# PHYSICS

**Paper 0625/01**
**Multiple Choice**

| Question Number | Key | Question Number | Key |
|---|---|---|---|
| 1 | **C** | 21 | **D** |
| 2 | **D** | 22 | **C** |
| 3 | **B** | 23 | **A** |
| 4 | **B** | 24 | **C** |
| 5 | **B** | 25 | **C** |
| 6 | **A** | 26 | **B** |
| 7 | **A** | 27 | **C** |
| 8 | **C** | 28 | **B** |
| 9 | **A** | 29 | **B** |
| 10 | **A** | 30 | **C** |
| 11 | **D** | 31 | **C** |
| 12 | **B** | 32 | **D** |
| 13 | **C** | 33 | **B** |
| 14 | **C** | 34 | **B** |
| 15 | **C** | 35 | **A** |
| 16 | **B** | 36 | **B** |
| 17 | **D** | 37 | **C** |
| 18 | **C** | 38 | **B** |
| 19 | **B** | 39 | **C** |
| 20 | **D** | 40 | **D** |

## General comments

A total of 4888 candidates sat the paper, showing a further increase in numbers this year. There was a mean score of 27.087, and a standard deviation of 6.529.

Once again only two items proved very easy, having a facility of 90% or higher. These were items **3** and **28.** More taxing, with a facility 60% lower, were items **2**, **7**, **12**, **15**, **18**, **19**, **23**, **26**, **34**, **38** and **40**.

## Comments on individual questions

(Percentages in brackets after an item number show the proportion of candidates choosing the correct response).

Although item **1** (81%) was well answered, 15% of candidates opted for D, confusing a time in minutes and seconds with a decimal number, always a potential trap with digital time values. In item **2** (22%), all distractors were popular, especially B, with most candidates missing the point that the ball will always accelerate when in free fall with negligible air resistance. The speed item **3** (92%) caused few problems, but in item **4** (83%), one in ten believed weight to be the same as mass. With a facility of 74%, the balance item **5** proved too much for some, with all distractors being effective. However, in item **6** (78%), only distractor C worked – perhaps a thermometer (B and D) was too implausible. Item **7** (57%) on density was troublesome, understandably, the most common mistake by far was to opt for C. In item **8** (70%), 21% chose A, failing to appreciate that there must be no resultant moment for equilibrium to be established. Item **9** (81%) was well answered, but many candidates chose C, which was the resultant force from the engine, and not the resistive force. Most understood the energy changes in item **10** (80%), with the rest choosing from all three of the other possibilities.

Every incorrect option was attractive to some in item **11** (69%), but in item **12** (31%) nearly half the candidates believed that the pressure above the enclosed liquid surface was atmospheric – it seems that the barometer is widely misunderstood. Distractor D proved more attractive then A or B in item **13** (78%), but there were no clear preferences in the well-answered Brownian motion item **14** (86%). Item **15** (37%) on gas pressure proved to be very difficult with just over half choosing graph D, presumably having failed to read everything carefully. In item **16** (84%), on melting and boiling, option A distracted best, being chosen by 10% of candidates, whereas in item **17** (82%) option C was chosen by 13%. Item **18** (55%) on heat loss caught out a significant number of candidates who didn't appreciate that both convection <u>and</u> evaporation were affected by the lid. In item **19** (45%), almost as many candidates as were correct thought that warm air moved away from the heater through the gap, suggesting an incomplete understanding of convection. With a facility of 82%, the wave item **20** was well answered, and this was similar for item **21** (79%), although 15% chose B. In item **22** (82%) the most common mistake was to recognise D as a correct diagram for refraction, but dispersion was not shown in this.

The facility of the lens ray diagram item **23** was low (50%), with more than one in three opting for D, but the straightforward item **24** (87%) was not a problem for many. Item **25** (69%) required candidates to average the results, but more than a quarter of them chose B (0.5), probably because this value occurred twice. Approximately half the candidates found the recall item **26** (49%) a problem: A and D were both popular choices, each method containing only half of the correct procedure. The magnetism and electric current items **27** (81%) and **28** (95%) were well or very well answered. Although four out of five candidates gained a mark for item **29** (80%), those who failed to use Ohm's law were at a loss to find an answer.

Item **30** (62%) showed confusion between parallel and series circuits, with distractor D proving popular. Approximately one in five candidates chose A in item **31** (71%), failing to realise that a second resistor added in parallel will reduce the overall resistance. Item **32** (74%) was well answered, with the most common mistake being to choose A, with the fuse in parallel with the rest of the circuit. The second fuse item **33** (63%) was also tackled quite well by most, with option C (10 amps) being the most popular distractor. Less well answered was item **34** (39%) on electrical power transmission, with many candidates appearing very confused; this would seem to be a good topic to explain thoroughly. Most candidates were confident with item **35** (71%), with B being the most common error, understandably, and a similar success rate was found in the linked item **36** (74%). Item **37** (72%) was generally tackled successfully, but other candidates needed to concentrate on the primary cause of the brightness increasing, i.e. the thermistor's changing resistance. Deducing half life from raw data without a graph (item **38** (59%)) was a challenge causing many to fail, and surprisingly the straightforward recall item **39** (67%) did not have as high a facility as might be expected. In the final item **40** (57%), nearly a quarter of candidates confused nucleons with neutrons, and chose B.

# PHYSICS

**Paper 0625/02**

**Core Theory**

## General comments

Generally, the standard of scripts was quite pleasing. There were perhaps not many outstanding scripts, because, presumably candidates of this calibre would have been entered for the extended syllabus paper. However, there were many candidates who showed a good grasp of the core material, and deserve to obtain the appropriate grade. There was no question which was not at least attempted by most candidates, and there were few candidates who left appreciable numbers of blank spaces on the paper.

Where the candidate knew the underlying Physics, any accompanying mathematics was usually clearly indicated, although there are still some candidates who risk losing marks by failing to show their working. Poor use of units is not penalised too heavily on this paper, but it is an important aspect of all sciences. The impression gained during the marking was that some candidates have become careless with their use of units. If the answer line of a numerical question does not have a unit printed by it, it is required that the candidate provide it.

As always, weakness in written English is not penalised, unless it becomes impossible to understand what a candidate means by what has been written. Candidates are to be complimented on generally being able to make themselves understood but the general standard of handwriting is of concern. As with the standard of English, poor writing is not penalised, but there were far too many instances where marks could not be awarded because it was impossible to decipher what the candidate had written. It is wise for a candidate to write clearly at all times.

## Comments on specific questions

### Question 1

**(a)** This question was well answered by most. There were some who obtained an incorrect answer, but also failed to score marks for working because either it was not shown or it was set out poorly. [200 minutes]

**(b)** Most answers scored full marks for this part, even if a mistake had been made in **part (a)**, because no further penalty is incurred if a candidate uses a previously-calculated incorrect answer. Good advice to candidates would be to ask themselves "Is my answer sensible?" as there were several instances where candidates obtained implausible answer without apparently realising it and therefore losing marks. [10 or 20]

### Question 2

**(a)** A fairly simple question for most candidates. A few could not do the multiplication correctly, and a few gave the answer in $cm^3$. [3 $m^3$]

**(b)** Some candidates had the density equation the wrong way round, and some gave the units for density rather than mass. However, the question was usually well answered. [3000 kg]

**Question 3**

**(a)** Most knew what the extension was, but a sizeable minority simply wrote Z as the answer. This did not score the mark.

**(b) (i)** Very few failed to read the weight correctly. [4.2 – 4.6 N]

**(ii)** Only a handful of candidates realised that the tension would be the same as the load. Many did something involving both the 4.2 and the 1.7. [4.2 – 4.6 N]

**(iii)** Many spotted that the tension would increase, but a large proportion answered in terms of the ***ex***tension, and so did not score the mark.

**(iv)** Many answered correctly, but also many answered in terms of what happened to the spring, not the weight e.g. "It went back to its original length"

**Question 4**

The whole of this question was rather poorly done. Most candidates showed weakness in at least one of the parts. Answers to part **(c)** often showed awareness of modern applications (e.g. use of cellphones), but a lot of attempts were too vague to be worth marks (e.g. "used in hospitals"). Gamma-rays were often confused with X-rays.

**Question 5**

**(a)** It is clear that, whilst many candidates can cope with the calculation of the echo method, large numbers are very uncertain about what actually happens when the sound hits the wall. Those who knew that the sound was reflected from the wall with the same frequency were definitely in the minority.

**(b)** A good number got the distance correct, but there were at least as many who thought that the sound had only travelled 240 m. The rest of the attempts were mainly the result of some calculation involving 240 and 1.6. Pleasingly, very few tried to engineer the mathematics so that they got 330 m/s as the answer to **(ii)**, and only a handful offered 330 m/s as the answer to **(ii)**. Many answers to **(iii)** were intelligent, although some were too vague to gain the marks.

[480 m, 300 m/s]

**Question 6**

Unfortunately, answers to this question were disappointing.

**(a)** Very few clearly indicated the length to be measured although there were lots of marks at the top of the mercury column which suggested that the candidate might have known the answer, but did not actually answer the question. What was required was a clear indication of the length of the mercury column from mercury surface to mercury surface. Some indicated the length from the bottom of the tube to the top of the column, and others indicated the length of the vacuum above the mercury.

**(b)** Most knew that the mercury level would fall, and even though most attempted an answer to **part (ii)**, hardly any offered an explanation in terms of the behaviour of the air molecules, which was demanded by the question.

**(c)** Virtually none knew where the mercury level in the right-hand barometer would be.

**(d)** Most scored at least one mark for this section.

 

**Question 7**

**(a)** Candidates often scored well on this part. Common faults/criticisms were (i) careless drawing, including failure to use a straight edge, (ii) not drawing in the normal, as instructed, (iii) drawing the incident and reflected rays at right angles to each other, (iv) incorrectly labelling i and r, including showing the deviation as i, and showing i and r as angles with the surface.

**(b)** All that was required here was i = r. Some insisted on writing it out in words but were awarded the mark nevertheless. There were also a considerable number of candidates that introduced sin i and sin r, which lost them the mark.

**(c)** Candidates which followed the instructions usually scored both marks provided their drawing was clear. However, a lot of candidates put the second mirror above the existing one, and parallel with it.

**Question 8**

Answers to this question were very pleasing, with lots of candidates scoring full marks, and lots more losing only one mark. Those candidates who put the wrong polarity for N and S in **(a)** and **(b)** were allowed "error carried forward" for the ticks in **part (ii)** of each. The most common mistake was in **(d)**, where some candidates thought that the rod and magnet would be attracted.

**Question 9**

**(a)**, **(b)** There was good understanding about the switch positions.

**(c)** Many candidates could calculate the current correctly, but some used 6 x 4 or 12 x 4 or 12/4 or 4/6, and often inappropriate units were offered. Some candidates gave the answer without any working being shown, which scored the marks if the answer was correct, but scored no marks if it was incorrect. [1.5 A]

**(d)** Support for the two ways of connecting was about equally divided. Those who chose connection 1 generally could not give a convincing reason for their choice. Those who chose connection 2 usually gave the "if one lamp blows, the other will continue working" reason, and scored a mark. Hardly any said either so that both lamps would then have the full voltage across them (although many did say "same voltage", which was not quite what was wanted), or that each would then operate at full brightness.

**Question 10**

This question and **Question 11**, both of which were on electromagnetism topics, were very poorly answered. Teachers could well regard this as significant.

**(a)** Virtually no candidates could mark the position of the slider correctly. Hardly any attempts were drawn on the potential divider, but were instead drawn elsewhere on the diagram.

**(b)** Hardly any candidates could begin to make an attempt at a suitable answer. There were lots who gave answers involving current flowing through the core to the motor, or who had the core heating up and expanding, or magnetising the contacts so that they attracted, or involving electrostatics. In general, candidates were unable to apply their knowledge of electromagnetism.

**Question 11**

**(a)** Surprisingly, since the term "core" was used in the previous question, hardly any could come up with that name for the piece of iron in this question.

**(b)** There were more candidates who chose a.c. for the mains supply, but not many fewer chose d.c. or "doesn't matter". It was sometimes impossible to tell whether the first letter was a poorly written "a" or a poorly written "d", and so the mark was lost.

**(c)** Those who knew the equation could usually get the correct answer, provided it was transposed correctly. [200]

**Question 12**

This section of the syllabus is often intellectually quite demanding for core candidates. However, it was quite pleasing to see how well many of them coped with this question. Those who had not studied the topic adequately made the usual mistakes, but generally the attempts were quite good.

**Location Entry Codes**

UNIVERSITY *of* CAMBRIDGE
International Examinations

As part of CIE's continual commitment to maintaining best practice in assessment, CIE has begun to use different variants of some question papers for our most popular assessments with extremely large and widespread candidature, The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions are unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiner's Reports.

| Question Paper | Mark Scheme | Principal Examiner's Report |
|---|---|---|
| Introduction | Introduction | Introduction |
| First variant Question Paper | First variant Mark Scheme | First variant Principal Examiner's Report |
| Second variant Question Paper | Second variant Mark Scheme | Second variant Principal Examiner's Report |

**Who can I contact for further information on these changes?**
Please direct any questions about this to CIE's Customer Services team at: international@cie.org.uk

# PHYSICS

**Paper 0625/31**

**Extended Theory**

## General comments

Teachers are urged, out of fairness to their candidates, to encourage their candidates to attempt appropriate papers. It was encouraging to note how many competent candidates there were.

Most candidates managed to score at least some marks on most questions and there were no questions which proved unreasonably hard for all candidates.

Where the candidate knew the underlying Physics, any accompanying mathematics was usually clearly indicated, although there are still some candidates who risk losing marks by failing to show their working. The correct use of units is an important aspect of all sciences. The impression gained during the marking of this set of scripts was that some candidates have become careless over their use of correct units. It is expected that candidates will give appropriate units for all final answers, and a unit penalty is applied for wrong or missing units.

As always, weakness in written English is not penalised, unless it becomes impossible to understand what a candidate means by what has been written. Candidates are to be complimented on generally being able to make themselves understood but what cannot be complimented was the general standard of handwriting. As with the standard of English, poor writing is not penalised, but there were far too many instances where marks could not be awarded because it was impossible to decipher what the candidate had written. It is wise for a candidate to write clearly.

## Comments on specific questions

### Question 1

**(a)** Very few could give a valid reason why the trolley accelerates, or could show that they understood why the runway had a slight slope. Even if candidates have not actually done this experiment they should be familiar with a similar one from their reading.

**(b)** Most could apply F = ma, and calculate the answer. [0.8 kg]

**(c)** Finding the missing value in the table was no problem for most candidates. [0.875 m/s$^2$]

**(d) (i)** This was a simple calculation, but many tried to use speed = distance/time, and got nowhere. [0.6 m/s]

**(ii)** Another straightforward calculation, which many spoiled by using the final speed, from **part (i)**, instead of the average speed. [0.36 m]

### Question 2

For some reason, candidates always get mixed up when attempting questions on moments. Perhaps teachers could take note of this observation.

**(a)** Most made a reasonable, if untidy, attempt at this. In general, attempts used appropriate masses at appropriate distances.

**(b)** The explanations of the test in this part were very poor. It is a common weakness for candidates to be unable to describe things clearly. In this case the problem was mainly that most did not describe a test i.e. an actual manipulation/experiment, but instead simply invoked the Principle of moments, using their values. This, of course, scored no marks.

**(c)** It was fortunate that on this occasion correct units were not insisted upon because very few candidates would have scored either mark.

**(d)** Very few candidates scored marks here. The three main reasons were forgetting to include the weight of the disc, being unable to convert to N and trying to answer by adding moments.

**Question 3**

**(a) (i)** The appropriate equation was well known and used. It was unfortunate that many candidates then went on to subtract the atmospheric pressure, and so lost a mark. [735 000 Pa]

**(ii)** This required the addition of atmospheric pressure to the previous answer, which many did. The mark was awarded for the correct addition, even if the previous answer was wrong. [835 000 Pa]

**(b)** P = F/A was successfully applied in most cases. [$1.625 \times 10^6$ N]

**(c)** Surprisingly, a lot of candidates could not explain clearly why the pressure was less. Many related pressure and depth, but did not apply it to the situation in the question.

**Question 4**

**(a)** The usual zig-zag line was all that was required here, and large numbers scored the mark.

**(b)** Many candidates got part of the way with their answer, by writing about the dust particles being hit from all directions, or randomly. Only a handful went on to say that the hits were just as likely to be up as down.

**(c)** Most, in some way or other, explained that the specks would be moving slower.

**Question 5**

**(a)** Answers to these two parts were usually vague and unconvincing.

**(b)** This question asked for the ***readings*** that are needed. Most did not supply this information, but instead tried to anticipate the quantities that still needed to be known, e.g. mass of water. Possibly the reason for this is not reading the question carefully enough, but possibly it is also due to inexperience in actually doing such experiments and writing a description of the method.

**(c)** Most knew $ml_f$ and Pt, but only the more competent could use them to calculate $l_f$. Not many knew the significance of the 21.0 g of ice melted during the extra 2.0 minutes. [338 J/g]

**Question 6**

Optics questions often pose problems to IGCSE candidates, and there was evidence of this here.

**(a)** A surprisingly large number of candidates could not state what is meant by monochromatic light.

**(b)**, **(c)** Most knew the equation for refractive index, but very few adapted it for light passing into the less dense medium. So, many only scored one mark. The rays drawn on the diagram were inconsistent with only some being correct. [48.0 – 48.2°]

**(d)** A good number of candidates indicated that dispersion would occur but others incorrectly indicated a changed case of refraction or even reflection.

**(e)**, **(f)** There were lots of confused answers to these parts.

**Question 7**

**(a)** Those candidates who took trouble with their diagrams scored well on this part. The mark scheme was strict over its three marks and careless answers lost marks. However, it was good to see that the vast majority realised that the emerging waves were arcs of circles, even if they were poorly drawn. Reference to the published mark scheme will show how the three marks were allocated.

**(b)** Many knew $v = f\lambda$, but some of these could not transpose the equation. Others thought that $f = v\lambda$. Very few knew the unit for frequency, s or m being popular. [8 Hz]

**(c)** Whatever the value obtained in the previous part, it was good to see how many realised that the frequency of the diffracted waves was the same. Interestingly, a noticeable minority thought that the frequency would be halved.

**Question 8**

**(a)** The function of the diode was well known.

**(b)** $Q = It$ was frequently used or stated. Unfortunately, so was $E = VIt$. The correct unit was rarely quoted. [86 400 C]

**(c)** This was an easy definition provided it had been learned. Very few scored marks on this part. In the study of Physics certain things have got to be **known** before progress in understanding can happen. This is one such instance.

**(d)** The circuit diagram should not have caused problems, but many candidates put the lamps in parallel. Also, the calculations showed a lack of ability with electrical theory. [1.33 A, 57 600 J]

**Question 9**

**(a)** Few had any idea about how to store the surplus energy. Common mistakes were to use a transformer/change the transformer and use a capacitor.

**(b)** This was known by most.

**(c)** Quite a few candidates failed to think about the question and wrote IR or I/R, but the majority answered correctly.

**(d)** There were lots of wrong answers to this calculation, even amongst those who knew the equation. The reasons were mainly an inability to transpose the equation, or substituting the wrong values. Those candidates who tried to work out the answer without first quoting the equation were the most likely to make mistakes. [34 880]

**(e)** The same comments apply as for (d). [25 A]

**Question 10**

**(a)** Very few failed to correctly identify the three components.

**(b)** Conversely, very few were able to offer a sensible description of how the circuit worked. This type of description is difficult, especially for those for whom English is not the first language, but the better candidates should have been able to cope, and many of them did score at least some of the marks. All credit to them.

**Question 11**

Candidates' understanding of the cathode ray tube was fragile, to say the least.

**(a)** The labelling of this diagram was disappointing. As is often the case, the X- and Y-plates were frequently interchanged. The cathode was often labelled as the grid or the ray gun (*electron* gun was allowed as an answer, even though not strictly correct)

**(b)** There was an interesting range of suggestions for these functions, including the correct ones.

**(c)** The general fragility of understanding showed itself here as well, but better candidates knew how the cathode ray tube functioned.

# PHYSICS

**Paper 0625/32**

**Extended Theory**

## General comments

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Most candidates managed to score at least some marks on most questions and there were no questions which proved unreasonably hard for all candidates.

Where the candidate knew the underlying Physics, any accompanying mathematics was usually clearly indicated, although there are still some candidates who risk losing marks by failing to show their working. The correct use of units is an important aspect of all sciences. The impression gained during the marking of this set of scripts, was that some candidates have become careless over their use of correct units. It is expected that candidates will give appropriate units for all final answers, and a unit penalty is applied for wrong or missing units.

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## Comments on specific questions

### Question 1

**(a)** Although relatively simple, very few candidates could give a correct reason for the constant speed.

**(b) (i)** Acceptable explanations for the acceleration were rare.

**(ii)** Most knew the equation F = ma.

**(iii)** The calculation was frequently performed correctly, but often the unit was incorrect. [24 N]

**(c) (i)** The key to this calculation was the addition of 14.0 N to the previous answer. Few did this, but those who did were able to score all the marks if they made no further mistakes. Many candidates subtracted the 14.0 whereas others did not know how to deal with the calculation at all. [3.17 m/s$^2$]

**(ii)** This was competently done by many. However, a few tried to use speed = distance/time and were therefore unsuccessful. [7.8 – 8.0 m/s]

### Question 2

For some reason, candidates always get mixed up when attempting questions on moments. Perhaps teachers could take note of this observation.

**(a)** Most made a reasonable, if untidy, attempt at this. In general, attempts used appropriate masses at appropriate distances.

**(b)** The explanations of the test in this part were very poor. It is a common weakness for candidates to be unable to describe things clearly. In this case the problem was mainly that most did not describe a test i.e. an actual manipulation/experiment, but instead simply invoked the Principle of moments, using their values. This, of course, scored no marks.

**(c)** It was fortunate that on this occasion correct units were not insisted upon because very few candidates would have scored either mark.

**(d)** Very few candidates scored marks here. The three main reasons were forgetting to include the weight of the disc, being unable to convert to N and trying to answer by adding moments.
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**(a) (i)** The appropriate equation was well known and used. The pity was that many candidates then went on to subtract the atmospheric pressure, and so lost a mark. [735 000 Pa]

**(ii)** This required the addition of atmospheric pressure to the previous answer, which many did. The mark was awarded for the correct addition, even if the previous answer was wrong. [835 000 Pa]

**(b)** P = F/A was successfully applied in most cases. [$1.625 \times 10^6$N]

**(c)** Surprisingly, a lot of candidates could not explain convincingly why the pressure was less. A lot related pressure and depth, but did not apply it to the situation in the question.

**Question 4**

**(a)** The usual zig-zag line was all that was required here, and large numbers scored the mark.

**(b)** Many candidates got part of the way with their answer, by writing about the dust particles being hit from all directions, or randomly. Only a handful went on to say that the hits were just as likely to be up as down.

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**(a)** Answers to these two parts were usually vague and unconvincing.

**(b)** This question asked for the ***readings*** that are needed. Most did not supply this information, but instead tried to anticipate the quantities that still needed to be known, e.g. mass of water. Possibly the reason for this is not reading the question carefully enough, but possibly it is also due to inexperience in actually doing such experiments and writing a description of the method.

**(c)** This calculation was pleasingly well done. Most candidates at least knew mcθ and Pt, even if they could not do the calculation. Most who obtained the correct answer also had the correct units. This is often a difficult topic for some candidates, but clearly some Centres had taught it well. [4.88 J/(gK)]

**Question 6**

Optics questions often pose problems to IGCSE candidates, and there was evidence of this here.

**(a) (i)** A surprisingly large number of candidates could not state what is meant by monochromatic light.

**(ii)**, **(iii)** Most knew the equation for refractive index, but very few adapted it for light passing into the less dense medium. So, many only scored one mark. The rays drawn on the diagram were inconsistent with only some being correct. [56.68 – 60°]

**(b)** Some thought that the ray would be refracted out into the air, but the majority knew that the ray would be totally internally reflected although few bothered to explain why, despite being told to do so. Reflected rays on the diagram were marked correct if they were drawn at the correct angle, even those who actually labelled the angle as 48.8°. Some candidates seem to think that the incident and reflected rays are at right angles to each other.

**Question 7**

**(a)** Those candidates who took trouble with their diagrams scored well on this part. The mark scheme was strict over its 3 marks, and careless answers lost marks. However, it was good to see that the vast majority realised that the emerging waves were arcs of circles, even if they were poorly drawn. Reference to the published mark scheme will show how the 3 marks were allocated.

**(b)** Many knew $v = f\lambda$, but some of these could not transpose the equation. Others thought that $f = v\lambda$. Very few knew the unit for frequency, s or m being popular. [8 Hz]

**(c)** Whatever the value obtained in the previous part, it was good to see how many realised that the frequency of the diffracted waves was the same. Interestingly, a noticeable minority thought that the frequency would be halved.

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**(c)** This was an easy definition provided it had been learned. Very few scored marks on this part. In the study of Physics certain things have got to be **known** before progress in understanding can happen. This is one such instance.

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**Question 11**

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# PHYSICS

**Paper 0625/04**
**Coursework**

## General comments

It is pleasing to see that points made from previous reports were noted. Although the following points are still relevant to some of the Centres:

- It should be noted that although Moderators do not expect to see written evidence of Skill C1, they do expect to be provided with details of how candidates achieved the marks awarded.

- It is advisable that a maximum of two skill areas should be assessed on each practical exercise.

The candidates at all the Centres were given many opportunities to demonstrate their practical skills using a varied range of tasks from different areas of the specification, clearly a large amount of good work has been completed by teachers and candidates. The majority of samples displayed clear annotation marks and comments which were helpful during the moderation process.

# PHYSICS

**Paper 0625/05**
**Practical Test**

## General comments

The aim of the examination is to enable candidates to display their knowledge and understanding of practical physics techniques. These include:

- graph plotting
- tabulation of readings
- manipulation of data to obtain results
- drawing conclusions
- dealing with possible sources of error
- control of variables
- accurate measurements
- choice of the most effective way to use the equipment provided

The general level of competence shown by the candidates was sound. Very few candidates failed to attempt all sections of each of the questions and there was no evidence of candidates suffering from lack of time. Many candidates dealt well with the range of practical skills tested. Each question differentiated in its own way. The majority of candidates showed evidence of preparation for the different types of question in the examination.

## Comments on specific questions

### Question 1

**(a)** Most candidates recorded sensible values with correct units and performed the calculation correctly.

**(b)** Similarly most candidates recorded sensible values although some had a value for $h_2$ that was clearly wrong.

**(c)** The calculation was often correct but relatively few candidates scored the final mark which required three elements to be correct – the value to be in the appropriate range, 2 or 3 significant figures and the unit of $g/cm^3$.

**(d)** All possible answers were seen as candidates had to think very clearly and consistently. Some candidates did not appreciate that the density of the material would not change regardless of how the experiment was carried out and that the calculated answer would be greater than the actual value under the circumstances described.

### Question 2

**(a)** Many candidates found it difficult to score full marks here. Most candidates knew the circuit symbols but did not score the mark for a correct arrangement. It seemed that many had been trained using past papers and assumed, without proper consideration, that this would be the same as previous circuits they had seen. Therefore, many connected the voltmeter across the power source.

**(b)** Most candidates were able to fill in the table correctly with sensible values. Those who had set up the circuits incorrectly could score most of the available marks but lost the accuracy mark.

**(c) (i)** Candidates had to make a statement that matched their own results to score the first mark. The second mark was scored if they could justify their statement by making reference to the results.

**(ii)** Several possible responses could earn a mark here (e.g. a comment about the possible heating effect) but many candidates struggled to find a suitable response.

**Question 3**

**(a)** A few candidates recorded the temperature of the hot water instead of room temperature.

**(b)** Some candidates recorded incorrect (or no) units. A few wrote 20 for all the volume readings.

**(c)** The graph was generally accurately plotted with the temperature and volume scales labelled but a suitable temperature scale using at least half of the available grid was often not used. A significant number of candidates lost marks since their lines were too thick or they drew poorly judged best fit curves.

**(d)** To score the marks in this part candidates needed to make one sensible comment about preventing heat loss to the surroundings and one comment about adding the water in a more regulated way (e.g. at set times, or in smaller volumes). Weaker candidates found this difficult.

**Question 4**

**(a) and (e)** Accurate measurements, correct calculations and the use of units were required and many candidates succeeded in gaining the marks. Candidates who were used to this type of experiment worked through confidently and achieved the accuracy mark since their values for the focal length were consistent (within an acceptable tolerance).

**(f)** Many candidates could match their results from **parts (d)** and **(f)** to make the correct conclusion (from their own results – even if wrong).

**(g)** Again, candidates used to looking at images could see that the size was the same but the image was inverted. Those who lacked personal experience struggled to come up with sensible answers.

# PHYSICS

**Paper 0625/06**

**Alternative to Practical**

## General comments

The aim of the examination is to enable candidates to display their knowledge and understanding of practical physics techniques. These include:

- graph plotting
- tabulation of readings
- manipulation of data to obtain results
- drawing conclusions
- dealing with possible sources of error
- control of variables
- accurate measurements
- choice of the most suitable apparatus

It is assumed that, as far as is possible, the IGCSE course will be taught so that candidates undertake regular practical work as an integral part of their studies of physics. This examination should not be viewed as a suggestion that the course can be fully and effectively taught without practical work. Clearly, some of the skills involved in practical work can be practised without doing experiments (graph plotting and the tabulation of readings, etc). However, there are parts of the examination in which the candidates are effectively being asked to answer from their own practical experiences and the answers given by some candidates point to a lack of practical physics experience. This was particularly noticeable in **Questions 2** and **4**. Some candidates with personal practical experience displayed a good overall understanding of what was required and therefore scored higher marks than other candidates with apparently more limited experience.

Almost without exception candidates attempted all five questions. The examination appeared to be accessible to the candidates and there was no mark that proved unobtainable. Many candidates had prepared for the examination (very sensibly) by working through past papers. However, the examination showed that where this was done without understanding, candidates gave answers that would have been correct in similar questions from a previous examination session. The diagram in **Question 2** showed this in particular.

## Comments on specific questions

### Question 1

**(a), (b) and (c)** Many candidates conveyed the idea of taking the reading at eye level sufficiently well to score the first mark. Most candidates recorded sensible values with the correct units and performed the calculations correctly.

**(d)** All possible answers were seen as candidates had to think very clearly and consistently. Some candidates did not appreciate that the density of the material would not change regardless of how the experiment was carried out and that the calculated answer would be greater than the actual value under the circumstances described.

### Question 2

**(a)** Many candidates found it difficult to score full marks here. Most candidates knew the circuit symbols but did not score the mark for a correct arrangement. It seemed that many had been trained using past papers and assumed, without proper consideration, that this would be the same as previous circuits they had seen. Therefore, many connected the voltmeter across the power source.

**(b)** Most candidates were able to fill in the units correctly.

**(c) (i)** Candidates needed to show that they understood the idea of 'within the limits of experimental accuracy'. For prediction 1 they could comment that the readings were 'close enough' or 'not quite close enough'. Either of these responses shows understanding. For prediction 2 they had to comment to the effect that the pd in circuit 3 was close to half of that in circuit 1 or 2.

**(ii)** Several possible responses could earn a mark here but many candidates struggled to find a suitable response.

**Question 3**

**(a)** Some candidates recorded incorrect (or no) units. A few wrote 20 for all the volume readings.

**(c)** The graph was generally accurately plotted with the temperature and volume scales labelled but a suitable temperature scale using at least half of the available grid was often not used. A significant number of candidates lost marks since their lines were too thick or they drew poorly judged best fit curves.

**(d)** To score the marks in this part candidates needed to make one sensible comment about preventing heat loss to the surroundings and one comment about adding the water in a more regulated way (e.g. at set times, or in smaller volumes). Weaker candidates found this difficult.

**Question 4**

**(a) and (b)** Accurate measurements and correct calculations and use of units were required here and many candidates succeeded in gaining the marks. However a significant number recorded inaccurate values of either $x_s$ or $y_s$ or both. Weaker candidates struggled to calculate the actual distance $y$.

**(c)** Candidates used to looking at images knew that the image was inverted. Overall, candidates who were used to this type of experiment worked through confidently and achieved high marks whereas those with seemingly little or no personal experience clearly struggled.

**Question 5**

**(a)** The ability to estimate is an important skill and this question showed that many candidates have difficulty here.

**(b)** Straightforward suggestions (e.g. minimise the current and switch off between readings) were correctly suggested by candidates with good practical experience. Too many candidates could not make two good suggestions. Many, but fewer than might be expected, knew that a variable resistor can be used to control current.