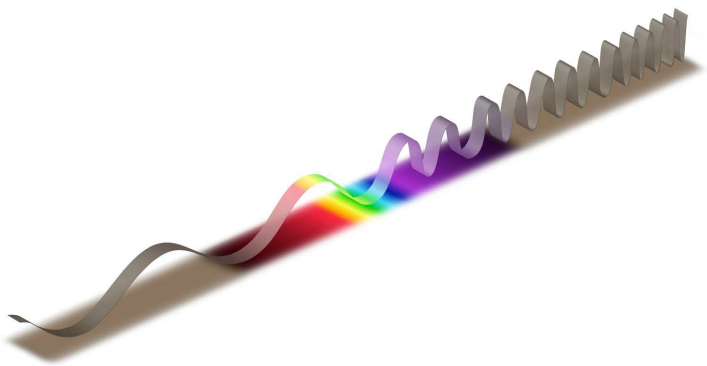
Cambridge Assessment International Education

Specimen Paper Answers – Paper 5

Cambridge IGCSE™ / IGCSE (9–1)

Physics 0625 / 0972

For examination from 2023



Version 1

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Contents

Introduction

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

In this booklet, we have provided answers for all questions with examiner comments where relevant. This paper requires candidates to answer short-answer and structured questions and candidates are awarded maximum of 40 marks for this paper and the mark scheme provides the answers required to gain the marks.

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

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

2023 Specimen Paper 5 Mark Scheme

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

Assessment at a glance

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

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

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

Core assessment

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

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

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

Extended assessment

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

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

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

Practical assessment

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

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

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

Question 1

Question 1(a)

1 In this experiment, you will investigate how partly covering the top of a beaker of water affects the rate at which the water cools.

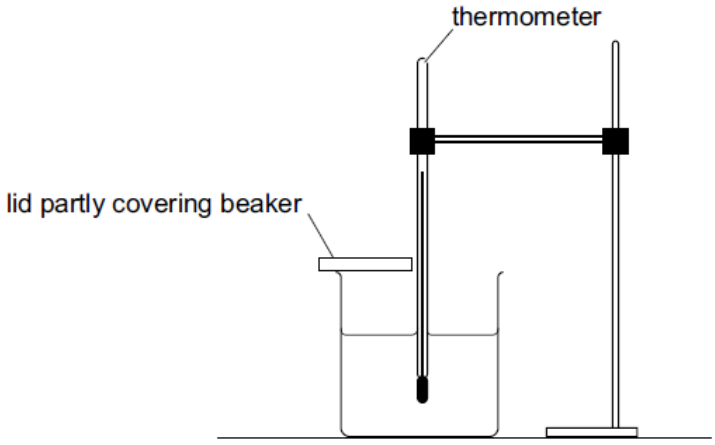


Fig. 1.1

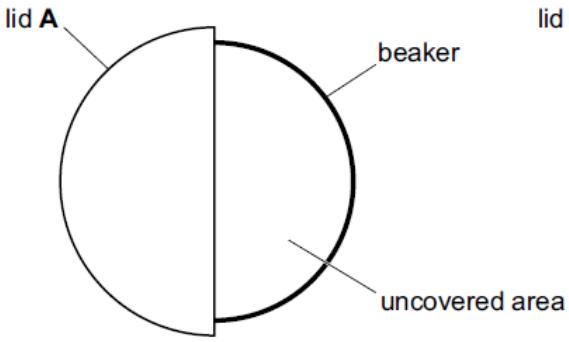


Fig. 1.2

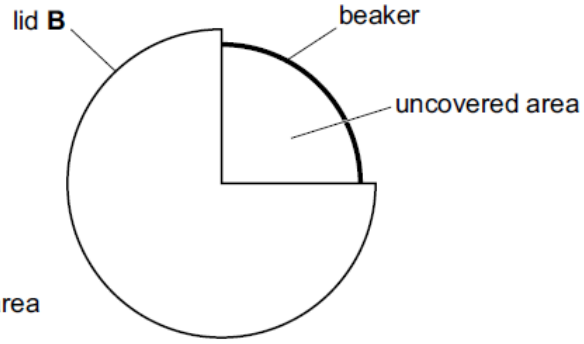


Fig. 1.3

(a) Refer to Fig. 1.1 and Fig. 1.2.

Instructions

- Pour 100 cm^3 of hot water into the beaker and cover half of it with lid **A** as shown in Fig. 1.2. This leaves 50% of the top of the beaker uncovered.
- Place the thermometer into the hot water and record, in the first row of Table 1.1, the temperature θ of the water at time t = 0. Immediately start the stopwatch.
- In Table 1.1, record the temperature θ of the water at times t = 30 s, t = 60 s, t = 90 s, t = 120 s, t = 150 s and t = 180 s.
- Pour the water out of the beaker.

[1]

Mark awarded = 1 out of 1

Examiner comment

Temperatures are realistic and decreasing.

Common mistakes

Room temperature inserted at $t = 0$.

Question 1(b)(i)

(b) (i) Repeat **(a)**, using lid **B** instead of lid **A** to cover more of the beaker as shown in Fig. 1.3. This leaves only 25% of the top of the beaker uncovered. [2]

Mark awarded = 2 out of 2

Examiner comment

Temperatures also decreasing and to at least 1° C (i.e. not all to nearest 5° C or nearest 10° C).

Question 1(b)(ii)

(ii) Complete the headings in Table 1.1. [1]

Table 1.1

	beaker with lid **A**	beaker with lid **B**
t / ..s.....	θ / ..°C.....	θ / ..°C.....
0	80	81.0
30	77	79
60	74.5	77.5
90	72.5	76
120	70.5	75
150	69.0	74
180	68.0	73.5

Mark awarded = 1 out of 1

Examiner comment

Units have been added correctly.

Common mistakes

Some candidates, having filled in the readings, miss the instruction to complete the column headings and go straight on to the next item.

Question 1(c)(i)

(c) (i) Write a conclusion to this experiment, stating for which lid the cooling rate is greater. Justify your answer with reference to your results.

.....

Beaker with lid A

Lid A temperature falls by 12°C in 180s.

Lid B temperature falls by 7.5°C in 180s. [2]

Mark awarded = 2 out of 2

Examiner comment

Conclusion is correct with full explanation that refers correctly to the results.

Common mistakes

Candidates' justifications are too vague and do not include reference to the equal time interval.

Question 1(c)(ii)

(ii) Suggest a change to the **apparatus** that produces a greater difference between the rates of cooling for lid **A** and lid **B**. Explain why the change produces a greater difference.

change *Insulate sides of beaker*

.....

explanation *Loss of thermal energy is then only from the water surface.*

.....

[2]

Mark awarded = 2 out of 2

Examiner comment

Clearly stated change with a well-expressed explanation.

Common mistakes

Candidates will not read the question with sufficient care and miss the emphasis on a change in the **apparatus**. They will then suggest something that does not answer the question, for example 'use a longer time'.

Question 1(d)

(d) A student thinks that the cooling rate is directly proportional to the percentage of the surface area uncovered. He draws a graph of cooling rate against the percentage of uncovered area to investigate this.

Describe how his graph line shows whether the cooling rate and the percentage of surface area uncovered are directly proportional.

.....

Graph will be a straight line.

..... [2]

Mark awarded = 1 out of 2

Examiner comment

Second condition 'through the origin' has been missed. Candidate did not take the hint from the 2 marks allocation that 2 points were required.

Common mistakes

Candidate's omission here is a common mistake.

Question 1(e)

(e) Students in another country are doing the same experiment.

State **one** factor they must keep the same to obtain similar readings.

.....

Room temperature ..... [1]

Mark awarded = 1 out of 1

Examiner comment

Other possible answers might show a more thoughtful approach, but this is acceptable.

Total mark awarded = 10 out of 11

Question 2

Question 2(a)

2 In this experiment, you will investigate a resistance wire. The circuit has been set up for you.

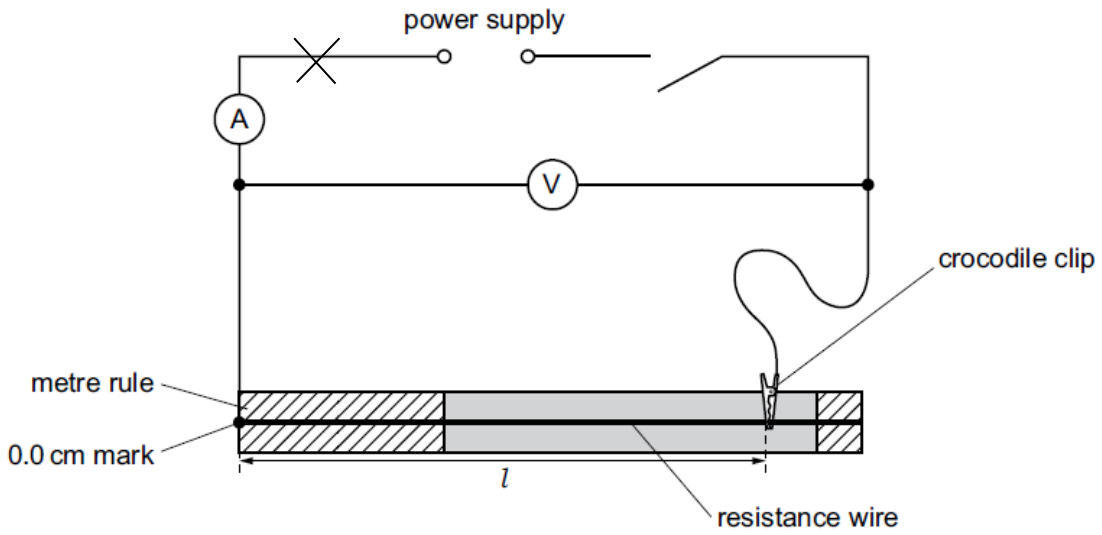


Fig. 2.1

(a) Refer to Fig. 2.1.

Instructions

- Connect the crocodile clip to a length l = 90.0 cm of the resistance wire.
- Switch on the power supply.
- In Table 2.1, record the value of the potential difference (p.d.) V and the current I for the wire.
- Switch off the power supply.
- Move the crocodile clip and repeat the procedure for lengths of resistance wire l = 60.0 cm and l = 40.0 cm.

[3]

Mark awarded = 3 out of 3

Examiner comment

V values are in range. I values are in range and increasing. All V values are to at least 1 decimal place and all I values are to at least 2 decimal places.

Question 2(b)

(b) Complete the column headings in Table 2.1.

Table 2.1

l / cm	V / V	I / A	R / Ω	$\frac{R}{l}$ / $\frac{\Omega}{\text{cm}}$
90.0	2.6	0.36	7.22	0.080
60.0	2.5	0.49	5.10	0.085
40.0	2.3	0.74	3.11	0.078

[1]

Mark awarded = 1 out of 1

Examiner comment

The units are correct.

Common mistakes

Leaving out the units.

Question 2(c)(i)

(c) (i) Calculate, and record in Table 2.1, the resistance R of each length l of the wire.
Use your readings from the table and the equation $R = \frac{V}{I}$.

[2]

Mark awarded = 2 out of 2

Examiner comment

Calculations are correct with consistent 3 significant figures.

Common mistakes

Inconsistent significant figures (e.g. second value here given as 5.1 whilst other two values are to 3 significant figures).

Question 2(c)(ii)

(ii) Calculate, and record in Table 2.1, the value of $\frac{R}{l}$ for each length l of the wire.

[1]

Mark awarded = 1 out of 1

Examiner comment

Calculations are correct.

Common mistakes

A rounding error.

Question 2(d)

(d) A student suggests that the values of $\frac{R}{l}$ for each length of wire should be the same.

State whether your results support this suggestion.

Justify your statement with reference to values from your results.

statement *The results do not support the suggestion.*

justification *The results are different from each other.*

[1]

Mark awarded = 0 out of 1

Examiner comment

The candidate has not appreciated that the results are close enough to be regarded as equal, within the limits of experimental accuracy.

Common mistakes

A contradictory answer, probably due to the candidate trying to memorise answers from mark schemes of past papers (e.g. 'results are nearly the same; beyond the limits'.)

Question 2(e)

(e) Other students do the experiment carefully with the same equipment and do **not** obtain identical results.

Suggest **one** difficulty with the procedure to explain this difference in results.

It is difficult to judge the exact position of the connection of the crocodile clip because of the width of the clip. [1]

Mark awarded = 1 out of 1

Examiner comment

A good practical observation.

Common mistakes

A vague answer not specific to the experiment, for example 'parallax error'.

Question 2(f)(i)

(f) A student finds that during the experiment, the wire becomes hot because there is a high current.

She decides to use a variable resistor to prevent this.

(i) Draw an **X** on the circuit in Fig. 2.1, to show where a variable resistor is connected for this purpose in the experiment.

You are **not** required to do this experiment. [1]

Mark awarded = 1 out of 1

Examiner comment

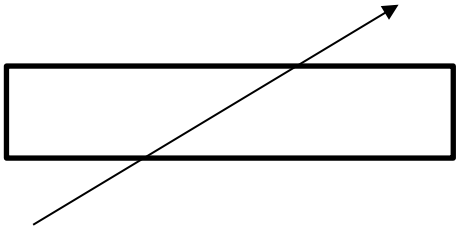
A correct position.

Common mistakes

Variable resistor placed below the voltmeter.

Question 2(f)(ii)

(ii) In the space below, sketch the circuit symbol for a variable resistor.



[1]

Mark awarded = 1 out of 1

Examiner comment

Correct symbol.

Common mistakes

A thermistor symbol or a symbol that has the strike-through with an arrowhead at one end and a thermistor ‘tail’ at the other.

Total mark awarded = 10 out of 11

Question 3

Question 3(a)

3 In this experiment, you will investigate the magnification produced by a converging lens.

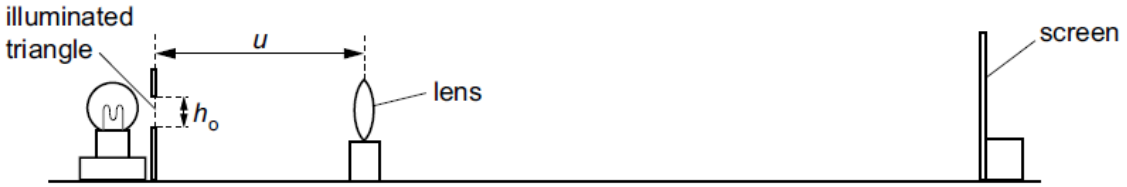


Fig. 3.1

(a) Refer to Fig. 3.1.

Instructions

- Measure and record the height h_O of the triangular object.

h_O = 1.5 cm

- Switch on the lamp.
- Set the distance between the illuminated triangle and the lens to u = 30.0 cm.
- Move the screen until a clear focused image of the illuminated triangle is seen.
- Measure, and record in Table 3.1, the height h_I of the image.
- Repeat the procedure for u = 35.0 cm, u = 40.0 cm, u = 45.0 cm and u = 50.0 cm.
- Switch off the lamp.

Table 3.1

u / cm	h_I / cm	M
30.0	1.5	1.00
35.0	1.1	1.30
40.0	0.9	1.77
45.0	0.8	1.88
50.0	0.7	2.14

[2]

Mark awarded = 2 out of 2

Examiner comment

h_O is within range. h_I values are decreasing.

Question 3(b)

(b) For each distance u, calculate, and record in Table 3.1, a value M using your results from **(a)** and the equation $M = \frac{h_O}{h_I}$.

[1]

Mark awarded = 0 out of 1

Examiner comment

The first two values are correct, but the others are not.

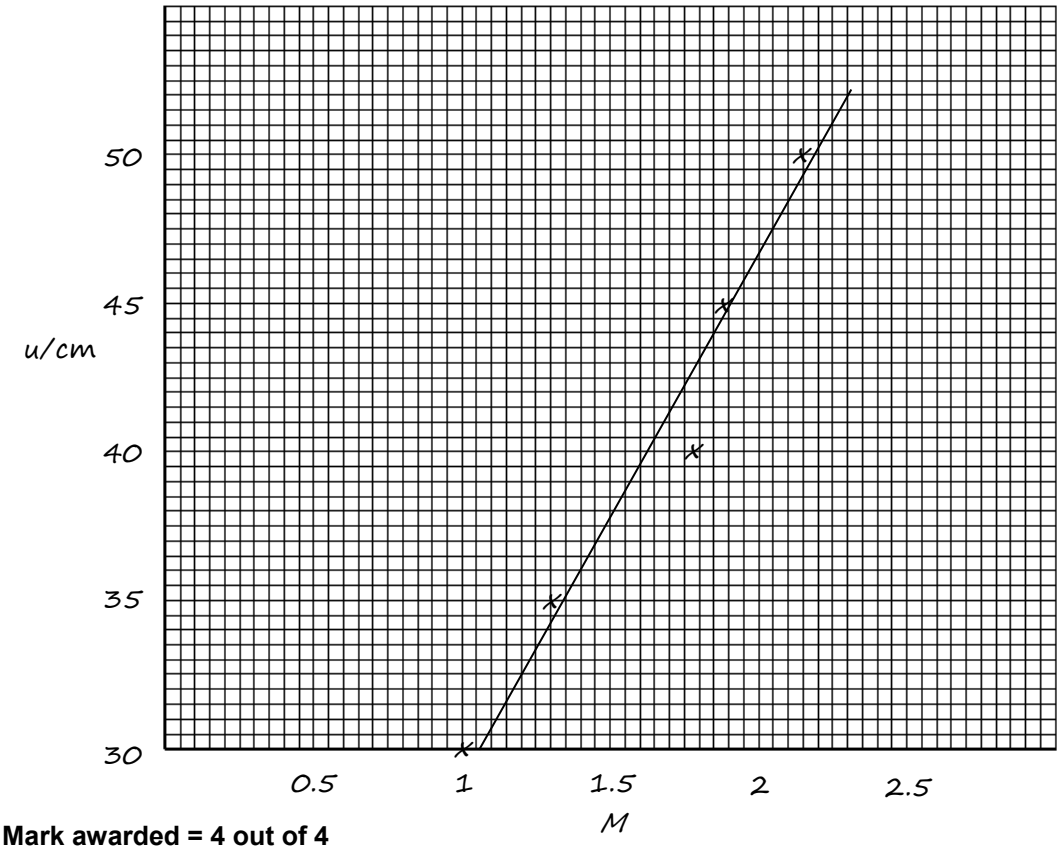
Common mistakes

Wrong calculation (e.g. u/h_I or rounding error).

Question 3(c)

(c) Plot a graph of u / cm (y-axis) against M (x-axis).

You do **not** have to start your axes at the origin (0, 0).



[4]

Mark awarded = 4 out of 4

Examiner comment

The graph is plotted well with axes labelled, a good choice of scale, accurate plots and a well-judged straight line.

Common mistakes

A poor choice of scale that results in the plots occupying less than half the graph grid in one or both directions.

Question 3(d)

(d) Determine the gradient G of the graph.

Show clearly on the graph how you obtained the necessary information.

G = out of range (see graph) [2]

Mark awarded = 1 out of 2

Examiner comment

The triangle is large and clearly marked on the graph. The *G* value is out of range due to the errors in the *M* calculations. This is a 'quality' mark gained by candidates who have carried out the experiment throughout with care and accuracy and therefore ended up with a good final result.

Common mistakes

Drawing a triangle that uses less than half of the line or failing to show the triangle clearly on the graph.

Question 3(e)

(e) Describe **one** difficulty that might be experienced when measuring the height of the image h_I.

Suggest an improvement to the **apparatus** to reduce this difficulty.

difficulty My hand gets in the way.

improvement Mark top and bottom of the image on the screen with a pencil. Then measure the distance between the marks.

[2]

Mark awarded = 2 out of 2

Examiner comment

A clear and thoughtful answer showing a good appreciation of practical difficulties.

Common mistakes

An answer that does not address the question, possibly learned from the mark scheme of a past paper (e.g. 'It is difficult to line up the pins. View the bases of the pins.')

Total mark awarded = 9 out of 11

Question 4

4 A student is investigating the factors that affect the size of the crater (hole) a ball makes when it is dropped into sand.

Plan an experiment to investigate **one** factor that affects the size of the crater. You are **not** required to do the experiment.

The apparatus available includes:

metal balls of different sizes
a tray of dry sand.

Write a plan for the experiment.

In your plan, you should:

- state which factor is being investigated
- state a key variable to keep constant
- list any additional apparatus needed
- explain briefly how to do the experiment, including what is measured and how this is done
- state how to obtain reliable results for this experiment
- suggest a suitable graph to be drawn from the results.

You may draw a diagram if it helps to explain your plan.

I will investigate the effect of changing the mass of the ball.

I will keep the height of drop constant.

I will need a balance to measure the masses of the balls.

I will use a rule to measure the height.

Firstly, I will measure the mass of the balls with the balance. Then I will drop the first ball into the sand. Then measure the diameter of the crater.

I will repeat this with each metal ball.

I will plot a graph of mass of ball against diameter of crater.

[7]

Mark awarded = 6 out of 7

Examiner comment

A clear and concise answer. The candidate has followed the order of the bullet points and briefly addressed each one in turn. All the required elements are present apart from a suggested precaution.

Common mistakes

Candidates often write too much. They begin by repeating much of the introduction to the question including the list of apparatus provided. Having spent time on this they then write an account without, apparently, referring to the bullet points which are there to help them to structure their answer. This results in a rambling account which often misses vital elements such as the measurements that must be taken. In this type of investigation question (but not in this particular case) candidates often offer a prediction (which is not asked for) and then do not offer an explanation of how to reach a conclusion, which is required.

General precautions that apply to most experiments, e.g. how to avoid parallax errors, are not required but candidates should offer precautions that are specific to the investigation. For example, in this investigation, flattening the surface of the sand before each trial.

Total mark awarded = 6 out of 7

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