d)(ii)

2(d)(iii)

2(d)(iv)

Q2	Mark scheme
(a)	θ_H 60 – 100 θ_C 10 – 40 and θAV correct Unit °C
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(c)	Perpendicular viewing of scale OR wait until temperature stops rising OR carry out without undue delay between parts
(d)(i)	Correct diagram with lid Insulation placed round beaker
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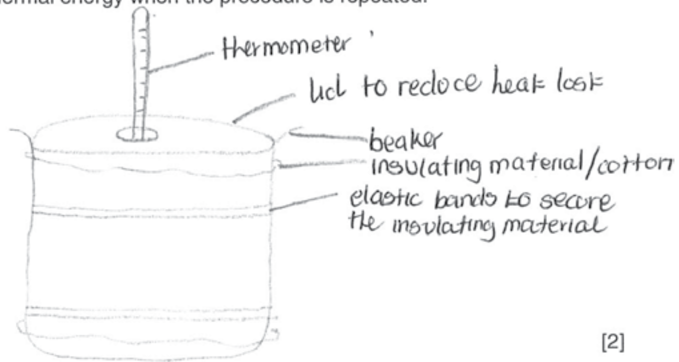
(d)(iii)	Statement and justification to match results
(d)(iv)	Two from: Room temperature (or other environmental condition) Temperature of cold water Temperature of hot water Volumes of water Size/shape/material/surface area of beaker

(d) Empty both beakers.

You are provided with

- a lid, with a hole for the thermometer,
- some insulating material,
- two elastic bands.

(i) In the space below, draw a labelled diagram to show how you will use these items to reduce the loss of thermal energy when the procedure is repeated.



[2]

(ii) Using the improvements shown in your diagram, repeat the procedure in parts **(a)** and **(b)**.

θ_H = 77°

θ_C = 32°

θ_{AV} = 54.5°

θ_M = 56°

[1]

(iii) Comment on whether the improvements made to the apparatus have significantly changed the value of the temperature θ_M. Use your results to justify your answer.

$\frac{56-52}{56} \times 100 = 7.14\%$, ~~Yes it has~~ ~~No it has~~ Yes it has changed the value, because it ~~Ht chang~~ increased by 4° from 52° to 56°

[1]

(iv) Suggest two conditions that should be kept constant for all parts of this experiment.

1. Initial temperature
2. room temperature

[2]

[Total: 11]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)(i)

2(d)(ii)

2(d)(iii)

2(d)(iv)

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Cambridge Assessment International Education

Interactive

Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 3

Cambridge IGCSE™ Physics 0625

Version 2.0

Cambridge Pathway

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3 In this experiment, you will investigate refraction using a transparent block.

Carry out the following instructions, using the separate ray-trace sheet provided. You may refer to Fig. 3.1 for guidance.

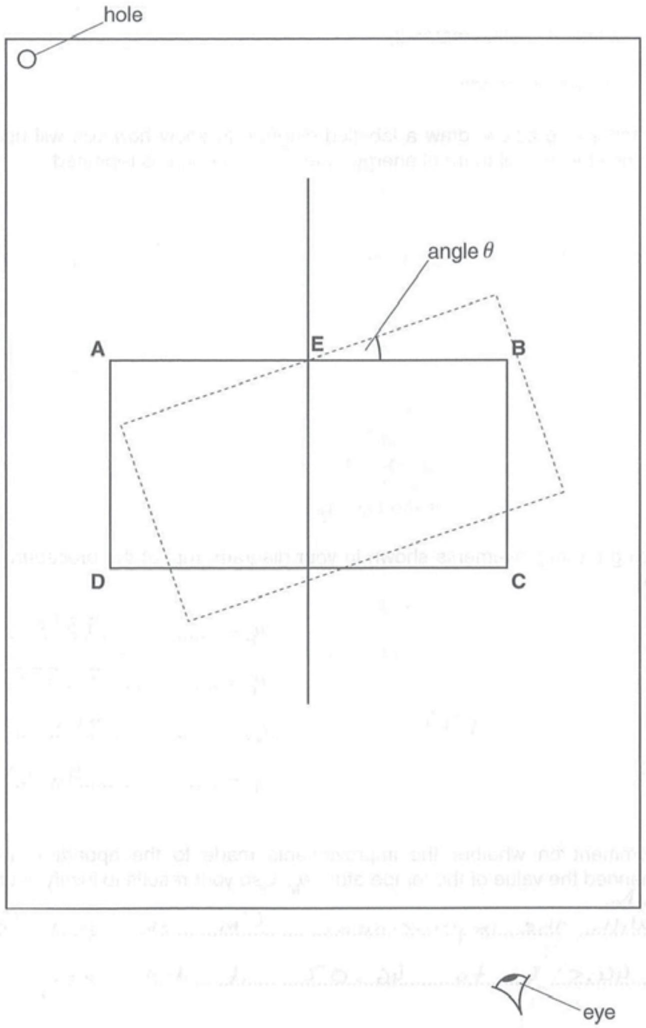


Fig. 3.1

Select page

Your Mark

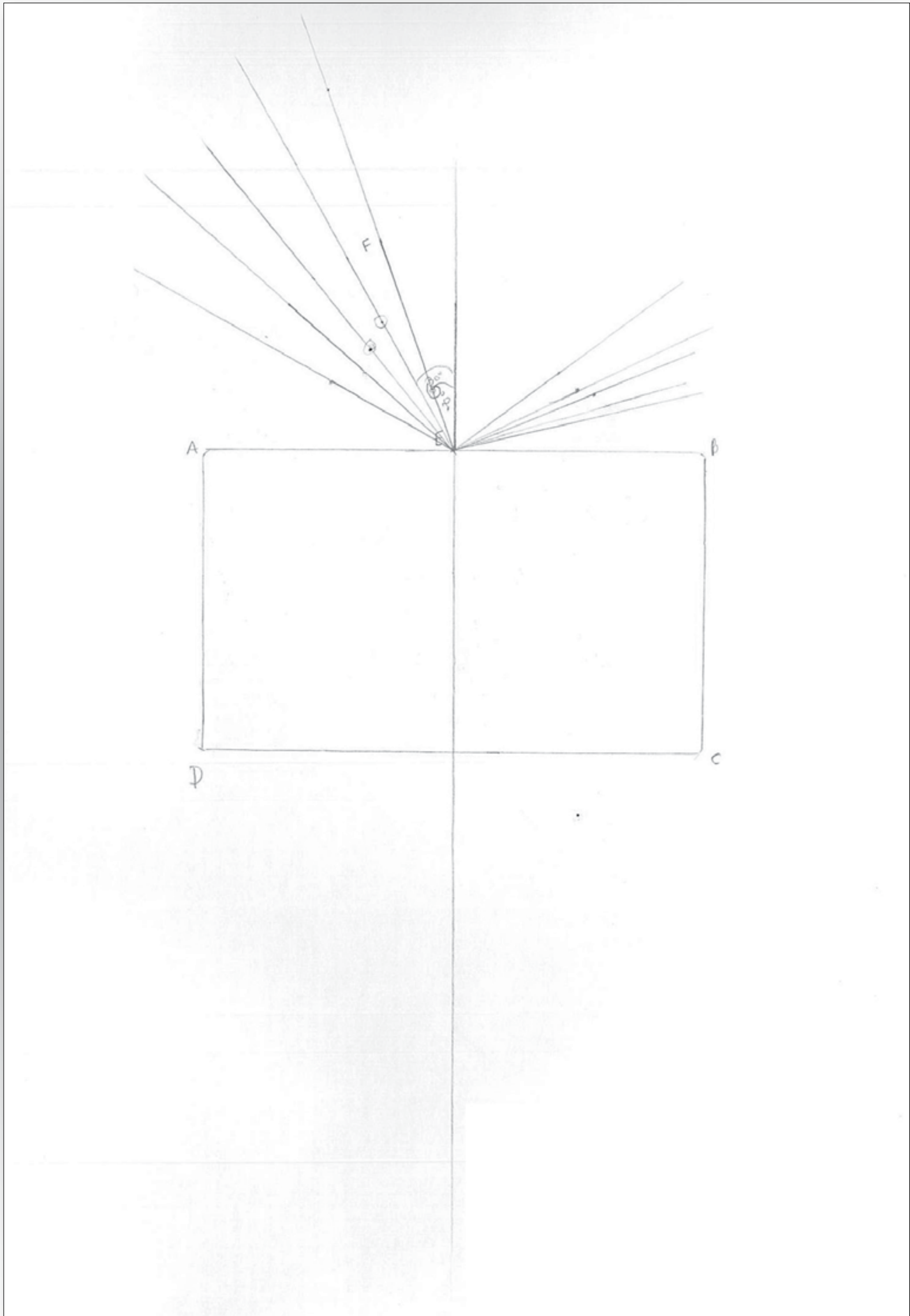
3(a)

3(b)

3(c)

3(d)

Q3	Mark scheme
(a)	Ray trace: Correct normal and all lines in approximately the right places P at least 5 cm from **AB** Table: θ values within ±2° of ray trace values θ values within ±1° of 20, 30, 40, 50, 60
(b)	Graph: Axes correctly labelled and right way round Suitable scales All plots correct to ½ small square Good line judgement, thin, continuous line
(c)	Triangle method shown on graph and triangle using at least half of candidate's line G 0.9 – 1.1
(d)	Points close to/scattered from line (to match graph)/all on line.



Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

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(d)	Points close to/scattered from line (to match graph)/all on line.

(a) • Place the transparent block, largest face down, on the ray-trace sheet supplied. The block should be approximately in the middle of the paper. Draw the outline of the block **ABCD**.

• Remove the block and draw a normal at the centre of side **AB**. Label the point **E** where the normal crosses **AB**.

• Draw a line **FE** to the left of the normal and at an angle $i = 20°$ to the normal.

• Place a pin P on the line **FE**, at a suitable distance from the block for producing an accurate ray trace.

• There are vertical lines L_1 and L_2 drawn on the block. Replace the block so that line L_1 is at point **E**.

• Observe the images of L_1 and P through side **CD** of the block. Carefully move the block, keeping line L_1 at point **E**, until the vertical line L_2 and the images of L_1 and P appear one behind the other. This is indicated by the dashed position of the block shown in Fig. 3.1.

• Draw a line along side **AB** of the block to mark its new position.

• Remove the block.

• Measure the angle θ between the original position of **AB** and the new position of **AB**, as indicated in Fig. 3.1.

• Record $i = 20°$ and θ in Table 3.1.

• Repeat the procedure using values of $i = 30°, 40°, 50°$ and $60°$.

Table 3.1

i/°	θ/°
20	15
30	17
40	23
50	25
60	37

[4]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

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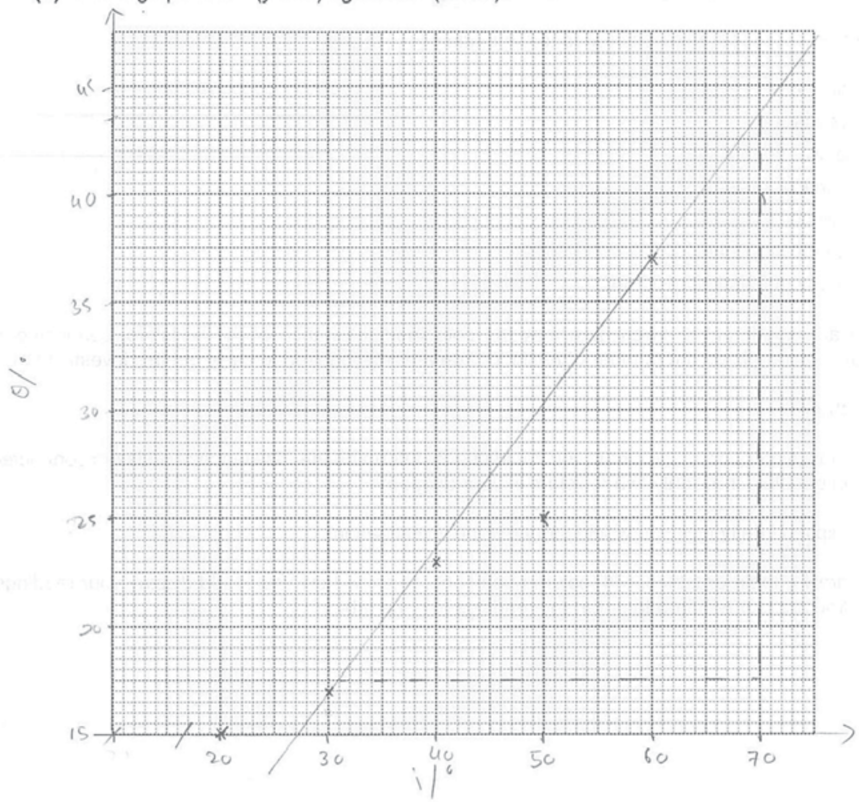
(b) Plot a graph of $\theta/°$ (y-axis) against $i/°$ (x-axis).



[4]

(c) Determine the gradient G of the graph. Show clearly on the graph how you obtained the necessary information.

$g = \frac{v}{h}$ $= 0.6666..7..$

$= \frac{43.5 - 17.5}{70 - 31}$ $G = $ ......0.667...... [2]

(d) Referring to your graph, comment on the quality of your measurements.

The measurements are not very accurate because they is no equal distribution of point on line of best fit. [1]

Tie your ray-trace sheet into this Booklet between pages 8 and 9.

[Total: 11]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

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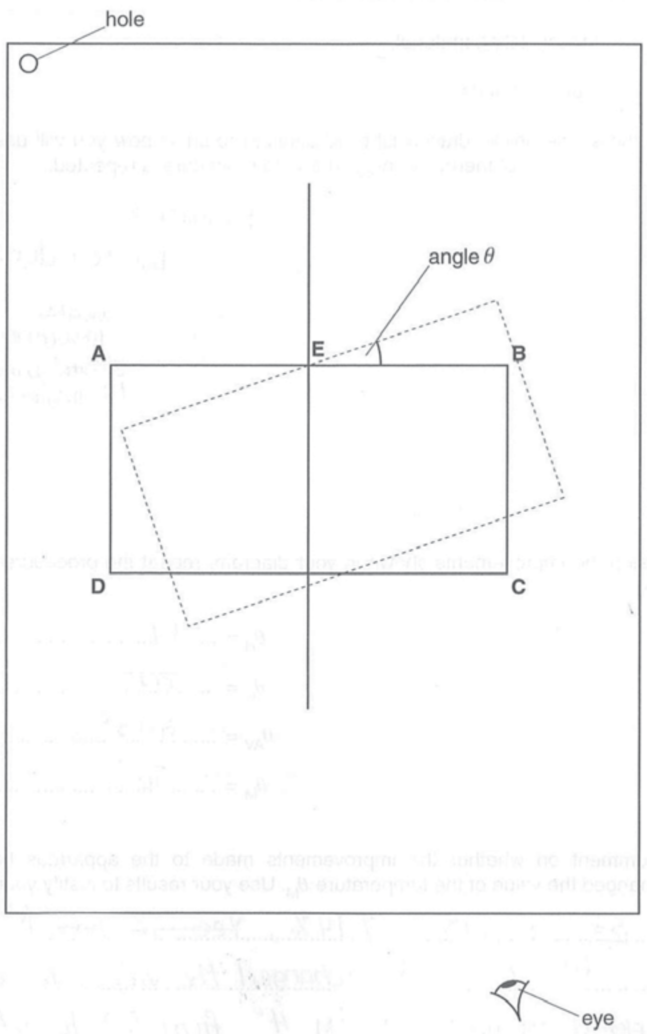

Fig. 3.1

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

Q3	Mark scheme
(a)	Ray trace: Correct normal and all lines in approximately the right places P at least 5 cm from **AB** Table: θ values within $\pm2°$ of ray trace values θ values within $\pm1°$ of 20, 30, 40, 50, 60
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- Measure the angle θ between the original position of **AB** and the new position of **AB**, as indicated in Fig. 3.1.
- Record $i = 20°$ and θ in Table 3.1.
- Repeat the procedure using values of $i = 30°, 40°, 50°$ and $60°$.

Table 3.1

i/°	θ/°
20	21
30	24
40	40
50	48
60	55

[4]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

Q3	Mark scheme
(a)	Ray trace: Correct normal and all lines in approximately the right places P at least 5 cm from **AB** Table: θ values within ±2° of ray trace values θ values within ±1° of 20, 30, 40, 50, 60
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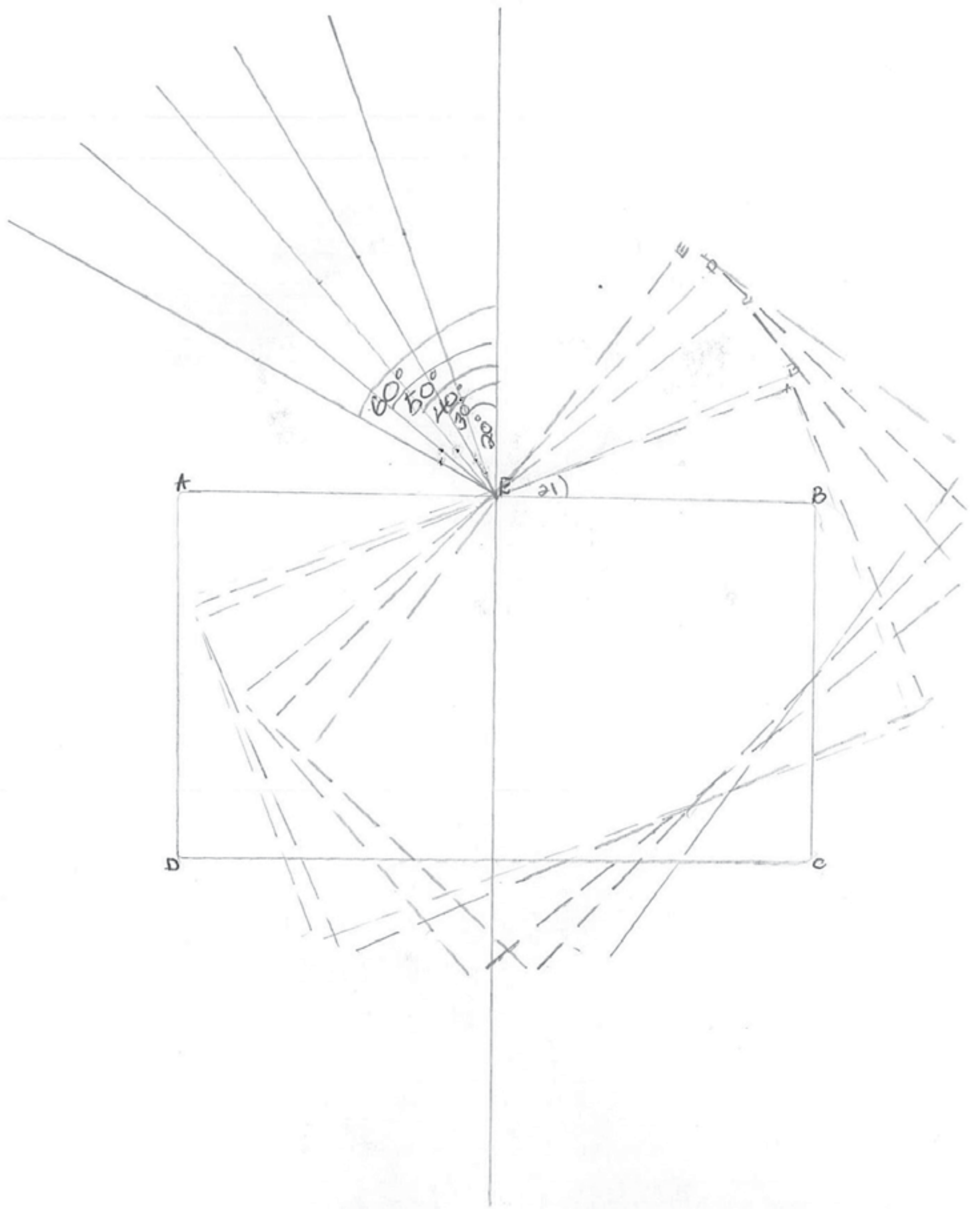

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

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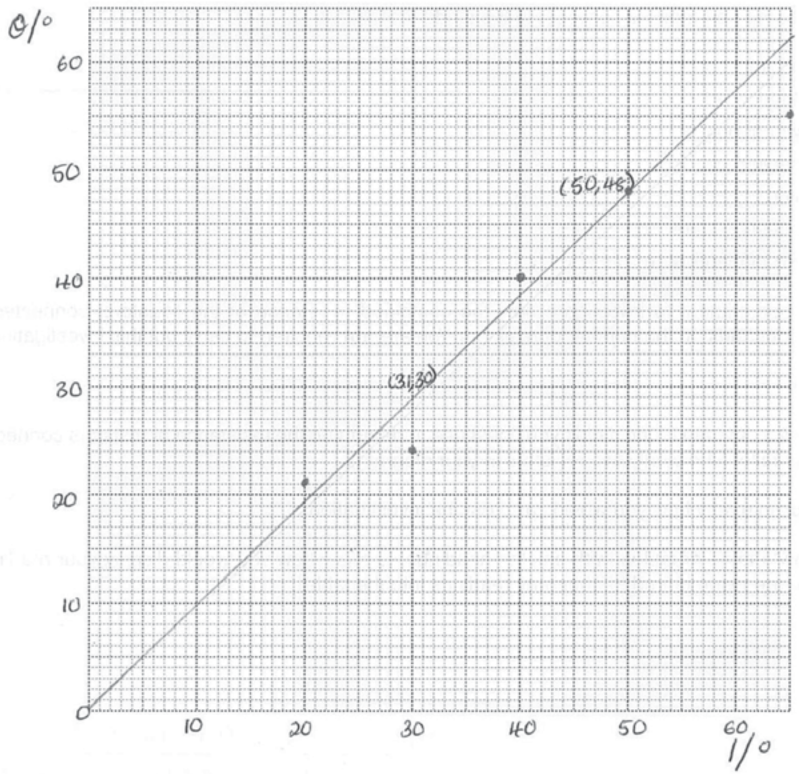
(b) Plot a graph of $\theta/°$ (y-axis) against $i/°$ (x-axis).



[4]

(c) Determine the gradient G of the graph. Show clearly on the graph how you obtained the necessary information.

(31, 30) (50, 48)
x_1 y_1 x_2 y_2

$G = \frac{x_2 - x_1}{y_2 - y_1} = \frac{50 - 31}{48 - 30} = 1.0555$ G = ...1.06...... [2]

(d) Referring to your graph, comment on the quality of your measurements.

Accurate, as they have a large difference in between ~~them~~ each other [1]

Tie your ray-trace sheet into this Booklet between pages 8 and 9.

[Total: 11]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

Q3	Mark scheme
(a)	Ray trace: Correct normal and all lines in approximately the right places P at least 5 cm from **AB** Table: θ values within ±2° of ray trace values θ values within ±1° of 20, 30, 40, 50, 60
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Carry out the following instructions, using the separate ray-trace sheet provided. You may refer to Fig. 3.1 for guidance.

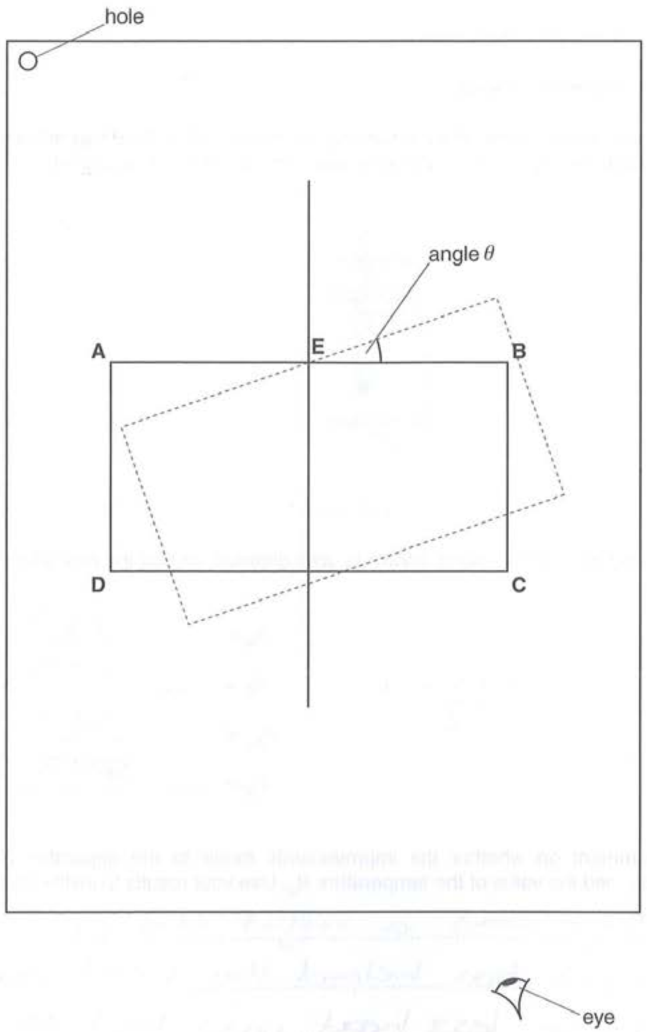

Fig. 3.1

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

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• Draw a line along side **AB** of the block to mark its new position.

• Remove the block.

• Measure the angle θ between the original position of **AB** and the new position of **AB**, as indicated in Fig. 3.1.

• Record $i = 20°$ and θ in Table 3.1.

• Repeat the procedure using values of $i = 30°$, $40°$, $50°$ and $60°$.

Table 3.1

$i/°$	$\theta/°$
20	50
30	52
40	54
50	. 56
60	60

[4]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

Q3	Mark scheme
(a)	Ray trace: Correct normal and all lines in approximately the right places P at least 5 cm from **AB** Table: θ values within ±2° of ray trace values θ values within ±1° of 20, 30, 40, 50, 60
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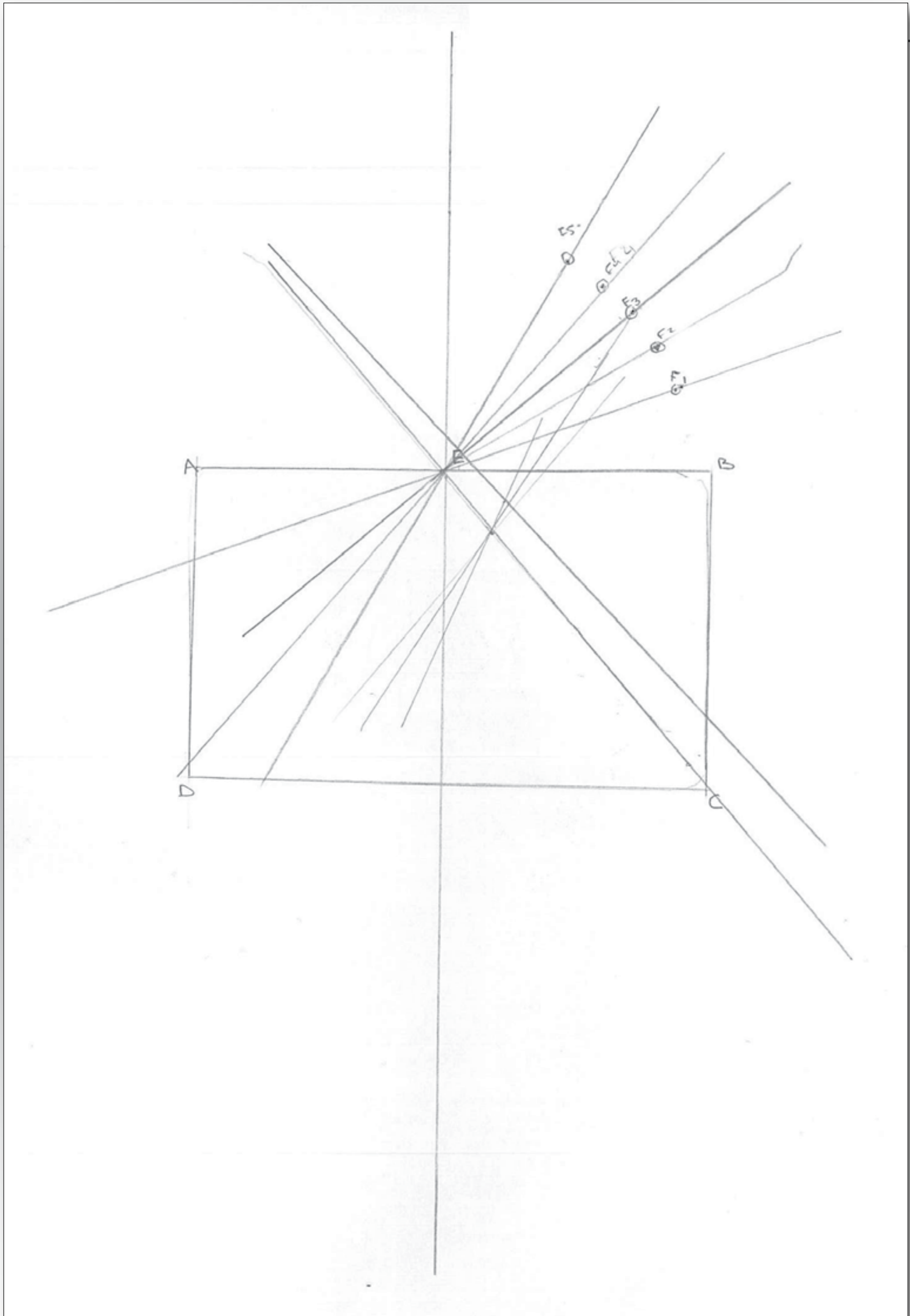

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

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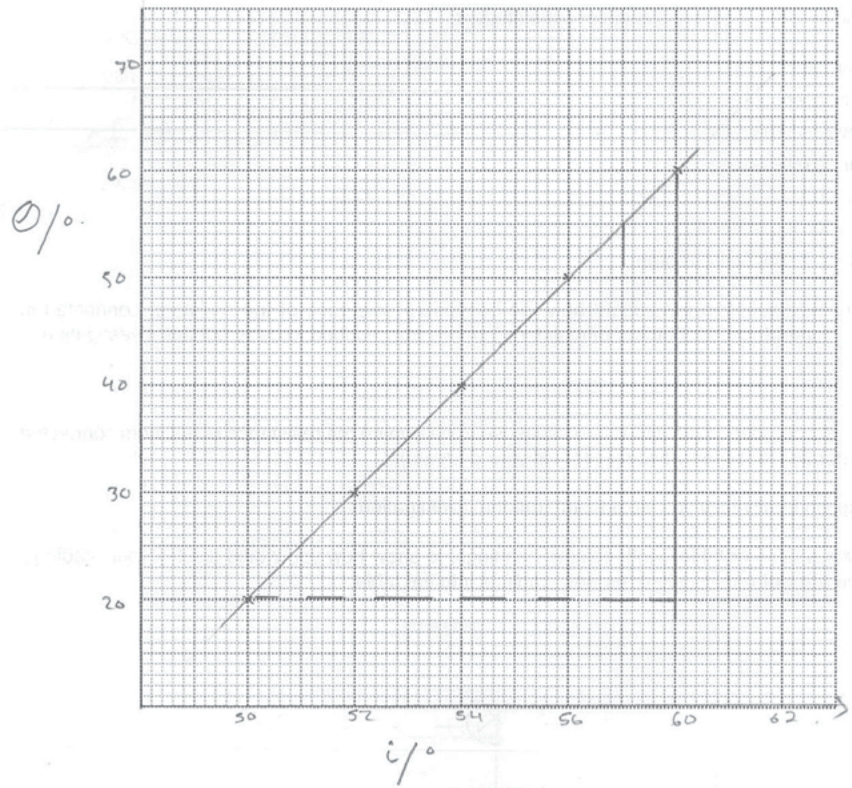
(b) Plot a graph of θ/° (y-axis) against i/° (x-axis).



[4]

(c) Determine the gradient G of the graph. Show clearly on the graph how you obtained the necessary information.

$g = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{60-20}{60-50} = \frac{40}{10}$

G = 4 .....[2]

(d) Referring to your graph, comment on the quality of your measurements.

As the angle increases so does the angle of i incidence. .....[1]

Tie your ray-trace sheet into this Booklet between pages 8 and 9.

[Total: 11]

Select page

	Your Mark
3(a)	
3(b)	
3(c)	
3(d)	

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(a)	Ray trace: Correct normal and all lines in approximately the right places P at least 5 cm from **AB** Table: θ values within ±2° of ray trace values θ values within ±1° of 20, 30, 40, 50, 60
(b)	Graph: Axes correctly labelled and right way round Suitable scales All plots correct to ½ small square Good line judgement, thin, continuous line
(c)	Triangle method shown on graph and triangle using at least half of candidate's line G 0.9 – 1.1
(d)	Points close to/scattered from line (to match graph)/all on line.

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Cambridge Assessment International Education

Interactive

Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 4

Cambridge IGCSE™
Physics 0625

Version 2.0

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Select page

4 A student is investigating resistors connected in parallel.

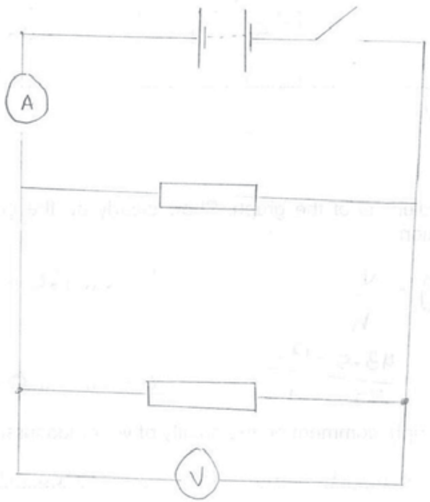
The following apparatus is available to the student:

- ammeter
- voltmeter
- power supply
- variable resistor
- switch
- connecting leads
- a box of identical resistors.

Plan an experiment to investigate how the combined resistance of the resistors, connected in parallel, depends on the number of resistors. You are **not** required to carry out this investigation.

You should:

- draw a diagram of the circuit you could use to determine the resistance of resistors connected in parallel (show only two resistors in your diagram)
- explain briefly how you would carry out the investigation
- draw a table or tables, with column headings, to show how you would display your readings. You are **not** required to enter any readings into the table.



Set the ~~s~~ circuit as above, with ~~one~~ two resistors. Close the switch and measure the current and voltage. Repeat experiment by adding ~~a~~ a resistor every time until a total of 6 resistors.

Your Mark

4

Q4	Mark scheme
	MP1 On circuit diagram: one voltmeter in parallel with any component **MP2** Circuit diagram correctly shows power supply, ammeter, unless in a branch, two or more resistors in parallel **MP3** Circuit diagram: Correct symbols for ammeter, voltmeter and fixed resistor **MP4** Repeat with a different number of resistors (in parallel) **MP5** Table that includes columns for number of resistors, voltage/V and current/A **MP6 and MP7** Then any two from: Resistance calculated (may be shown in table) Use low current (to stop resistors getting too hot)/switch off between readings Use at least 5 different combinations Repeat with different current or voltage or variable resistor setting Drawing a graph of number of resistors against combined resistance

are added.

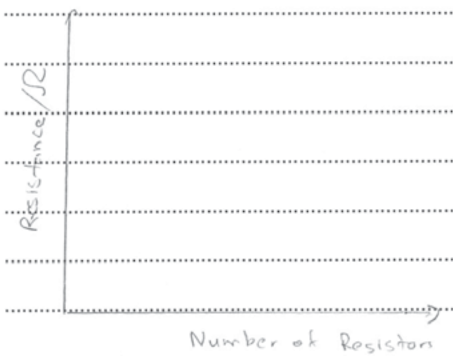
No. of resistor	Voltage /V	Current /A	Resistance /Ω
2			
3			
4			
5			
6			

→After measuring the voltage and current calculate Resistance using the formula

V=IR

Resistance = $\frac{\text{Voltage}}{\text{Current}}$

Plot a graph for resistance against number of resistors.



[7]

[Total: 7]

Select page

Your Mark

4

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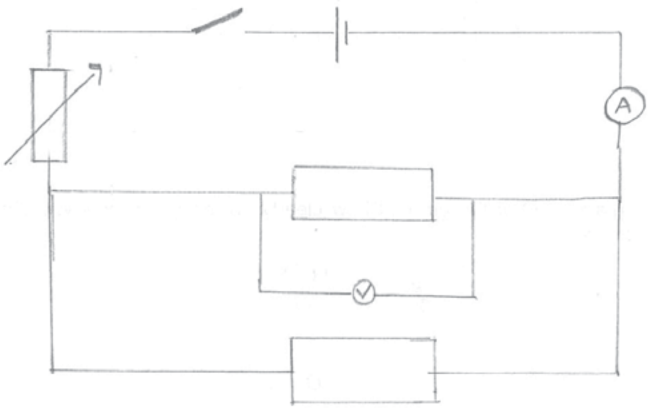

Set up the apparatus as shown

Method

1) ~~S~~ Use the variable resistor to control the amount of current ~~s~~

Select page

Your Mark

4

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Question 4

2) Use a voltmeter to measure voltage (V)

3) ~~Switch on~~ Use 2 resistors

4) Switch on

5) Measure the current using the ammeter and voltage using voltmeter. Record these values

6) Repeat steps (3 – 5) using 3, 4, 5 and 5 resistors respectively

7) ~~M.~~ Record your values and use the equation $R = \frac{V}{I}$ to measure the resistance.

Plot a graph of voltage, V (x-axis) and current, A (y-axis)

V/V	I/A	R/Ω

← Table

Conclusion

The highest resistance will have the lowest current. ~~The~~ and the highest voltage.

[7]

[Total: 7]

Select page

Your Mark

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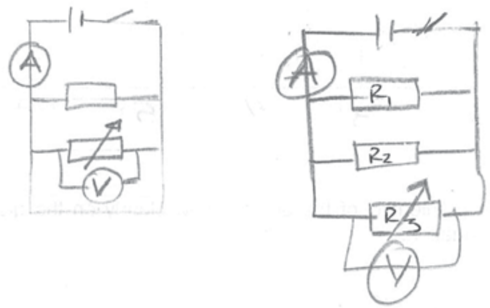
Fig 1



~~We connect the apparatus as shown above~~
~~Fig 1, We switch on the power,~~
We connect a resistor (with known Resistance)
then we connect ~~and~~ a variable resistor

Select page

Your Mark

4

Q4	Mark scheme
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in parallel and connect a voltmeter in parallel as shown by Fig 1. We record the ~~A~~ readings on the ammeter and voltmeter in the table below and calculate resistence.

A Ammeter	Voltmeter (V)	Resistence (Ω)

Then we calculate the combined resistence using the formula $\frac{\text{Product of both Resistors}}{\text{Sum of both Resistors}}$

Then we repeat the experiment by ~~varying the~~ Adding another resistor in parallel as shown by ~~figure~~ Fig. 2. Then we record the readings in the Table and ~~record~~ the calculate the combined resistence by formula

$$\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

[7]

[Total: 7]

Select page

Your Mark

4

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Paper 6 (May / June 2016), Question 1

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1 A student is investigating the stretching of a spring.

The apparatus is shown in Fig. 1.1.

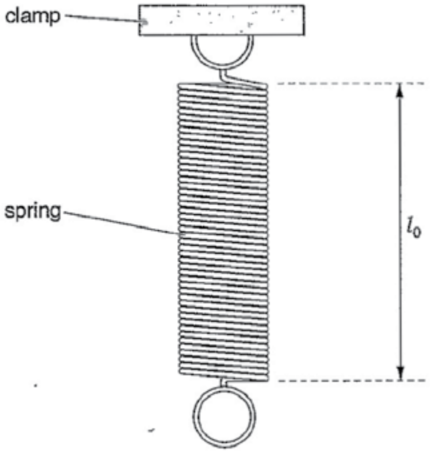


Fig. 1.1

(a) On Fig. 1.1, measure the unstretched length l_0 of the spring. Record l_0 in the first row of Table 1.1. [1]

(b) The student hangs a load L of 1.0 N on the spring and measures the new length l of the spring. She repeats the measurements using loads of 2.0 N, 3.0 N, 4.0 N and 5.0 N. The readings are shown in Table 1.1.

(i) For each set of readings, calculate the extension e of the spring using the equation $e = (l - l_0)$. Record the values of e in the table.

Table 1.1

L/N	l/mm	e/mm
0.0	55	0
1.0	59	4
2.0	64	9
3.0	69	14
4.0	74	19
5.0	78	23

[1]

(ii) Explain briefly one precaution that you would take in order to obtain reliable readings.

Wait for the spring to go back to it's original length before taking the next reading. [1]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

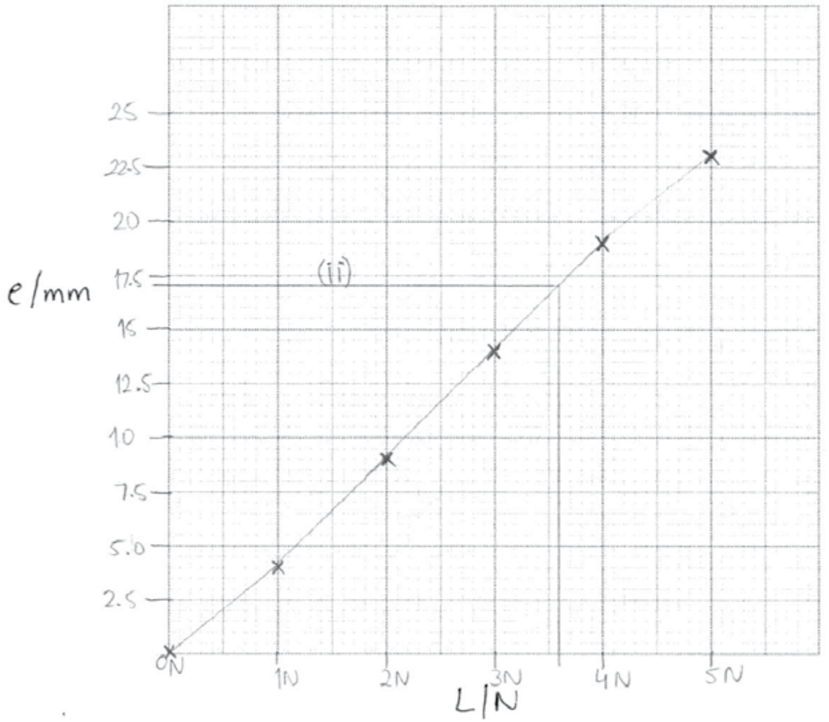
1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	l_0 = 55 (mm) c.a.o.
(b)(i)	4, 9, 14, 19, 23 ecf (a)
(b)(ii)	Viewing scale at right angles or use of straight edge/set square/pointer between bottom of spring and scale/ruler
(c)	Graph: Axes correctly labelled with quantity and unit Suitable scales All plots correct to ½ small square Good line judgement, thin, continuous line, neat plots
(d)(i)	e = 17 (mm) ecf (a)
(d)(ii)	method clearly shown on graph W value 3.5–3.75 Unit N needed No ecf from (i)

(c) Plot a graph of e/mm (y-axis) against L/N (x-axis).



[4]

(d) The student removes the load from the spring and hangs an unknown load **X** on the spring. She measures the length l of the spring.

l = 72 mm

(i) Calculate the extension e of the spring.

e = l − l0
e = 72 − 55 = 17

e = 17 mm [1]

(ii) Use the graph to determine the weight W of the load **X**. Show clearly on the graph how you obtained the necessary information.

W = 3.6N [2]

[Total: 10]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
(a)	l_0 = 55 (mm) c.a.o.
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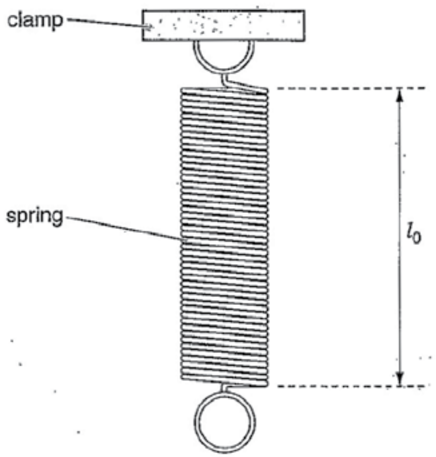

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4.0	74	19
5.0	78	23

[1]

(ii) Explain briefly one precaution that you would take in order to obtain reliable readings.

I won't put any external force on the load as the length of the spring will change. [1]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(c)

1(d)(i)

1(d)(ii)

Q1	Mark scheme
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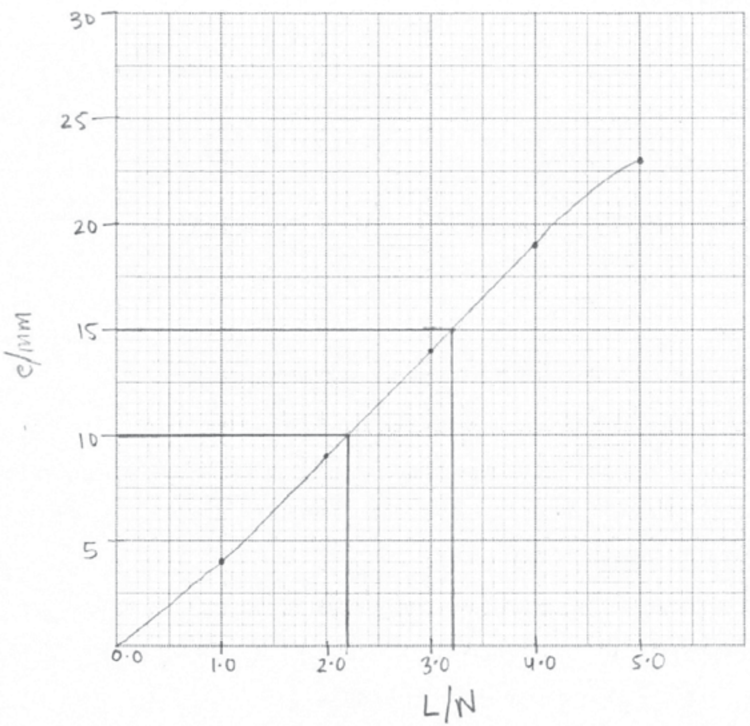
Select page

(c) Plot a graph of e/mm (y-axis) against L/N (x-axis).



Scale

Y-axis

10 units = 5 mm

Xaxis

10 units = 1 N

[4]

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l = 72 mm

(i) Calculate the extension e of the spring.

e = 17 mm [1]

(ii) Use the graph to determine the weight W of the load **X**. Show clearly on the graph how you obtained the necessary information.

gradient $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{15-10}{3{\cdot}2 - 2{\cdot}2}$

$= 5$

$5 = \frac{72-15}{x - 3{\cdot}2}$

$\Rightarrow 5x - 16 = 57$

$5x = 73$

$x = 14{\cdot}6$

W = 14·6 N [2]

[Total: 10]

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(c)

1(d)(i)

1(d)(ii)

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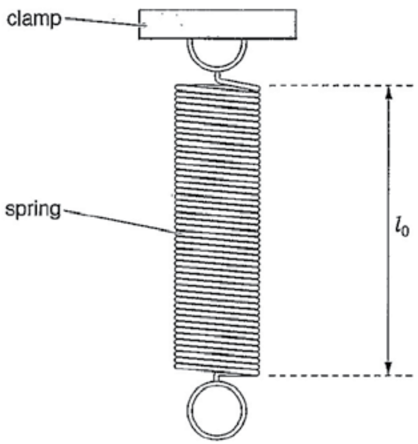

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L/N	l/mm	e/mm
0.0	55	0
1.0	59	4
2.0	64	5
3.0	69	5
4.0	74	5
5.0	78	4

[1]

(ii) Explain briefly one precaution that you would take in order to obtain reliable readings.

~~it was a spring law~~ the spring law could happen in this progress, when the weight was increase [1]

maybe the spring just decreasing it range from original lenght when put on weight

	Your Mark
1(a)	
1(b)(i)	
1(b)(ii)	
1(c)	
1(d)(i)	
1(d)(ii)	

Select page

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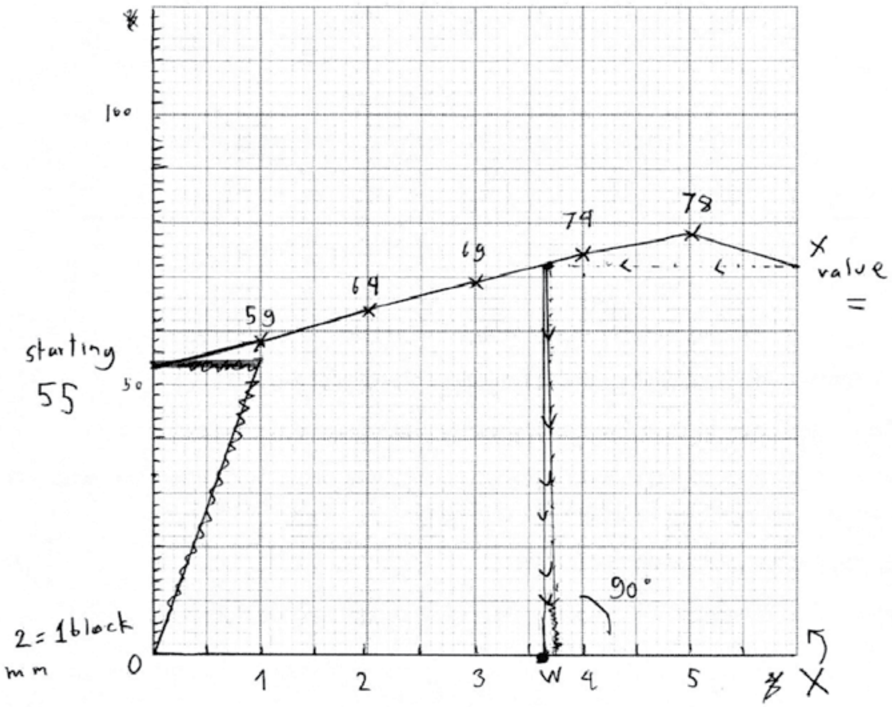

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l = 72 mm

(i) Calculate the extension e of the spring.

e = 17 mm [1]

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W = 3.7 N [2]

[Total: 10]

Select page

Your Mark

1(a)

1(b)(i)

1(b)(ii)

1(c)

1(d)(i)

1(d)(ii)

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Interactive

Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 2

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Physics 0625

Cambridge Pathway

Version 2.0

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Select page

2 A student is using a balancing method to determine the weight of a piece of soft modelling clay. The apparatus is shown in Fig. 2.1.

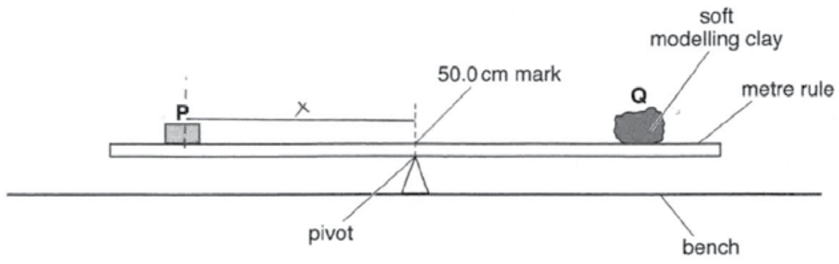


Fig. 2.1

P is a metal cube of weight $P = 1.0\,\text{N}$. **Q** is the piece of soft modelling clay.

The student places the cube **P** so that its weight acts at a distance x from the pivot.

He adjusts the position of **Q** to balance the rule and measures the distance y from the centre of **Q** to the pivot. He calculates the weight W of **Q** using the equation $W = \frac{Px}{y}$.

(a) **On Fig. 2.1**, mark clearly the distance x. [1]

(b) Suggest a change to **Q** that would make it easier to find the value of y accurately.

+Make the shape ~~fa~~ more defined, e.g: Square. So you can find the center of the object. [1]

(c) It is difficult to achieve an exact balance of the metre rule in this type of experiment. This can make the result unreliable.

Explain how you would reduce the effect of this problem to improve the reliability of the experiment.

+ Use a solid object instead of a modelling clay.
+ Make sure object P and Q don't cover the lines and numbers of the ruler. [1]

Your Mark

2(a)

2(b)

2(c)

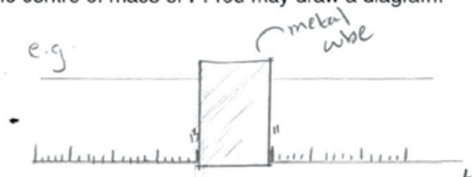
2(d)

2(e)

Q2	Mark scheme
(a)	x shown clearly from centre of P to pivot
(b)	Make Q into a cube/regular shape/small contact area with rule
(c)	Move Q or P slowly one way until it just tips, then back other way until it tips back and take middle reading OR repeat procedure/experiment AND take average
(d)	Measure width w of cube Place w/2 either side of desired position OR draw centre line on cube/find centre of mass of cube and mark side of rule in desired position OR take readings on both sides of the cube and find the mean
(e)	Place rule on pivot (without P and Q) and record/find balance point

(d) The metal cube **P** is larger than the width of the metre rule.

Explain briefly how you would determine the reading of the metre rule scale at the position of the centre of mass of **P**. You may draw a diagram.



step 1) you will determin the two points. Beginning of the cube and the back.

step2) And because we need the center ~~who~~ we are going to add both values (e.g: 11+13) and then divide by 2.
(e.g: 24÷2 = 12)

Step) hence you will find the center of the cube in the most acurate way possible.

.... [2]

(e) Before starting the experiment, the student determines the position of the centre of mass of the metre rule.

Explain briefly how you would do this.

+ By balancing the ruler on the Pivot.

+ Or by hanging it from two sides and then drawing a line, where the plumb falls. where the two lines intersect is the centre of mass, after each side [1]

[Total: 6]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)

2(e)

Q2	Mark scheme
(a)	x shown clearly from centre of P to pivot
(b)	Make Q into a cube/regular shape/small contact area with rule
(c)	Move Q or P slowly one way until it just tips, then back other way until it tips back and take middle reading OR repeat procedure/experiment AND take average
(d)	Measure width w of cube Place w/2 either side of desired position OR draw centre line on cube/find centre of mass of cube and mark side of rule in desired position OR take readings on both sides of the cube and find the mean
(e)	Place rule on pivot (without P and Q) and record/find balance point

2 A student is using a balancing method to determine the weight of a piece of soft modelling clay. The apparatus is shown in Fig. 2.1.

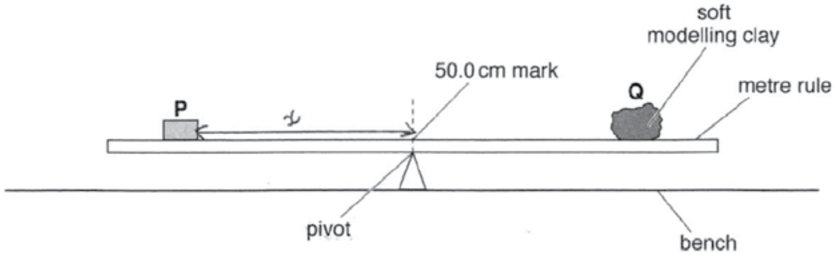


Fig. 2.1

P is a metal cube of weight $P = 1.0$ N. **Q** is the piece of soft modelling clay.

The student places the cube **P** so that its weight acts at a distance x from the pivot.

He adjusts the position of **Q** to balance the rule and measures the distance y from the centre of **Q** to the pivot. He calculates the weight W of **Q** using the equation $W = \frac{Px}{y}$.

(a) **On Fig. 2.1**, mark clearly the distance x. [1]

(b) Suggest a change to **Q** that would make it easier to find the value of y accurately.

Give an ~~appropr~~ appropriate measured shape to the modelling clay [1]

(c) It is difficult to achieve an exact balance of the metre rule in this type of experiment. This can make the result unreliable.

Explain how you would reduce the effect of this problem to improve the reliability of the experiment.

~~Repeating~~ By repeating the experiment several times and taking average

[1]

Select page

Your Mark

2(a)

2(b)

2(c)

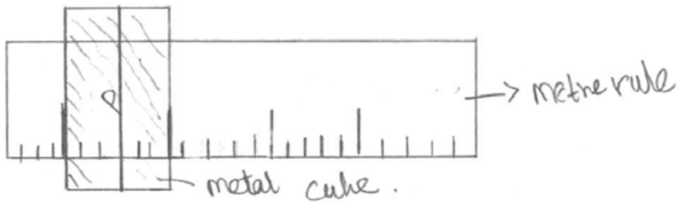
2(d)

2(e)

Q2	Mark scheme
(a)	x shown clearly from centre of P to pivot
(b)	Make Q into a cube/regular shape/small contact area with rule
(c)	Move Q or P slowly one way until it just tips, then back other way until it tips back and take middle reading OR repeat procedure/experiment AND take average
(d)	Measure width w of cube Place w/2 either side of desired position OR draw centre line on cube/find centre of mass of cube and mark side of rule in desired position OR take readings on both sides of the cube and find the mean
(e)	Place rule on pivot (without P and Q) and record/find balance point

(d) The metal cube **P** is larger than the width of the metre rule.

Explain briefly how you would determine the reading of the metre rule scale at the position of the centre of mass of **P**. You may draw a diagram.



By dividing the mass equally on both sides of the required position

[2]

(e) Before starting the experiment, the student determines the position of the centre of mass of the metre rule.

Explain briefly how you would do this.

By placing the metre rule on the pivot and ~~seen~~ seeing the point where it balances equally [1]

[Total: 6]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)

2(e)

Q2	Mark scheme
(a)	x shown clearly from centre of P to pivot
(b)	Make Q into a cube/regular shape/small contact area with rule
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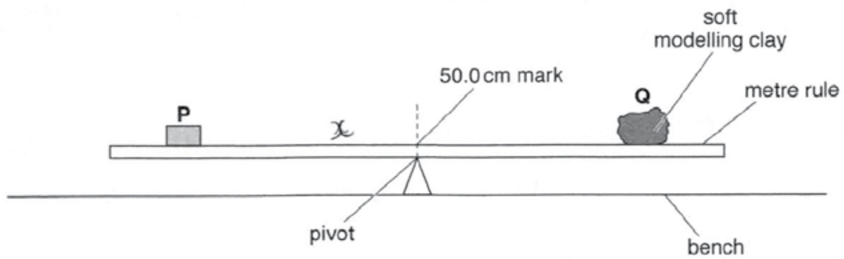

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He adjusts the position of **Q** to balance the rule and measures the distance y from the centre of **Q** to the pivot. He calculates the weight W of **Q** using the equation $W = \frac{Px}{y}$.

(a) **On Fig. 2.1**, mark clearly the distance x. [1]

(b) Suggest a change to **Q** that would make it easier to find the value of y accurately.

~~Weigh it~~ Place it on it's centre of mass. [1]

(c) It is difficult to achieve an exact balance of the metre rule in this type of experiment. This can make the result unreliable.

Explain how you would reduce the effect of this problem to improve the reliability of the experiment.

Repeat the experiment and find the average. [1]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)

2(e)

Q2	Mark scheme
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(e)	Place rule on pivot (without P and Q) and record/find balance point

(d) The metal cube **P** is larger than the width of the metre rule.

Explain briefly how you would determine the reading of the metre rule scale at the position of the centre of mass of **P**. You may draw a diagram.

you would measure the reading and subtract it from 50.0 cm

[2]

(e) Before starting the experiment, the student determines the position of the centre of mass of the metre rule.

Explain briefly how you would do this.

by placing on the pivot so it doesn't tilt.

[1]

[Total: 6]

Select page

Your Mark

2(a)

2(b)

2(c)

2(d)

2(e)

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Interactive

Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 3

Cambridge IGCSE™ Physics 0625

Version 2.0

Cambridge Pathway

In order to help us develop the highest quality resources, we are undertaking a continuous programme of review; not only to measure the success of our resources but also to highlight areas for improvement and to identify new development needs.

We invite you to complete our survey by visiting the website below. Your comments on the quality and relevance of our resources are very important to us.

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Would you like to become a Cambridge International consultant and help us develop support materials?

Please follow the link below to register your interest.

www.cambridgeinternational.org/cambridge-for/teachers/teacherconsultants/

3 A student is investigating the magnification of images produced by a lens.

The apparatus is shown in Fig. 3.1.

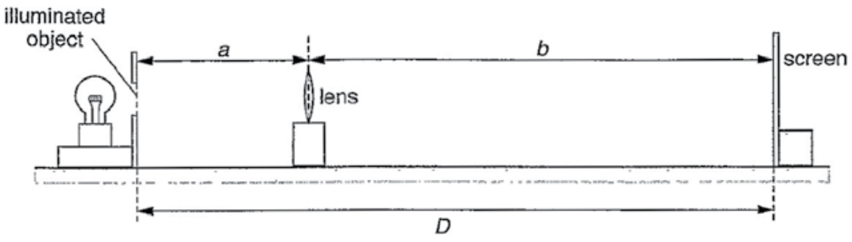

Fig. 3.1

The student places a screen at a distance $D = 80.0\,\text{cm}$ from an illuminated object. The screen and the illuminated object remain in the same positions throughout the experiment.

(a) She places the lens close to the illuminated object. She moves the lens until she sees a sharply focused, **enlarged** image of the object on the screen.

She measures the distance a from the illuminated object to the centre of the lens.

$a =$ 20.3 cm

She measures the distance b from the centre of the lens to the screen.

$b =$ 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

$m_1 =$ 2.94 [1]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

3(e)

Q3	Mark scheme
(a)	$m_1 = 2.94$
(b)	($m_2 = 0.329$ OR 0.33) m_1 and m_2 to 2 or 3 significant figures only AND both m with no unit (accept ×)
(c)	Statement, expect YES. Must match results. e.c.f .allowed Justification to include idea of within (or beyond) limits of (experimental) accuracy
(d)	Any two from: • Use of darkened room/brighter lamp/no other lights • Mark position of centre of lens on holder • Place metre rule on bench (or clamp in position) • Ensure object and centre of lens are same height from the bench • Move lens slowly/to and fro (when focusing) • Lens, object, screen vertical/perpendicular to bench • Repeat with different D • Use of graph paper/cm scale on screen to measure image
(e)	image appears well focused over a (small) range of lens positions/not all of image focused at same time/relevant reference to chromatic aberration

(b) The student then moves the lens towards the screen until a **smaller**, sharply focused image of the object is seen on the screen.

She measures the distance x from the illuminated object to the centre of the lens.

$x =$ 60.2 cm

She measures the distance y from the centre of the lens to the screen.

$y =$ 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

$m_2 =$ 0.329 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

statement Yes

justification $m_1 \times m_2 = 0.967 < 1$, but ~~the~~ the result is within the limit of experimental accuracy.

[2]

(d) State two precautions that you would take in this experiment to obtain reliable results.

1. Keep the object, lens and screen at the same height.

2. Do the experiment in a dark room.

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

~~The~~ It is hard to find the best sharply focused image because of the small difference between images. [1]

[Total: 7]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

3(e)

Q3	Mark scheme
(a)	$m_1 = 2.94$
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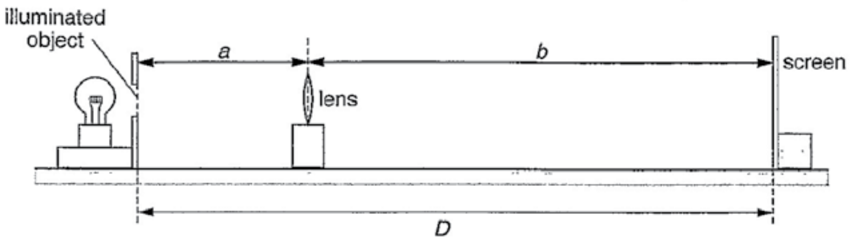

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She measures the distance a from the illuminated object to the centre of the lens.

$a =$ 20.3 cm

She measures the distance b from the centre of the lens to the screen.

$b =$ 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

$m_1 =$ 2.94 [1]

Select page

Your Mark

3(a)

3(b)

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$x =$ 60.2 cm

She measures the distance y from the centre of the lens to the screen.

$y =$ 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

$m_2 =$ 0.33 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

statement the magnification of the image is ~~the same~~ not the same

justification The magnification wouldn't be the same ~~no matter where~~ ~~the len is placed~~ becaue it can change according to where the lens is placed 2.94 x 0.33 = 0.97 [2]

(d) State two precautions that you would take in this experiment to obtain reliable results.

1. adjust the lens back and forth until it show clear and sharp image

2. make the experiment in a dark room.

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

Becaus the size of the object also make the experiment difficult [1]

[Total: 7]

Select page

Your Mark

3(a)

3(b)

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3(e)

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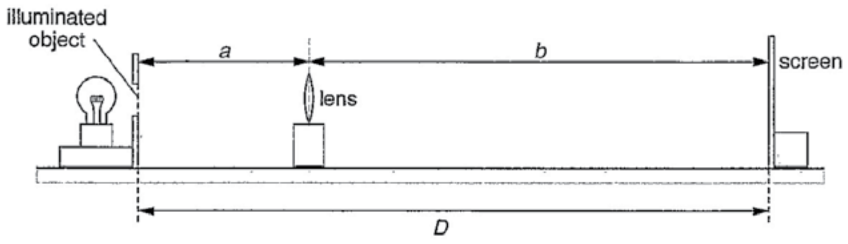

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She measures the distance a from the illuminated object to the centre of the lens.

a = 20.3 cm

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b = 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

m_1 = × 2.94 [1]

Your Mark

3(a)

3(b)

3(c)

3(d)

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She measures the distance x from the illuminated object to the centre of the lens.

x = 60.2 cm

She measures the distance y from the centre of the lens to the screen.

y = 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

m_2 = X 0·3 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

statement NO

justification It is because the distances from the centre of lens and from illuminated object is vice versa in the two experiments therefore magnifications are also different.

[2]

(d) State two precautions that you would take in this experiment to obtain reliable results.

1. use a bright light bulb so that image formed can be clearer.

2. Carry out this experiment in a dark room with no other light.

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

It is because the lens is adjusted by hand.

[1]

[Total: 7]

Select page

Your Mark

3(a)

3(b)

3(c)

3(d)

3(e)

Q3	Mark scheme
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Interactive

Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 4

Cambridge IGCSE™
Physics 0625

Version 2.0

Cambridge Pathway

In order to help us develop the highest quality resources, we are undertaking a continuous programme of review; not only to measure the success of our resources but also to highlight areas for improvement and to identify new development needs.

We invite you to complete our survey by visiting the website below. Your comments on the quality and relevance of our resources are very important to us.

www.surveymonkey.co.uk/r/GL6ZNJB

Would you like to become a Cambridge International consultant and help us develop support materials?

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www.cambridgeinternational.org/cambridge-for/teachers/teacherconsultants/

4 A student is investigating how the resistance of a wire depends on the length of the wire. The student aims to plot a graph.

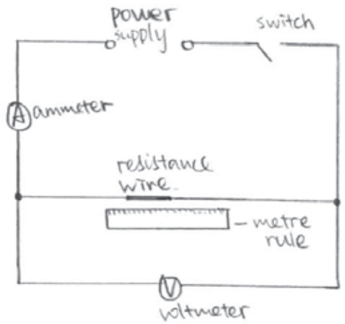
The following apparatus is available to the student:

ammeter
voltmeter
power supply
variable resistor
switch
connecting leads
resistance wires of different lengths
metre rule.

Plan an experiment to investigate how the resistance of a wire depends on the length of the wire.

You should

- draw a diagram of the circuit you could use to determine the resistance of each wire
- explain briefly how you would carry out the investigation
- suggest suitable lengths of wire
- state the key variables that you would control
- draw a table, or tables, with column headings to show how you would display your readings. You are not required to enter any readings in the table.



Select page

Your Mark

4

Q4	Mark scheme
	Circuit diagram: MP1 Sample of wire must be clearly identifiable by a label on the diagram or by letters on the diagram with an explanation in the text MP2 All circuit symbols correct (even if circuit is incorrect) Method: MP3 Take readings of V and I MP4 For 5 or more lengths MP5 Range of lengths must be between 5 cm and 2 m with the largest length at least twice the smallest Table drawn with headings: MP6 l/m, V/V, I/A, R/Ω Key variables to control: MP7 Any one from • Material/resistivity/conductivity/type of wire • Diameter/radius/thickness/cross sectional area • Temperature of wire

Steps: ① According to the diagram, connect the circuit with the apparatus, and connect a ~~5~~ 10 cm resistance wire. (length measured by metre rule)
② close the switch, read the current on the ammeter, I and the potential difference on the voltmeter, V and record them onto the table.
③ Use the formula, resistance = $\frac{\text{p.d}}{\text{current}}$, calculate the resistance of this wire as R and record the data.
④ repeat the experiment, only change the wires with different lengths (measured by meter rule), they are ~~10cm~~ 15cm, 20cm, 25cm, 30cm, 35cm, 40cm seperately, calculate their resistance and record the data.
(Keep the power supply constant.)

length of resistance wire/cm	I / A	V / V	R / Ω

[7]

[Total: 7]

Select page

Your Mark

4

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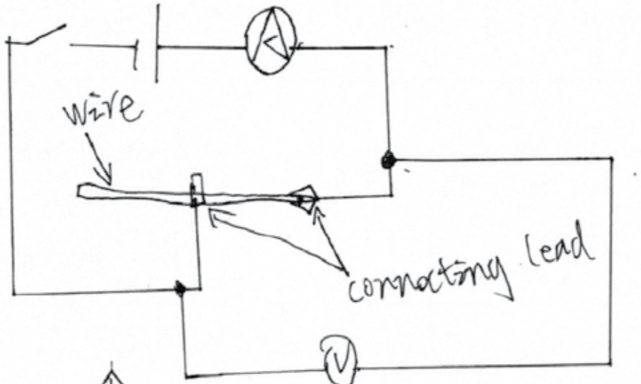

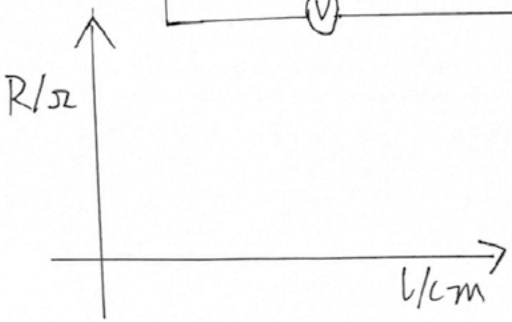

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~~First, connect the circuit~~

The length of wire should be 50cm long.

First, connect the connecting lead on the wire and connect the circuit. Record the length of the wire which is connect into the circuit and the voltage and the current. Use $R = \frac{V}{I}$ to get the resistance of the wire.

Then change the position of the connecting lead and repeat the experiment.

In the experiment, you should not change the ~~wire and the~~ sectional area of the wire and the voltage of the battery.

[7]

[Total: 7]

Select page

Your Mark

4

Q4	Mark scheme
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investigate

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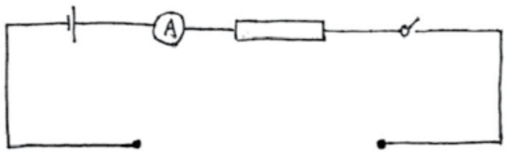
- state the key variables that you would control
- draw a table, or tables, with column headings to show how you would display your readings. You are not required to enter any readings in the table.



	Test 1			Test 2		
length/cm	Ammeter (A)	V (V)	R (Ω)	A (A)	V (V)	R (Ω)

Select page

Your Mark

4

Q4	Mark scheme
	Circuit diagram: MP1 Sample of wire must be clearly identifiable by a label on the diagram or by letters on the diagram with an explanation in the text MP2 All circuit symbols correct (even if circuit is incorrect) Method: MP3 Take readings of V and I MP4 For 5 or more lengths MP5 Range of lengths must be between 5 cm and 2 m with the largest length at least twice the smallest Table drawn with headings: MP6 l/m, V/V, I/A, R/Ω Key variables to control: MP7 Any one from • Material/resistivity/conductivity/type of wire • Diameter/radius/thickness/cross sectional area • Temperature of wire

Build a circuit like the diagram as shown, place different length of wire at the connecting leads, each one test for twice by change the resistance (variable resistor), record the ammeter and voltmeter reading, measure its length after testing in the circuit.

During the experiment, make sure each wire only need to test for twice, but different considerable resistance, ~~the~~ other one still need to test at these two resistance.

Then caculate.

[7]

[Total: 7]

Select page

Your Mark

4

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	Circuit diagram: MP1 Sample of wire must be clearly identifiable by a label on the diagram or by letters on the diagram with an explanation in the text MP2 All circuit symbols correct (even if circuit is incorrect) Method: MP3 Take readings of V and I MP4 For 5 or more lengths MP5 Range of lengths must be between 5 cm and 2 m with the largest length at least twice the smallest Table drawn with headings: MP6 l/m, V/V, I/A, R/Ω Key variables to control: MP7 Any one from • Material/resistivity/conductivity/type of wire • Diameter/radius/thickness/cross sectional area • Temperature of wire

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Cambridge Assessment
International Education

Interactive

Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 5

Cambridge IGCSE™
Physics 0625

Version 2.0

Cambridge Pathway

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5 A student is investigating the cooling of water.

Some of the apparatus is shown in Fig. 5.1.

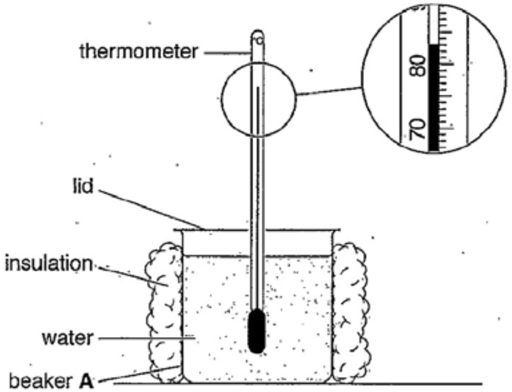

Fig. 5.1

(a) The student pours 200 cm^3 of hot water into a 250 cm^3 insulated beaker labelled **A**. He covers the top of the beaker with a lid.

The student takes a temperature reading every 30 s as the water cools. The readings are shown in Table 5.1.

(i) Complete the column headings in the table. [1]

(ii) The starting temperature θ of the hot water in beaker **A** is shown on Fig. 5.1.

Record this temperature in the table at time t = 0 s. [1]

Table 5.1

	beaker **A** insulation and lid	beaker **B** insulation, no lid	beaker **C** lid, no insulation
t/ s	θ/ °C	θ/ °C	θ/ °C
0	83	85	78
30	80	79	74
60	77	74	71
90	75	70	68
120	73	67	66
150	71	64	64

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

5(c)

5(d)

5(e)

Q5	Mark scheme
(a)(i)	s, °C, °C, °C
(a)(ii)	83(°C)
(b)(i)	First box/sentence indicated
(b)(ii)	Clear reference to readings with examples of temperature differences
(c)	Any two from: • Room temperature (or suitable reference to draughts or similar) • Starting temperature (of water) • Density of packing/amount/type of insulation • Thickness of lids/identical lids
(d)	Card or any suitable insulating material Should be a good insulator/poor conductor
(e)	Perpendicular viewing/view at right angles/eye level Reading to bottom of meniscus

(b) The student repeats the procedure using a 250 cm^3 beaker labelled **B**. This beaker is insulated but has no lid.

He repeats the procedure again using a 250 cm^3 beaker labelled **C**. This beaker has a lid but no insulation.

All the readings are shown in Table 5.1.

(i) Tick the statement that best describes the results of the investigation.

☐ Removing the lid speeds up the rate of cooling significantly more than removing the insulation.

☐ Removing the insulation speeds up the rate of cooling significantly more than removing the lid.

☑ There is no significant difference between removing the lid and removing the insulation.

[1]

(ii) Justify your answer by reference to the readings.

low difference of changing in temperature

85°C − 79°C = 6°C 78°C − 74°C = 4°C 6°C − 4°C = 2°C

74°C − ~~78~~ 70°C = 4°C 71°C − 68°C = 3°C 4°C − 3°C = 1°C (So the low difference should be include

[1]

(c) State two of the conditions that should be kept the same in this experiment in order for the comparison to be fair.

1. Initial ~~Ge~~ temperature of hot water

2. ~~Repeat the experiment~~ humidity

[2]

(d) Suggest a suitable material for the lid. Give a reason for your choice of material.

material wood

reason ~~Becaus~~ It is a insulator and can keep heat inside the beaker efficiently

[2]

Select page

Your Mark

5(a)(i) ☐

5(a)(ii) ☐

5(b)(i) ☐

5(b)(ii) ☐

5(c) ☐

5(d) ☐

5(e) ☐

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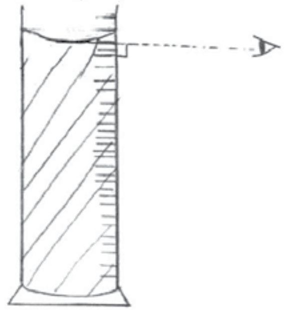
(e) Describe briefly how a measuring cylinder is read in order to obtain a reliable value for the volume of water. You may draw a diagram.



Eyes should perpendicular to the measuring cylinder's scale of level of water

[2]

[Total: 10]

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

5(c)

5(d)

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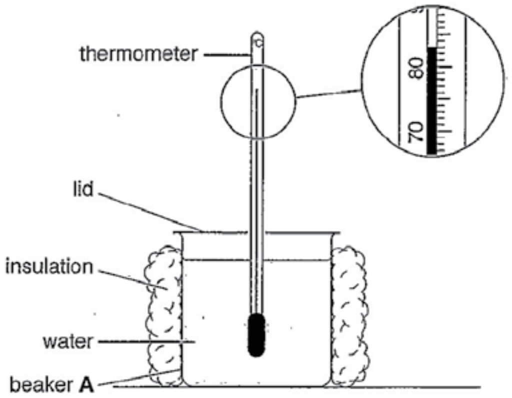

Fig. 5.1

(a) The student pours 200 cm³ of hot water into a 250 cm³ insulated beaker labelled **A**. He covers the top of the beaker with a lid.

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Record this temperature in the table at time $t = 0$ s. [1]

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(b) The student repeats the procedure using a 250 cm^3 beaker labelled **B**. This beaker is insulated but has no lid.

He repeats the procedure again using a 250 cm^3 beaker labelled **C**. This beaker has a lid but no insulation.

All the readings are shown in Table 5.1.

(i) Tick the statement that best describes the results of the investigation.

- [ ] Removing the lid speeds up the rate of cooling significantly more than removing the insulation.
- [ ] Removing the insulation speeds up the rate of cooling significantly more than removing the lid.
- [x] There is no significant difference between removing the lid and removing the insulation.

[1]

(ii) Justify your answer by reference to the readings.

Beaker B and C ~~are~~ have different rates of cooling at the start but then Beaker B's rate gets faster and the become almost same [1]

(c) State two of the conditions that should be kept the same in this experiment in order for the comparison to be fair.

1. Volume of water

2. Initial temperature of water

[2]

(d) Suggest a suitable material for the lid. Give a reason for your choice of material.

material Rubber

reason Good insulator

[2]

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

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5(e)

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(e) Describe briefly how a measuring cylinder is read in order to obtain a reliable value for the volume of water. You may draw a diagram.

The point at which the top of the water is is read in the scale provided so in this case the volume of the water is 9cm3

....[2]

[Total: 10]

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

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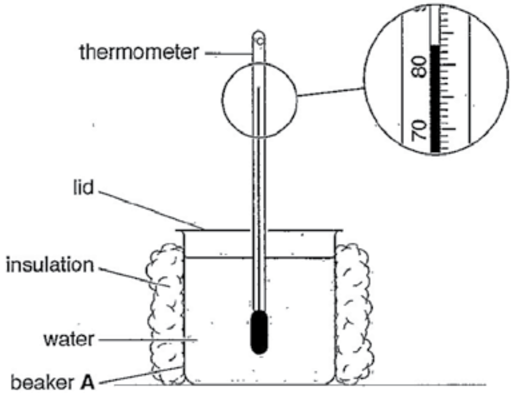

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All the readings are shown in Table 5.1.

(i) Tick the statement that best describes the results of the investigation.

- [x] Removing the lid speeds up the rate of cooling significantly more than removing the insulation.
- [x] Removing the insulation speeds up the rate of cooling significantly more than removing the lid.
- [ ] There is no significant difference between removing the lid and removing the insulation.

[1]

(ii) Justify your answer by reference to the readings.

Because in beaker C, ~~it~~ you can see the result and temperature going down much faster than Beaker B. [1]

(c) State two of the conditions that should be kept the same in this experiment in order for the comparison to be fair.

1. ~~f~~ Surrounding temperature should be kept same /normal at all times.

2. Size of the beaker ~~used~~. that is used.

[2]

(d) Suggest a suitable material for the lid. Give a reason for your choice of material.

material Glass.

reason In-expensive and it also catches water droplets.

[2]

Select page

Your Mark

5(a)(i)

5(a)(ii)

5(b)(i)

5(b)(ii)

5(c)

5(d)

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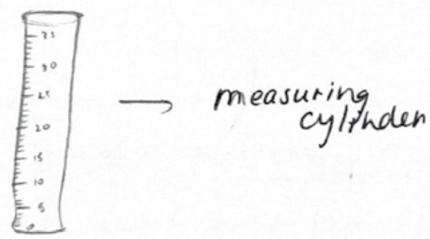

water is filled inside measuring cylinder. The readings will be given and there are proper divisions in the cylinder you you to obtain a much more accurate reading [2]

[Total: 10]

Select page

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