SCIENCE

Paper 5125/01
Multiple Choice

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

Comments on specific questions (Physics only)

Only 6 candidates were entered for the 5125 paper; individual question comments are, therefore, from the 167 5124 candidates whose scores ranged from 11 to 38 with a mean score of 22.94 and a standard deviation of 6.46. **Questions 7** and **8** proved to be very easy with **Question 20** very demanding. The more straightforward questions, attracting a 70-80% correct response, included **Questions 3, 5, 6, 9, 16** and **19**. Some more able candidates found that were more challenged by **Questions 12, 13, 14** and **15**. Many of the questions discriminated well, in particular **Questions 4, 9, 10, 11** and **18**.

Question 1 was well answered with less able candidates choosing option C.

Question 2 was well known although both options A and D, in attracting a number of more able candidates, proved to be 'positive' distractors, ones that correlate positively with success in the test. Option C attracted the less able candidates.

Question 3 was well known by most of the candidates. Ever keen to multiply numbers, some of the less able candidates favoured option D.

Question 4 showed excellent discrimination with most of the less able candidates divided between options A and C.

Question 5 and Question 6 were both well known and correctly answered by 78% of candidates.

Question 7 and Question 8 were also well known with a correct response from 90% and 96% of candidates respectively.

Question 9 discriminated well with less able candidates divided equally between options A and D.

Question 10 showed excellent discrimination, with less able candidates divided equally between all three incorrect options.

Question 11 also showed excellent discrimination with less able candidates choosing option A. Some more able candidates, forgetting to halve the time, chose option D.

Question 12 A significant number of better candidates chose option C rather than the key, option B, failing to appreciate the significance of 'around the *circuit*'. Option A was the choice of most less able candidates.

Question 13 was not well known and indicated guesswork from the candidates, even from the more able. Both options C and D attracted more responses than did option B, the key.

Question 14 was well answered, particularly by the less able candidates! A significant number of the more able candidates chose option C.

Question 15 The numbers of candidates electing for the wrong options indicated that many were uncertain and made their choice by guesswork; this included some of the more able who made contributions to the numbers choosing one from the two incorrect options A and D. Options B and C each drew the same number of responses with the less able favouring option B, and the more able, option C, the key.

Question 16 and Question 19 Both questions were well answered.

Question 17 showed some uncertainty from the more able candidates, some of who consider transformer action is caused by 'a *steady* direct current' (option B).

Question 18 An easy question which showed good discrimination, with less able candidates divided between options A and B.

Question 20 showed that the concept of 'half-life' was not understood with the key, option D, attracting only a 13% response from, in the main, more able candidates. Option A was the choice of 69% of candidates, including some of the more able!

<u>Comments on specific questions (Biology only)</u>

Question 21

This question worked well.

Question 22

As in previous years, the question on osmosis caused difficulty for some candidates.

Question 23

Weaker candidates were challenged by the unusual format of this question.

Question 24

Candidates tended to focus (wrongly) on the heat of the underwater springs, and so chose option A..

Question 25

Most candidates could recognise that the diagram represented a leaf cell, but were not sure which one of the two leaf cell options given was correct.

Question 26

This was an easy question.

Question 27

There was some guessing here.

Question 28

This was a straightforward question.

Question 29

This question (on blood circulation) proved to be difficult.

Question 30–31

These questions discriminated well

Question 32–33

These were straightforward questions, but caused some problems.

Question 34

It was surprising that candidates had difficulty in identifying the liver as the organ affected by alcohol.

Question 35

This question, about food webs, proved to be difficult.

Question 36

This question worked well.

Question 37

Candidates confused cause and effect, sometimes believing that decreased nitrogen content causes soil erosion (rather than the other way round).

Question 38

This question proved difficult.

Question 39

This was an easy question.

Question 40

This question discriminated well.

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Paper 5125/02
Theory (Physics)

Most candidates showed evidence of being well-prepared and performed well. There was the usual range of ability but a greater number than last year gained higher marks. It was pleasing to see that there were good answers to almost all questions, although some of the more difficult concepts were answered well by only a minority of candidates.

Calculations were well done by many and descriptions of experiments were clear and concise. A large number of candidates, however, lost marks by describing the wrong experiment.

Section A

Question 1

(a) Most candidates gained the mark for knowing that they had to find the gradient of the graph. The majority then went on to do so successfully. A small minority made a mistake in reading the co-ordinates of the graph and so calculated an incorrect value. The correct answer of 1.6 m/s^2 was given by most candidates.

(b) The majority of candidates gained the mark for knowing that weight is equal to mass times g. A significant minority failed to gain further marks by using 10 m/s^2 as their value of g rather than the value that they had calculated in (a). A small number used 10 m/s^2 and then multiplied by one sixth remembering that the moon's gravity was one sixth that of Earth's. Although this was not the intended method of working this out, these candidates were given full credit. The correct answer was 0.8 N.

(c) The majority of candidates knew that the distance travelled is equal to the area under the graph and worked this out successfully. A significant minority tried to use distance equals average speed times time. Almost all of these failed to gain the second mark because they used a speed of 2.125 m/s rather than the average speed. The correct answer is 0.8 m.

Question 2

(a) This was well done by many candidates who correctly stated that a micrometer screw gauge or vernier callipers are appropriate instruments. A large number of candidates, however, wrongly stated that a centimetre ruler could measure to the precision indicated.

(b) Most candidates knew that mass was equal to volume multiplied by density and so gained a mark. A significant minority, however, were unable to determine the volume correctly and did not, therefore gain any further credit. 3 cm^3 and 9 cm^3 were popular values for the volume rather than the correct value of 27 cm^3. The correct value for the mass was 202.5 g, although full marks were given to those who gave 203 g.

Question 3

Most candidates were able to calculate the moment as 330 Ncm and then went on to equate moments to gain full marks for the correct answer of 220 N. A significant minority failed to get the correct answer because they used 9.5 cm as the distance from pivot to effort rather than 11 cm as was stated in the question.

Question 4

(a) Most candidates were able to give correct energy transfers. In (i) the correct transfer is from kinetic or movement or mechanical to electrical. A small minority stated that the transfer was from gravitational potential energy into electrical. In (ii), most gained the mark for stating that the energy transfer was from electrical into light energy. Some stated that the transfer was into heat and light and also gained full credit, but no credit was given to those who stated that electrical energy was transferred into heat energy alone as this is not the correct answer to the question that was asked.

(b) Most candidates knew that the power was the work done per second or that the loss of gravitational potential energy is calculated using mgh. Rarely, however were candidates able to put both ideas together to calculate the correct answer of 3.0 W. A small number used 2.0 as the time.

Question 5

(a) This was well done by most candidates but the usual confusion about the meaning of sensitivity prevented large numbers from gaining full marks. In 1, a mark was given for knowing that the large bulb allowed a great amount of mercury to be held. A second mark was given for stating that this meant that there was, therefore, a greater movement of mercury per degree change in temperature or that the sensitivity is increased. In 2., many knew that the thin glass allowed rapid conduction of heat and so gained a mark but most of these went on to state, incorrectly that this improved the sensitivity, for which they gained no further credit. The more able minority gained the final mark for stating that it improves the speed of response.

(b) This question was well done by most candidates who showed a clear understanding of the conditions in which a thermocouple thermometer should be used.

Question 6

(a) The majority of candidates gave a convincing explanation of what is meant by a longitudinal wave, correctly stating that the vibrations are parallel to the direction that the wave moves. Only a small minority confused these with transverse waves.

(b) The formula $v = f\lambda$ was well known by most candidates but a significant minority were unable to change this to $\lambda = v/f$ in order to work out the correct answer. Many divided f by v and a small minority multiplied the speed by the frequency. The most able calculated the correct answer of 0.75 m.

Question 7

(a) It was pleasing to see that most candidates knew the correct formula and were able to apply it correctly to work out the correct value for the refractive index of 1.53. Only the least able minority failed to use sines.

(b) The first mark was given to those who showed that the ray was refracted away from the normal. This mark was gained by most candidates. The second mark was for drawing the emergent ray parallel to the incident ray. This mark was gained by a small majority.

Question 8

(a) This was the least well-done part of **Question 8** but, pleasingly, a large number of candidates knew that potential difference is energy divided by charge and so were able to work out the correct answer of 6 V.

(b) The majority knew that current is charge divided by time and so calculated the current to be 1.5 A.

(c) Most candidates knew that power could be found by dividing energy by time or by multiplying current by potential difference and so were able to work out the correct answer of 9 W.

Question 9

(a) Pleasingly, almost all candidates knew that a beta particle is an electron.

(b) The most able were able to calculate the number of neutrons to be 52 and so gained the mark. The less-able minority stated, wrongly that the number was 90.

(c) Most candidates knew that the number of electrons in a neutral atom is equal to the number of protons and so, correctly, gave a value of 38 for this part.

(d) Only the most able knew that when a beta particle is emitted, a neutron changes into a proton and so realised that the proton number increases by 1. These were able to work out the correct answer of 39.

Question 10

(a) The majority knew that the voltage would decrease or that the frequency would decrease but rarely did candidates know that both occur. Only the most able drew a graph showing both decreased amplitude and decreased frequency.

(b) This question was the least well-answered on the paper. Very few candidates stated that the a.c. generator causes a varying magnetic field in the core and that this induces an e.m.f. in the secondary coil.

Section B

Question 11

(a) This question was not popular but those candidates who attempted it scored well. Most candidates scored at least four of the five available marks. A mark was awarded for a diagram showing the wire with a suitable power supply and an ammeter and voltmeter correctly connected. Only a very small minority made the usual mistake of drawing the voltmeter in series with the rest of the circuit. A second mark was given for showing some means of varying the voltage so that a series of readings could be taken. A third mark was gained by stating that current and voltage are measured and a fourth for showing that these are found by reading the ammeter and the voltmeter. The fifth mark was for stating that the p.d. is then changed and the procedure repeated. The most common mistake was to draw a circuit that did not allow the voltage to be changed.

(b) Most candidates gained some credit for drawing a graph which was a straight line through the origin but many failed to gain a second mark for correctly labelled axes. Most commonly, candidates omitted the units.

(c) This question was surprisingly badly done by all but the most able. A mark was awarded for knowing that the resistance would be less. The second mark was for realising that the current in the wire would be greater and the final mark for relating this to a change in the gradient of the line. Most candidates, surprisingly, thought that using a wire of greater cross-section would cause the graph to become curved.

Question 12

(a) This question was very popular and was well answered by most candidates who scored most of the marks available. Most were able to give a clear account of how to use a plotting compass to plot the field around the magnet. A small number lost a mark for not stating that the position of the magnet needs to be marked. A significant minority described the less-satisfactory method of using iron filings to plot the field. This method was given a maximum of 3 marks.

(b) Most candidates gained at least two of the available marks. The majority gave good accounts of how the coil could be used to make a magnet, although many lost credit by stating that they would use an iron rod. The method of demagnetising a magnet was clearly known; most candidates specified that a.c. should be used but only a minority of them knew that the current needs to be reduced slowly or the magnet needs to be removed in an east-west direction. Only a very small number confused d.c and a.c.

(c) This was extremely well-answered with most candidates gaining full marks.

Question 13

(a) This question was answered well by a small majority of candidates. The most common mistake was to describe an inappropriate experiment. Many candidates described an experiment to compare how well two different surfaces absorb or emit radiant heat. These candidates gained no marks. The able candidates who described a suitable experiment scored marks for describing a method of heating the rods equally; the most convincing suggested using a tank of hot water. Further marks were gained for describing a method of detecting how quickly heat was transferred (wax on the rods was the most common method), for stating what observations would be made and for explaining how these observations would tell them which was the better conductor of heat.

(b) This question was very well-answered. Most candidates were aware that heat is transferred by molecular vibrations being passed from particle to particle in the rod.

(c) In (i) only a minority knew that the insulated box ensures less heat loss by conduction or convection. In (ii), whilst most were aware that black is a good absorber of radiation, surprisingly few realised that this results in more rapid or more efficient heating of the water.

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Paper 5125/04
Theory (Biology)

Too few candidates to provide a meaningful report.