PHYSICS

Paper 0625/01
Multiple Choice

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

General comments

The number of candidates for this paper, 3774, was higher than last year, and there was a very similar mean score of 28.551, again close to the target of 30. The standard deviation of 6.621 was higher.

Items with a facility of 90% or over were **1**, **5**, **6**, **11**, **14**, **21** and **24**, and those with a facility of below 60% were items **9**, **15**, **16**, **18**, **19**, **27**, **29**, **30**, **32**, **33** and **34**.

Comments on specific questions

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

The measurement item **1** (96%) allowed candidates an easy start to the paper, and the spe h item **2** (88%) was also well answered. Item **3** (83%) was on average speed, and almost candidates added the distances but failed to notice that the time was only 30 minutes. A simila chose option C in the very straightforward unit recall item **4** (88%). However, the next two items on d **5** (90%) and **6** (92%), have appeared frequently in various forms, and caught out few. The first challenge appeared in item **7** (68%), in which nearly 20% believed that the symmetry of the diagram mean that all the forces would be equal, rather than thinking for a moment that this could not be true. A quarter of candidates opted for B in item **8** (73%), possibly being attracted by the simple shape rather than considering the heights of the Centres of mass. As almost one in two chose distractor A in item **9** (43%), it seems to be worth stressing the process by which hydroelectric power stations operate. Item **10** (74%) led to quite an even spread of choices for those failing to understand energy changes.

As in previous papers, item **11** (95%), on pressure caused by a solid's weight, caused few difficulties. The barometer item **12** (70%) was more problematic, with almost a quarter of candidates choosing A, perhaps in the belief that VW represented some trapped air whose pressure was increasing. Stressing that the space above the mercury is almost a vacuum would seem necessary. The kinetic theory item **13** (89%) was much better answered, but 9% opted for A. Change of state caused few problems in item **14** (95%), but in item **15** (53%) on the same topic all distractors proved popular, especially A, showing that many candidates were unaware that temperature remains constant during melting and boiling. Item **16** (49%) also caused difficulty, with nearly one in three simply reading the position of the top of the mercury column and answering C. Although the heat transfer item **17** (87%) was well answered, item **18** (44%) proved too difficult for most; understandably D was by far the most popular distractor. Item **19** (56%) was also problematic, with B being popular.

The following wave item **20** (81%) and lens item **21** (91%) showed much stronger performance, as did the reflection item **22** (89%). The relationships between loudness and amplitude, and pitch and frequency (item **23** (71%)) were less secure (C was a popular choice). Echoes caused far fewer problems in item **24** (94%), but the magnet items **25** (63%) and **26** (also 63%) proved more of a challenge, D being a mistake in 26. A very poor response was shown in item **27** (35%), with nearly half of all candidates opting for C – it would be well worth stressing in teaching that both e.m.f. and p.d. are measured in volts. In item **28** (70%) more than one in five believed an α-particle to be unaffected by an electric field. In the resistance items **29** (58%) and **30** (50%) it was A and D respectively which were the most popular distractors.

The well-performing item **31** (73%) was better answered, with the choice of C being the rather more common mistake, but the electrical safety item **32** (30%) taxed many, the clear favourite distractor here being A, showing a lack of understanding of the operation of a circuit breaker. Similarly item **33** (45%) caused problems, the popularity of C seeming to show confusion between electrical and thermal insulation as well as confusion over the source of the heating. In the motor item **34** (58%), predictably, B was a popular choice. Item **35** (71%) showed all distractors to be effective and the straightforward c.r.o. item **36** (88%) was well answered. Item **37** (73%) was very close to the target facility of 75% and item **38** (67%) on half life also worked well (option A being the most popular error here). Finally the atomic structure items **39** (77%) and **40** (78%) both gave good statistics, with distractors B and D respectively being the most attractive.

PHYSICS

Paper 0625/02

Paper 2 (Core)

General comments

Candidates performed well on this paper, and there were some very pleasing scripts. Most candidates usually managed to find at least something on every question on which they could score marks. Generally, where a candidate found a problem, there was still some understanding, rather than no knowledge at all.

Numerical work was usually adequately carried out, except where the underlying Physics was not known. As always, candidates need to be reminded that it is important to show their working in numerical questions. Also, in all science subjects the correct use of units is essential, and candidates should develop good habits in this respect.

Once again, the standard of handwriting was sometimes very poor. There is no penalty for this, nor for poor English, but if the marker cannot work out what the candidate is trying to say, as is sometimes the case, marks cannot be awarded. There were one or two cases where even the candidate's name was difficult to read.

Comments on specific questions

Question 1

Most could read the stopwatch and calculate the time to make one bracket. Some candidates could deduce and justify clearly that the worker met the target of part **(c)**. However, the working for this part was rarely clear to follow, and often consisted of just a jumble of figures, from which the marker had to extract what value was possible.

Question 2

This was well answered by most candidates, which was pleasing. Candidates at this level find choosing an appropriate definition easier than writing one themselves.

Question 3

(a) As might be expected, some candidates interpreted the graph as if it were a distance/time graph. However, the majority coped with it correctly and well. A few interpreted QR as "stationary" and QR as "going in reverse", but generally the answers were pleasing.

(b) – (d) were all answered well.

Question 4

(a) Most knew about conduction through a metal, but quite a few did not know about radiation from the Sun. Convection from the Sun was a common incorrect answer.

(b) (i) Very few could score both marks here. Some even put the same thing in both boxes.

(ii) All that was required for this answer was some idea of energy loss or of friction. Most could not give this, and simply repeated things from the question, like "Because the child is sitting still."

Question 5

This whole question was very poorly done by most candidates. This is clearly a topic which nee attention in teaching time.

Question 6

(a) There were some good ray diagrams, but there were also many very careless ones. In parts **(ii)** and **(iii)**, the question clearly refers to the bottom edge of the mirror, but some candidates drew normals and rays at other places. Many did not know which way the normal went, with some drawing it vertically down. The point of the question was that the reflected ray passed over the top of the woman's head, thus providing the answer to **(b)**, but many insisted on drawing it to her eyes. However, the most frequently occurring error was in the position of the image of the woman's eye. About 19 out of every 20 scripts showed it positioned on the surface of the mirror.

(c) Because of the problems with (b), answers to (c) were rarely correct. It was interesting to note that there were some candidates who scored several marks in (c), despite thinking the image was on the surface of the mirror.

Question 7

Both parts of this question were disappointingly answered. Hardly any took into account the "there and back" aspect of the question in either part, and so got answers which were out by a factor of 2. Fortunately for them, the "there and back" error penalty only cost them 1 mark, and if the rest of the working was correct, they could rescue some marks. However, this was such a common error that teachers should take note. Very few could give a suitable suggestion for the obstacle causing the echo in part **(a)**. Common ideas seemed to centre around the tree itself, the axe-head and the open space around the tree. "A wall" was not awarded the mark unless the candidate indicated that it was a large wall.

Question 8

(a) & (b) Both these parts were well answered.

(c) Very few candidates could write anything worth even 1 mark. Most answers were little more than "An electric field is a field." Even a mention of an area or region would have scored 1 mark, but it rarely happened. Quite a lot of candidates said that an electric field was a magnetic field, and then proceeded to talk about north and south poles. There are a number of definitions like this in Physics which are so easy to learn if the candidate takes the trouble, and a lot of marks can be scored in exams, merely for knowing or being able to apply such definitions. Teachers should not be afraid to insist on their students learning by heart a selection of the most important basic definitions.

Question 9

(a) The straight line was usually clearly drawn with a sharp(ish) pencil/pen. A few curved the line up beyond 4 N, but this was not penalised. One or two drew the line from the origin – this was penalised.

(b) There were some interesting explanations for this, with a lot of them being worth a mark.

(c) It was worrying how few could find the extension from the graph. Errors ranged from an inability to take correct readings from the graph to thinking that the length at 3 N was the answer.

(d) Even finding the weight accurately from the length, using the given length, proved too much for some. Candidates for this examination usually score well on graph questions, but not on this occasion.

Question 10

(a) & (b) A few answers were poorly-expressed, but usually the marks were scored.

(c) When the equation was known, the calculation was very competently executed. Some candidates tried to use Ohm's Law, and of course got nowhere.

(d) It was necessary to interpret candidates' answers generously, but most could give [illegible] explanation of why the bell should not be connected to the transformer.

Question 11

Most candidates knew where electrons and neutrons are to be found, although in some cases a certain "benefit of the doubt" had to be given. Fewer candidates were sure of how many electrons and neutrons there are in uranium-238, and in a similar way, not as many knew what happened to proton numbers when an alpha particle is emitted. To score both marks, the candidate had to say both that it decreased and also by 2.

Question 12

(a) Candidates did not answer this part very well. Many thought that changing the position of the ammeter with one or other of the rest of the components would solve the problem. Quite a few simply said "change the connections on the ammeter" or "connect positive to positive and negative to negative" or some variation of these. None of these attempts answers the question unambiguously, and did not score the mark. Although language weakness is never penalised in this paper, nevertheless if a candidate's answer is wrong or incomplete or ambiguous, it is very difficult to give the benefit of the doubt.

(b) Most knew what an ammeter measures.

(c) Circuit diagrams were usually correct and well drawn.

(d) Most could name the instrument, but a very large proportion showed the voltmeter in series with the other components.

(e) It was surprising that such a large number were unable to calculate the current in the resistor. A big proportion used I = VxR or I = R/V or even did not show a calculation at all.

(f) Not many realised that the current in the lamp would be the same as their answer to part **(e)**. The mark was given for repeating the answer in (e), regardless of whether that was correct or not.

(g) Although the calculation of the effective resistance of two resistors in parallel is not expected in the core of this syllabus, nevertheless candidates are expected to know that the value is smaller than either of the two resistors. The combined resistance could not be zero (although one or two thought it could), so the only possible option is 7.5 Ω. Most candidates chose one of the top two options, and very few could say anything acceptable about the effect on the current in the lamp. There were some candidates who answered this very last part in terms of the brightness of the lamp. Even if such deductions were correct, they did not score the mark because this did not answer the question.

PHYSICS

Paper 0625/03

Paper 3

General comments

It is pleasing to see a large number of scripts where it is obvious the candidates have a solid foundation of knowledge, and that many have built on that foundation to gain a good understanding of the work. The major criticism I have is the carelessness in using units demonstrated by many candidates, including some of those that otherwise scored well. There is also a hint that candidates do not have the opportunity to do as much practical work as might be expected, this became very apparent in **Questions 4** and **5**.

It was clear that the vast majority of candidates, from virtually every centre, had been entered at the correct level.

Comments on specific questions

Question 1

(a) Many candidates scored full marks in this section, giving an encouraging start so that they could go ahead confidently to demonstrate their knowledge and understanding.

(b)(i) Most candidates understood the process of finding the stone's volume, but the question specifically asked what readings should be taken, the readings that are taken are the volume of water in the partly filled cylinder and the volume when the stone is immersed in the water. It is not enough to simply say 'measure the rise in the volume of the water'.

(ii) Again it is important to explain fully that the stone is placed on the spring balance, perhaps tied on by a string, and that the reading is taken from the balance, many candidates went further than expected and then described how to find the mass from this measured weight.

(iii) The vast majority knew the equation although some failed to gain the mark because they did not give the equation a subject; mass/volume on its own is not an equation.

(iv) Credit was given for recognising that a cork will float and that a sinker or other device is needed to ensure that the cork is totally immersed in the water, many candidates answered this well and went on to explain that the volume of the sinker had to be taken from the increase in volume of the water.

Question 2

(a) and (b) These parts caused little difficulty. The point shown is the limit of proportionality, although elastic limit was accepted since generally (but not always) the two are very close together.

(c) Very few candidates really studied the graph to see that the extension per unit load increases after the limit of proportionality. Too many candidates satisfied themselves with saying either the spring no longer shows proportionality, which is true but is trivial, or that it does not go back to its original length, which it might or might not.

(d) The vast majority of candidates were able to complete the calculation, but very few included a unit at all, and of those that did, many got the incorrect unit. Common errors were to give N, mm, and the more exotic N/Hz. Candidates should be encouraged to think through what units a quantity should have.

Question 3

Some excellent answers were given to both these parts, candidates showing a real understa equating the kinetic energy to the potential energy. Surprisingly, the final part caused more trouble th earlier parts. It was sufficient to say that some of the initial potential energy was converted to heat or sou An even better answer, which was very rarely seen was ‘work is done against air resistance’.

Question 4

(a) It was very disappointing how many failed to read the graph correctly, the question clearly asked for the rise in temperature during the two time intervals and should have presented no difficulty. Was it lack of care in reading the question or lack of experience in doing and analysing practical work which caused this? I suspect the latter when taken in conjunction with the poor explanations given in the second part where only a minority talked in terms of energy loss, and amongst those, few stated that there was greater energy loss at the higher temperature.

temperature rise in first interval = 20°C
temperature rise in second interval = 15°C

(b) There were some very good attempts to calculate the specific heat capacity of water, although the units given were often incorrect. Amongst the predictable errors; using kilograms rather than grams, failing to include degrees Celsius, some candidates from specific Centres used J/kg/ which must be emphasised is technically incorrect.

(c) The diagrams of the thermocouple showed a variety of ideas, some diagrams were detailed and clear, whilst others showed little idea. The making of a simple thermocouple is something that candidates can do so easily and in my experience find quite magical that it actually works!

Question 5

(a) The vast majority of candidates recognised the energy transfer as being by conduction, and recognised that the molecules near **A** increased their vibration on heating. Few then went on to explain the vibration was passed on from molecule to molecule. An alternative approach was to explain conduction in terms of the movement of free electrons. This was rarely used and the ideas were often muddled.

(b) The diagram to explain the experimental procedure was sometimes drawn well. Often the diagram was totally wrong, showing direct heating and quite clearly conduction for example, or it was ambiguous, not making it clear if it was emission or absorption. Candidates should be taught to use simple 2-dimensional drawings; in this case a plan view of a heater surrounded by four plates, each with a thermometer attached, was the obvious way to draw this diagram. If, clearly, the wrong experiment was described in the diagram it was not possible to credit answers in the second two parts. Similarly, if no thermometers were included in the diagram then it was not possible to measure the temperature in the second part.

Question 6

(a) The diagram was completed well with few errors.

(b) This section caused more difficulties with many candidates opting for lateral inversion, however there are two reflections, therefore it is ‘laterally re-inverted’.

(c) Again the explanations showed a good understanding that the ray entering perpendicular to the surface (or with an angle of incidence of 90°) would pass straight through that surface.

(d) The calculation was done well, although a surprising number of candidates did not include the unit.

speed = 2×10^8 m/s

(e) Most candidates described total internal reflection and backed this up by explaining the angle of incidence at **B** is less than the critical angle. Only a few tackled the idea that the angle of incidence is 45°, so the angle of reflection is 45° and the deflection is 90°.

Question 7

(a) Most candidates were able to name one error in the diagram and a sizeable number gave answers for both.

(b) The sketch was quite variable. The majority realised that here would be a straight section to the wavefront after it came through the gap. Few, however, drew the curved edges correctly. The straight section should extend only to the projection of the edges of the slit, and the curve at the edge should not extended back to the barrier.

(c) The calculation was done well, although a lot of candidates lost marks by simply giving the wrong unit or by trying, incorrectly, to convert the answer to m/s. The message is clear; do not do unnecessary work!

speed = 9.6 cm/s

Question 8

(a) This was done well with the vast majority of scripts showing the switch in the correct position.

(b) Generally done well, although a small number of candidates drew the symbol for a thermistor or simply forgot to include the arrow head on the line through the rectangle.

(c) This question was removed from the examination in order to treat all candidates fairly.

(d) Good attempts were made to calculate the resistance, and in this case virtually everybody included the correct unit!

(e) Most candidates recognised that this was a parallel circuit and that the removal of **Y** did not effect the potential difference across **X** and **Z**.

Question 9

(a) Many good answers were given for both parts of this section. The connections to the plates were done correctly, although occasionally a candidate would have the plates the wrong way round, or more worryingly the negative terminal of the supply was connected to the beginning of the electron beam! The descriptions were clear and concise and rarely missed any of the important points.

(b) This section was not done so well. It is not enough to say that the X-plates move the beam backwards and forwards across the screen. It is the potential difference that is applied across the X-plates which deflects the beam, to move it back and forth a varying potential difference (or in this case a time-base voltage) moves it back and forth. A similar argument, applying a varying or alternating potential difference across the Y-plates was needed to explain the vertical movement of the beam.

(c) This was an easy mark for the majority, however failure to draw the two wavelengths specified caused some to lose the mark.

Question 10

(a) The majority of candidates recognised the circuit components although the occasional thermistor, diode, transducer and light emitting diode crept in.

(b) Virtually every candidate opted for either **B** or **C** with the majority choosing correctly.

(c) The action of the transistor is not easy to understand and it is not surprising that this section caused a great deal of difficulty. The problems started with candidates wrongly assuming that for the lamp to light the LDR should have low resistance (for high current). The idea that the high resistance of the LDR led to a larger input (or base-emitter) voltage was only understood by a very small minority, and those tended to come from a few specific Centres.

Question 11

(a)(i) Few candidates really explained what happens when a gas is ionised by radiation. Whi correctly explained that they lose electron(s), very few explained that the electron was knock the atom by the ionising particle or photon.

(ii) It was not enough to simply state that α-particles are better ionisers than β-particles. More was needed, such as more ionisations per unit length of their path, or that α-particles are more massive/have greater charge/travel more slowly than β-particles.

(b) Some good applications were given, however candidates must realise that they need to be specific with their answers. Vague answers such as medical uses/industrial uses/sterilisation/tracers will not gain credit. The explanation/diagram was often quite well done and sometimes it qualified a vague answer in the first part for credit.

PHYSICS

Paper 0625/04

Coursework

General comments

The candidates at the ***small number of centres*** were given many opportunities to demonstrate their practical skills using a varied range of tasks from different areas of the syllabus. Clearly a large amount of good work has been completed by teachers and students. A large number of samples illustrated clear annotated marks and comments, which was helpful during the moderation process.

It is pleasing to see that points made from previous Moderators' reports were noted. The assessment criteria were successfully applied and the marks awarded to candidates were not adjusted.

The following two points are still relevant to a couple of centres:

- Three skills should not be assessed in one task. It is acceptable to assess two skills using one task, the combinations that are most frequently used are C1 and C2; C2 and C3; C3 and C4.

- 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.

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 inaccuracy
- 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. 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 all the different types of question in the examination and it is pleasing to see that more candidates are successful in dealing with the optics question than has been the case in the past.

Comments on specific questions

Question 1

(a) Most candidates successfully recorded a sensible value for the mass (between 10 g and 50 g).

(b) and (c) The length was recorded correctly by most candidates (between 6 cm and 10 cm) and many scored the mark awarded for using at least three measurements with most of those sensibly using five or more measurements. The average was then usually correctly calculated.

(d) To score the marks here candidates needed to wrap at least 30 cm of the string provided around the rods (many used just one revolution) and then obtain the circumference by division. A significant number of candidates were confused here and were determined to involve π thus losing a mark.

(e) Most candidates calculated the volume V correctly.

(f) Few candidates scored the mark for the estimate. They were expected to realise that the volume of air could not be calculated with accuracy and therefore to give an answer less than V by up to 10% and expressed as a whole number. Estimation of answers is a useful skill to learn during the course.

(g) Most candidates were able to calculate the density. Answers to 1, 2 or 3 significant figures were allowed. The best candidates realised that they were using an estimated volume and so gave one or two significant figures.

Question 2

(a) – (d) The majority of candidates completed the table correctly but some apparently guessed calculate *T* and the examiners saw a variety of combinations of the figures in the table. values should have been given either all to three significant figures or all to four significant figures. Candidates must be able to correctly round their answers to the appropriate number of significant figures. Some lost a mark here.

(e) The graph work was disappointing in this examination. Too many candidates chose unsuitable scales or made plotting errors. The best fit lines were often too thick and poorly judged. However, most candidates scored the mark for the quality of their readings if all their plots were sufficiently close to the best fit line.

(f) Only the most confident candidates scored the mark for realising the statement was incorrect, giving the reason that the line was not a straight line through the origin (or words to that effect).

(g) A good proportion of candidates commented sensibly here about repeat readings, a greater range of *d* values or using a small/constant amplitude of swing.

Question 3

(a) – (i) and (k) – (p) It was pleasing to see that the recent improvement in the standard of work on this type of optics question has been maintained. Many candidates drew a good clear diagram following the instructions with care. Some candidates, however, seemed to have had little or no experience of this type of work and drew diagrams that were far from what was required, with rays in very obviously wrong positions. The 30° angle between **GJ** and the normal was usually correct as was the distance **AG**.

(j) and (q) Most candidates measured their angles correctly but some drew their lines without sufficient care and so lost the marks for the quality of their work, which was assessed by comparing their angles with the expected results (allowing a suitable tolerance).

(r) Candidates who were familiar with this type of practical work and who had been encouraged to understand the practical techniques involved were able to explain that the bases of the pins would be used because of the difficulty of ensuring the pins were vertical. Alternative wording that conveyed the necessary understanding was, of course, given full credit.

Question 4

(b), (c) and (e) The majority of candidates completed the tables correctly, showing temperatures that were decreasing. A few lost marks by wrongly inserting room temperature as the first reading.

(d) Most candidates suggested a suitable volume, with a correct unit, between 105 cm^3 and 250 cm^3.

(f) The conclusion here had to match the results and the examiners were looking for a justification in terms of the temperature differences.

(g) Candidates who understood the importance of the control of variables were able to successfully make three sensible suggestions. However, a significant number of candidates appeared to read the question without due care and to think that it asked for suggested precautions to enhance accuracy. This may have been due to assuming that this question was asking for exactly the same as a past paper that had been studied during revision sessions.

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 inaccuracy
- control of variables
- accurate measurements
- choice of 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 study of Physics. This examination should not be seen as suggesting 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, tabulation of readings, etc. However there are parts of this examination in which the candidates are effectively being asked to answer from their own practical experience.

The answers given by some candidates in this examination, point to a lack of practical Physics experience.

Some candidates have a good overall understanding of what is required, backed by personal practical experience and therefore score high marks. Others, obtaining lower marks, appear to have limited experience.

Almost without exception candidates attempted all the questions. The examination appeared to be accessible to the candidates and there was no mark that proved unobtainable. Overall the standard was pleasing.

Comments on specific questions

Question 1

(a) and (b)(i) Most candidates successfully recorded the correct values, giving the correct unit.

(b) (ii) A simple division was required here. However it appears that the word 'volume' made many candidates feel that they had to include π in their calculation.

(c) (i) Few candidates scored the mark for the estimate. They were expected to realise that the volume of air could not be calculated with accuracy and therefore to give their answer to one or two significant figures. Many gave an answer that bore no relation to the volume calculated in **(b)(ii)** and, even those who suggested an answer within the tolerance allowed, gave three or more significant figures. Estimation of answers is a very useful skill to learn during the course.

(c) (ii) Most candidates could calculate the density but the mark was only awarded to those who obtained an answer between 0.84 and 0.90 as this was a result of good work up to that point. Some lost the mark for the unit.

Question 2

(a) and (b) The majority of candidates completed the table correctly. The *T* values should have be either all to three significant figures or all to four significant figures. Candidates must be a correctly round their answers to the appropriate number of significant figures. Some lost a m here.

(c) The graph work was disappointing in this examination. Too many candidates chose unsuitable scales or made plotting errors. The *T*/s axis should have had a scale chosen so that the plots occupied more than half of the grid. Candidates were instructed where to start the *x*-axis but many were careless here and did not follow the instruction. The best fit lines were often too thick and poorly judged.

(d) Only the most confident candidates scored the mark for realising the statement was incorrect giving the reason that the line was not a straight line through the origin (or words to that effect).

(e) Most candidates scored the mark for suggesting improved accuracy.

Question 3

(a) It was pleasing to see that the recent improvement in the standard of work on this type of optics question has been maintained. Many candidates drew a good clear diagram following the instructions with care and obtaining accurate results for **AG** and *i*. Some candidates, however, seemed to have had little or no experience of this type of work and drew diagrams that were far from what was required, with lines in very obviously wrong positions.

(b) (i) Many candidates had a large pin separation marked. Past mark schemes have used a minimum pin separation of 5 cm as being worthy of a mark (as was the case this time). There is evidence that some candidates think that the pin separation must be exactly 5 cm. This is to misunderstand the practical point being tested and give a high risk of the candidate losing the mark with a pin separation of 4.9 cm.

(b) (ii) Candidates who were familiar with this type of practical work and who had been encouraged to understand the practical techniques involved were able to explain that the bases of the pins would be used because of the difficulty of ensuring the pins were vertical. Alternative wording that conveyed the necessary understanding was, of course, given full credit.

Question 4

(a) Most candidates gave the correct temperature reading including the unit. The answer '20.8°C' was seen in some cases and 32°C in others.

(b) Most candidates realised that there was a smaller temperature drop in beaker B.

(c) Most candidates could name a suitable insulating material.

(d) Candidates who understood the importance of the control of variables were able to successfully make three sensible suggestions. However a significant number of candidates appeared to read the question without due care and think that it asked for suggested precautions to enhance accuracy. This may have been due to assuming that this question was asking for exactly the same as a past paper that had been studied during revision sessions.

Question 5

(a) Most candidates knew the correct circuit symbols and were able to draw the circuit.

(b) Candidates who appeared to have experience of this type of practical work realised that the lamp was unnecessary as the ammeter (or voltmeter) would indicate if a current was present.

(c) The variable resistor was identified correctly by many.

(d) Only a minority of candidates were able to suggest that using a low current and ff between readings would minimise the heating effect.

(e) Some candidates correctly identified position A, along with correct reasoning that there is m the resistance wire included in the circuit.