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Group III
Sciences

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PHYSICS

Paper 0625/01
Paper 1

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

General comments

The mean mark for this Paper was 30.228, slightly higher than in November last year, and very close to the target of 30.000. The standard deviation of 5.870 was lower.

Items 11, **16** and **18** produced the highest scores, with over 90% of candidates answering correctly. Less than 60% were correct for **Items 3**, **10**, **24**, **30**, **37** and **39**.

Comments on specific questions

Item 1

This was on measurement and produced 84% correct responses.

Item 2

Almost four out of five candidates could answer this item, also on measurement, but 14% opted for **A**, indicating a need to check scales carefully.

Item 3

This was not well answered (29% correct) - 41% chose **A**, probably assuming that all motion graphs show speed against time.

Item 4

There were few problems with this item on speed.

Items 5 and 6

These were on mass and weight and produced correct answers from four out of five candidates.

Item 7

Nearly three quarters were correct, although nearly a fifth opted for **B**, failing to subtract the mass of the measuring cylinder.

Item 8

Of the 21% incorrect answers, 11% chose **A**, failing to appreciate that a change in direction implies acceleration, and therefore a resultant force.

Item 9

72% were correct. It was option **A** which attracted a quarter of candidates, who did not notice that the centre of gravity of **B** was lower.

Item 10

Less that half responded correctly, with more than a third opting for **B**: the stem contained the vital information that the car was accelerating.

Item 11

This caused very few problems.

Item 12

This was well answered. However, option **B** attracted 13% of responses, suggesting that these candidates believed the atmospheric pressure to act inside the tube.

Items 13 and 14

Little difficulty was experienced with both of these items.

Item 15

13% incorrectly chose **C**.

Item 16

Thermometers appear to be well understood and, with a facility of 92%, this item proved to be one of the easiest.

Item 17

This was answered correctly by three quarters of candidates, but option **B** (14%) and option **C** (10%) demonstrated that these candidates were not clear that melting ice will show a constant temperature.

Item 18

This was found easy (92% correct).

Item 19

Here 14% to opted for **A**, believing that radiation could be prevented by an air gap.

Item 20

B was the most popular distractor – a simple confusion between the two types of wave.

Item 21

Option **D** was chosen by 16%, who did not recall the difference between diffraction and refraction.

Item 22

Similarly, nearly one in five were attracted by distractor **D**, having not read the stem carefully.

Item 23

This was well answered.

Item 24

This caused 32% to choose **A**, and 13% **D** – before answering, candidates needed to look carefully at the frequencies given.

Item 25

Option **C** was quite commonly chosen.

Item 26

Both **B** and **C** proved attractive, suggesting a need to stress this method of demagnetisation.

Item 27

C proved the problem for 16% who were uncertain of induced magnetism.

Item 28

This caused few difficulties.

Item 29

C and **D** were thought correct by 11% and 16% respectively. These candidates either failed to rearrange the equation correctly, or did not calculate the values.

Item 30

Nearly half found this too challenging, with **B** and **A** proving the more popular distractors, perhaps indicating only a simple link between the resistance and the number of resistors.

Items 31, 32, 33 and 34

These were answered well

Item 35

A fifth of candidates chose **B**.

Item 36

This posed few problems.

Item 37

This was on potential dividers and was only correctly answered by just over a third, with **B** and **C** attracting 24% and 40% respectively – this topic would appear to need attention.

Item 38

One in five chose **A**, apparently having failed to learn the nature of alpha-particles.

Item 39

Just over half of responses were correct, but 27% opted for **D**, perhaps confusing radioactive emission with evaporation – an incorrect link which needs to be rectified.

Item 40

This final item was not found very difficult by most, with a facility of 81%.

Paper 0625/02
Core Theory

General comments

This Examination Paper performed well, with a good spread of marks. Some candidates scored close to maximum marks and very few candidates were unable to at least make some attempt at most questions. **Questions 10** and **11** required candidates to think carefully and apply the Physics they had learned. This was a skill which some candidates found difficult to exercise, possibly due to ignorance, but there were many pleasing attempts at these two questions and some good marks were scored. In the questions where mathematical work was required, most candidates coped very well, if they knew the underlying Physics. In most cases, candidates tried hard to write clearly and to set out their work in an understandable manner. There were, however, a handful who gave every impression of challenging the Markers to read what they had written - there were even one or two candidate names on the front cover which were difficult to read. It should be pointed out to such candidates that it is silly to lose marks because the Marker cannot read what has been written. Every allowance was given to interpret what candidates with poor English skills had written, and such candidates were only penalised if what they had written was clearly wrong or impossible to interpret.

Comments on specific questions

Question 1

Most candidates correctly answered **(a)(i)**, but a very large proportion of these could not give a reason. In **(b)** a very disappointing proportion realised that the energy in **C** was greater because of increased KE. In fact, only a small number even ticked the correct box. This suggests that once a question gets away from the usual PE turning into KE scenario, candidates do not really seem to understand this topic.

Question 2

This was a question which was well answered by most candidates. The most common mistake was to interchange insulator and conductor in **(a)** and **(c)**.

Question 3

The large number of correct answers was very pleasing. In the majority of cases, the direction was shown correctly, but the quality of the circles left a lot to be desired. Candidates were fortunate that no quality mark was applied here, and anything which looked as though it was intended to be a circle centred on the wire, however shaky, was credited. The comment must be, however, that candidates really must take more trouble over the diagrams they draw.

Question 4

Apart from the usual selection of careless subtractions, this question was well done, even the last part, where most candidates worked out that the liquid level would be lower.

Answers: 410g, 0.82 g/cm^3.

Question 5

Answers to this question were almost always dismally poor. Vagueness ruled! Most candidates do not seem to know precisely what happens to a nucleus during radioactive decay. A lot of answers confused decay with fission. In **(b)**, it was rare to find a candidate who even realised that two half-lives were involved, let alone obtain the correct answer.

Answer: 56 yrs.

Question 6

Virtually no candidate showed that they realised that melting point is a temperature. Most answers simply said "It is when.......", indicating that they thought it was a point in time. A similar state of affairs arose in **(c)(ii)**, where the vast majority clearly thought that the boiling point was the period during which boiling occurred, or the time when boiling started. In **(c)(i)**, very few spotted that boiling was already occurring at the start of the graph, so they showed the temperature rising in some fashion from the origin. Often the graph was the usual rise up to a maximum followed by a horizontal portion. In such a graph, credit would have been given if the temperature of the horizontal portion had been indicated as the boiling point, but very few could even do this. Most marked the "knee" of such a graph as the boiling point.

Question 7

Parts **(a)** and **(b)** were reasonably well done, although in **(b)** an action without an observation did not score the mark e.g. "Hold it near some small pieces of paper" did not score unless accompanied by "and see if they are picked up". In **(c)**, it was clear who had bothered to learn what an electric field is - most just wrote vaguely about charges. Part **(d)** was usually correctly answered, although markers often had to interpret what the candidates were saying. It was pleasing to see how many intelligent attempts were made at **(e)**. Throughout this question, many candidates confused electrostatics with magnetism, referring to such things as "charged poles" and "copper is not a magnetic material".

Question 8

Candidates were often wrong in the choice of unit for e.m.f., but apart from this, the question was well done by most candidates. It should be pointed out that, in **(b)**, to write down the "triangle" picture for relating V, I and R was not acceptable. The question requires an equation to be written down.

Answers: 2.35 V, 5.3 W.

Question 9

It was clear that most had a good understanding of how to measure the speed of sound. Some spoiled their answers by thinking in terms of the echo method, but most responded well to this slightly different approach to the experiment. The need for no buildings being near, and for the large distance, were well known, if not very clearly explained in many cases, and most candidates could provide an acceptable means of measuring the distance (some of which were very ingenious). The usual answer to **(d)** was along the lines of "Light travels faster than sound". This scored one of the two available marks, with the other mark, for an indication that it is very much faster, being scored only rarely. The calculation in **(e)** was usually well done, but it was disappointing how many candidates did not put a unit. Reasons for the repeat, in **(f)**, were usually vague, and not worth the mark available.

Answer: 340 m/s.

Question 10

It was recognised that for most candidates the apparatus in Fig. 10.1 would be a novel situation. However, a good proportion of candidates made an intelligent attempt at using their knowledge to suggest sensible answers to **(a)(i)** and **(iii)**, if not to **(ii)**. It was not expected that candidates would get the direction of the movement, simply that there would be movement and that in **(iii)** it would be in the reverse direction. Notice that the question asked for what is seen, so answers to **(i)** and **(iii)** in terms of force did not score. Answers to **(ii)** were usually vague, and rarely worth more than 1 mark. Part **(b)** could hardly be more standard, but candidates frequently could not put correct names in the top two boxes. If an incorrect name was written in the top box, the error was not penalised again in **(ii)** - here, the same incorrect name would be accepted.

Question 11

Although the working of a reed relay is clearly in the syllabus, it was expected that many candidates would find difficulty with this question because it requires understanding, rather than simple recall. Some candidates did indeed find the question beyond their capabilities, but it was most pleasing to see how many completely correct or very nearly correct answers there were, to both **(a)** and **(b)**. In many Centres, this is clearly a topic which has been carefully taught. Even some of the weaker candidates made attempts which, although wrong, showed sufficient application of Physics to be worth a mark or two.

Question 12

Unfortunately, after **Question 11**, intelligent application appeared to desert most of the candidates. Answers to this question were riddled with errors, even from many of the better candidates. In **(a)**, the vast majority of diagrams showed the emergent ray being refracted upwards, with "straight on" being the next most popular choice. The correct refraction, downwards, was a rarity. Again in **(a)**, nearly all candidates showed dispersion of the red light at one or other of the two surfaces, either into two rays or into multiple rays. "Refraction" or "deviation" were the only acceptable answers to **(a)(ii)**. A lot of candidates wrote "dispersion" or "reflection". In **(b)**, very few scored all of the marks relating to the diagram. Very few showed the dispersion starting at the first surface; frequently the two rays were not identified as red and violet, which lost a mark and which also meant it was impossible to judge whether X from **(d)(i)** was correctly positioned (i.e. beyond the red end of the spectrum). Many knew that IR is invisible, but fewer could name a suitable detector – "IR detector" and similar were not acceptable.

Paper 0625/03

Paper 3

General comments

The general standard of the entry appeared better than the November entry of previous years. The proportion of very good candidates was high and the numbers of very weak candidates appeared to be lower.

Questions or parts of questions where the ability to understand and apply Physics principles was essential, proved very difficult for even the most able candidates. Examples of this were **1 (c)**, **1 (d)**, **4 (b)**, **8 (b)**, **8 (c)** and **10 (c)**.

Questions involving calculation were generally well answered and the final solutions generally had correct units. However, the exception to this was **4 (a)(ii)** which produced few correct answers and very many wrong units.

Questions involving some knowledge of simple experiments have been very poorly answered in the past and this year proved to be no exception to that sequence. **Questions 2 (a)** and **2 (b)** were particularly disappointing examples.

Comments on specific questions

Question 1

(a) Generally well answered, but a number spoilt their attempt by not adding any labels as the question directed. Very few showed a steeper gradient for EF than BD. Weaker candidates often drew a "hump" shape which was not creditworthy.

(b)(i) Many correct solutions with the most common error using mass x distance instead of force x distance.

(ii) Surprisingly this was answered better than **(i)** with the majority of candidates scoring full marks. Common errors were to fail to square the velocity either at the formula stage or at the substitution stage.

(c) Most knew the difference between scalar and vector quantities but many failed to relate this knowledge to the question asked. Few clearly stated that the direction changed at D but the value did not and so the velocity (vector) changed.

(d) Few marks were scored because candidates failed to answer the question set. Many understood that the potential energy at F was less than the potential energy at B, but failed to say what had become of the apparent energy loss. Some indication that work done against the friction force along EF was converted to heat was all that was needed but this was rarely seen. Too many candidates confined their answers to the change from potential energy to kinetic energy along BD which contributed little to the answer.

Answers: **(b)(i)** 1.2 J, **(ii)** 0.63 J.

Question 2

(a)(i) The diagrams were very disappointing indeed with many candidates drawing a measuring cylinder with the rock immersed in water. Where a balance was drawn, all too often the 100 g mass and the rock were perched precariously on top of the rule so that it would have been impossible to balance it or have any real idea of exactly where the downward forces acted on the rule. It was expected that both the mass and the rock would be hung from the rule by the cotton thread.

(ii) A great many answers said nothing about readings, merely going into huge detail about how to balance the rule. Many others suggested volume readings and then gave exactly the same answer in part **(b)**. Too often the principle of moments was quoted without in any way relating this to the question.

(b) Generally well answered, but few made it clear that the rock had to be covered. A number used the measuring cylinder as an overflow can which was not allowed, whilst others filled the cylinder to the top with water and then magically managed to take the volume with the rock in the cylinder.

(c) Most calculated this correctly, stated the equation used and gave the correct unit.

Answer: **(c)** 3.7 g/cm^3.

Question 3

(a) Only a fraction of the candidates appeared to have any knowledge of thermocouples. Those that did choose the correct apparatus, made many bad mistakes such as separating the conductors at the hot junction or not joining the hot and cold junctions by anything. Very few labelled a galvanometer, ammeter or voltmeter. A simple single junction (hot) made from two different metal wires twisted together and the other ends to a suitable meter was all that was required.

(b)(i) Only a very small number realised that the meter needed to be calibrated to read in degrees or that the meter reading had to be converted to degrees.

(ii) A reasonable number understood that a change in temperature of the hot junction led to a change in current or e.m.f or voltage. (All these were allowed).

(c) Mostly correct, with high/low temperatures and rapidly changing temperatures quoted. Some gave "more accurate readings" which was not allowed.

Question 4

(a)(i) The responses were very disappointing with more than half the entry not knowing the formula or being unable to transpose it correctly.

(ii) Very few correct answers. Even when the correct formula was given in **(i)** it was often incorrectly used or arithmetic errors were made. The unit was more often given as J/kg when the value had been calculated in J/g.

(b) Answers were very poor with many candidates making no reference to the energy of the molecules. Clear answers in terms of the work done against the intermolecular forces to separate the molecules were rare even amongst the most able candidates.

Answer: **(a)(ii)** 2250 J/g.

Question 5

(a)(i) Candidates found this surprisingly difficult. The most common error was to mark the peak as a rarefaction and a trough as a compression.

(ii) Many correct answers, some where **(i)** was incorrect.

(b) This calculation scored a high percentage of fully correct answers, with full explanation and correct units.

Answer: **(b)** 260 Hz.

Question 6

(a)(i) As usual many candidates measured the wrong angle. Also, either many did not have a protractor or were incapable of using one accurately.

(ii) Far too many tried to explain in terms of total internal reflection and gave incorrect or confused answers. Refraction and reflection were often confused as were the angle of incidence, the angle of reflection and the critical angle. Those who knew the classic definition, that the critical angle is the angle of incidence in the denser medium for which the angle of refraction is 90°, had no difficulty in scoring full marks.

(b)(i) 1.0×10^{8} m/s and $1.5\text{x}10^{8}$ were common wrong answers to a question generally correctly answered.

(ii) Generally correctly answered but a number gave the correct expression but had no idea how to work out the answer.

(iii) Most candidates knew the correct answer but were unable to express themselves properly. Too often statements such as “at 90°” were made without any reference to the edge of the block at Y. Many said that no refraction occurred because there was no change in direction.

(iv) Generally correct but many “increases” and “stays the same” were seen.

Answer: **(b)(ii)** 1.5.

Question 7

(a)(i) Almost as many chose soft iron as steel.

(ii) Many candidates omitted to say that the bar had to be placed in the solenoid. Others replaced the cardboard by the bar which was accepted as correct though it seemed a strange thing to do.

(iii) The great majority gave a correct answer.

(b)(i)(ii)(iii) All three parts were very well answered with a great many scoring all 6 marks. The standard of presentation, with formulae shown and correct units was high. Common errors were the confusion of power and energy and mistakes arising out of wrong data from the stem of the question being used. Some of these could be assessed as an “error carried forward” for a penalty of only one mark.

(c)(i) Less than half gave the correct answer, with many doing all kinds of complex calculations resulting in the wrong answer. 7.0 V and zero were common wrong answers.

(ii) Candidates found this very difficult. Many made no attempt at all. Those who understood the question often gave vague statements about the sum of the voltages, without specifying which voltages, these gained only one mark out of two.

Answers: **(b)(i)** 3 Ω, **(ii)**, 48 W, **(iii)** 240 J; **(c)(i)** 5 V.

Question 8

(a) Almost all gave the correct direction from N to S.

(b)(i) A large proportion knew that the movement was at right angles to the line joining the poles. As expected some of these wrongly had the movement as upwards.

(ii) Many good explanations seen both in terms of Fleming's Left Hand rule and interacting fields.

(c) Answers were disappointing with too many giving reversal of the current and/or reversal of the magnetic poles. Changing the battery for an a.c. supply was another common wrong answer. The better candidates generally recognised that a coil with commutation was needed.

Question 9

(a)(i)(ii)(iii) Many good answers to all parts. It was pleasing to see so many accurate electron paths with a curve followed by a straight line.

(b) With a few notable exceptions this was very badly answered indeed. Many made no attempt at all, many others started from a radioactive source and ended with a Geiger Counter. Those who did show correct apparatus failed to label any parts which made it very difficult to give any credit.

Question 10

(a) The value 4 was usually given wrong units included time/days, min and even s.

(b) Most managed to do this correctly, with a significant number wrongly halving the percentage every 5 days even when they gave 4 days in **(a)**.

(c) Many good clear answers, but some refused to quote any evidence from the graph.

(d) Most candidates seemed to find balancing decay equations very easy and scored 2 marks. The others made every possible mistake one could think of, with some making no attempt at all.

Answer: **(a)** 4 days.

Paper 0625/04
Paper 4

General comments

It was pleasing to see that points made in previous Moderator's reports had been noted, and that all schools had been given appropriate tasks that enabled them to demonstrate their practical skills in all four areas. It is clear that a large amount of good work has been completed by Teachers and candidates, and this was reflected by an improvement in the mean mark for this component.

The marking criteria were, in most cases, successfully applied. In a small number of Centres the marking in one or two areas was slightly lenient or slightly severe, but it is pleasing to report that these variations were minor and it was not necessary to adjust the marks awarded to candidates from any Centre. It was particularly pleasing to see the generally accurate application of the marking criteria from Centres new to this component. Centres have received individual reports on their application of the marking criteria.

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 pleasing. Candidates often dealt well with most of the practical skills tested. Each question differentiated in its own way, but it was noticeable that most candidates coped equally well with each of the questions indicating a good preparation for the examination.

Comments on specific questions

Question 1

(c) – (e) Most candidates correctly took readings from their metre rule, giving values of *x* and *y* which were both less than 40 cm and totalled between 39.0 cm and 41.0 cm. Some candidates lost marks by failing to include the unit or to show that they could read the metre rule to better than the nearest cm. Most went on to calculate *m* correctly although a few missed the unit. Good clear diagrams showed that many candidates could overcome the problem of the weight covering the 10 cm mark on the rule.

(f)(g) As above, many candidates recorded correct values of *x*, *y* and *m* although some gave values of *x* or *y* that were greater than 50 cm showing that they had merely written the reading from the metre rule rather than find the distance from the pivot.

(h) Full marks were obtained here by candidates who correctly calculated the average, gave the answer to 2 or 3 sf with the unit, g and recorded the two *m* values within 5.0 g of each other.

Question 2

(a) – (e) Full marks here were awarded to candidates who recorded all the temperatures with correct trends (showing the appropriate decreases or increases in temperature) and who gave all temperatures to better than 1°C. Many failed to show this level of accuracy.

(f) The graphs were generally well plotted with a suitable temperature scale using at least half of the available grid but some candidates lost marks since their line was too thick or a poorly judged best fit curve.

(g) Most candidates correctly concluded that the rate of cooling is slower, but few responded correctly to the question since they did not justify their conclusion by reference to the table of readings. Rather they attempted a theoretical answer. They should be advised that theoretical answers are not required in the practical examination.

Question 3

(a) – (c) The majority of candidates recorded currents and voltages correctly with values given to at least 1 dp and the units present. Full marks for the ratio were awarded if it was arithmetically correct, to 2 or 3 sf and was given no unit.

(d) – (f) Some candidates performed the calculation of resistance incorrectly in spite of being given the equation to use. Most however were correct, enabling them to answer part **(f)** sensibly. Here candidates should realise that within the limits of experimental error they can conclude that the two ratios are equal.

(g) Most candidates drew a correct circuit with the voltmeter in parallel with the resistor. The most common error was in the variable resistor symbol. Some candidates drew a thermistor symbol and others a symbol which was a cross between a thermistor and a variable resistor.

Question 4

(a) – (e) Pleasingly, most candidates coped well with this question. In the past, lens questions have been badly done by a significant proportion of candidates. The majority recorded sensible readings for the various distances, although some lost a mark because they did not take readings of *u* or *v* to better than the nearest 0.5 cm.

(f) – (j) Similarly the second set of readings posed no problems for the great majority of candidates.

(k) The ratios *u/v* and *y/x* provided an opportunity to test the accuracy of the candidates' work. Marks were awarded if the values were within 10% of each other. None of the ratios should have had a unit. The ratios are to be given as single numbers (in decimals) and here there has been a pleasing improvement in the work. Comments in earlier Examiners' Reports are clearly reaching candidates and producing real benefits.

(l) This was the only disappointingly answered part of the question. Relatively few candidates could write convincingly about possible precautions such as the prevention of parallax error and how that may be achieved or how to achieve a sharp focus or how to place the rule in order to take the readings. It is a good idea to mark a vertical line on the block supporting the lens and directly below the lens and then to place the metre rule on the bench. It is very difficult in practice to take an accurate reading whilst holding the rule above the lens.

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 or error
- 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. The overall standard of work was pleasing

Comments on specific questions

Question 1

(a) Accuracy was expected in measuring *x*. Most candidates were then able to calculate the average diameter correctly and go on to calculate *V* giving the answer to 2 or 3 sf and with the correct unit.

(b) Some candidates were apparently unused to a measuring cylinder and a range of incorrect readings was seen although many gave the correct response. Most could continue to calculate the volume of one bead.

(c) A variety of answers was accepted here. Candidates had to show an appreciation of limits of accuracy. For example the following were given credit.

- Method 1 is better; a measuring cylinder is not capable of accurate measurement.
- Method 1 is better; there may be air bubbles trapped between the beads in the measuring cylinder.
- Method 2 is better; method 1 does not take into account the irregular shapes of the beads.
- Method 2 is better; many more beads are used.

Question 2

(a) Most candidates correctly showed a voltmeter in parallel with the coil.

(b) Most candidates suggested student B, correctly justifying their choice in terms of the more precise measurements of voltage.

(c) Those candidates who were not confident with the symbol for a variable resistor produced a variety of answers. A common error was to draw a thermistor or a symbol that was a combination of the variable resistor and a thermistor.

(d) Many candidates carefully drew the pointer in the correct position.

Question 3

(a) The majority of candidates set up the scales for the graph correctly although a few merely wrote the readings from the table equally spaced along the axes. Plotting was generally accurate and most drew an acceptably thin straight line. However many lost the mark for judgement of the best fit line since they failed to take into account all of the plots. The determination of the gradient was difficult for many. To gain both marks for this section candidates had to show a large triangle on the graph and then go on to calculate a value for *G* between 1.15 and 1.25. Some lost marks for *W* by giving more than 2 or 3 sf or by not including the unit, N. In part **(v)**, only a minority of candidates spotted that if distance *a* was 0.045 m, then *b* would have to be greater than 0.50 m, i.e. beyond the end of the metre rule.

(b) Here again only a minority of candidates realised that either no correction is necessary, or a small weight could be attached to the end of the rule so that it balanced at the 50.0 cm mark, or the pivot could be moved to the 50.3 cm mark. Any of these responses gained credit.

Question 4

The majority of candidates scored well on the question, correctly stating that heat loss was the most likely cause. Precautions involving lids and insulation were commonly suggested and these were given credit, as were sensible suggestions about stirring or repeat experiments. However suggestions of an assistant to check results and similar points were not credited. Most gave the correct thermometer reading of 38°C but some wrote 30.8°C. The majority of candidates calculated the power (66 W) but some lost a mark by giving an incorrect unit (e.g. N or kg).

Question 5

Many candidates scored full marks in part **(a)** giving the magnification, 2.07, to 2 or 3 sf and with no unit. The diagram was often drawn to the correct size (height 3.0 cm) but few realised that the image would be upside down, suggesting a lack of familiarity with this type of experiment. Similarly part **(b)** showed that many candidates were unaware of the difficulty in taking the measurement whilst holding the metre rule. Thus a clamped metre rule or the rule resting on the bench gained credit.