SCIENCE

Paper Paper 5124/01, 5125/01, 5126/01
Multiple Choice

Paper 5124/01 (Physics, Chemistry)

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

Paper 5125/01 (Physics, Biology)

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

Paper 5126/01 (Physics, Biology)

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

Physics, Papers 5124/01 and 5125/01 – Questions 1 to 20

General comments

Question 17 proved to be very easy and **Question 15** very difficult. Some more able candidates also found problems with **Questions 4** and **10**. Many of the questions discriminated well, in particular **Questions 3**, **6**, **7**, **9** and **16**.

Question 1 was well-answered with less able candidates divided evenly between options **C** and **D**.

Question 2 was well-known with option **D** attracting the majority of less able candidates.

Question 3 showed very good discrimination, with less able candidates, ever keen to *multiply* numbers, favouring option **A** over option **D**.

Question 4 showed guessing among more able candidates with significant numbers choosing either option **A** (a positive distractor) or **D** suggesting uncertainty over the meaning of *elastic* deformation.

Question 5 divided candidates almost equally between option **B** and the key, option **D**.

Questions 6, **7 and 9** all showed good discrimination with a suggestion that some more able candidates chose option **B** in **Question 6** and option **D** in **Question 9**. In **Question 7**, option **D** attracted the less able candidates.

Question 8 discriminated well with less able candidates favouring option **C** but also making significant contributions to both options **A** and **D**.

Question 10 In the reflection and refraction of light there is a long held belief that angles are measured between the light ray and the boundary. This misconception appears to be alive and well with more candidates, including the more able, choosing option **C** rather than the key, option **A**.

Question 11 showed good discrimination with less able candidates choosing option **A**.

Question 12 Less able candidates were undecided and were divided almost equally between options **B** and **C**.

Question 13 discriminated well with options **A** and **D** dividing the less able candidates.

Question 14 In choosing option **A**, less able candidates again failed to convert time into seconds.

Question 15 showed uncertainty and guessing among candidates, including significant numbers of the more able who preferred option **A** over the key, option **C**. Option **B** was the most popular choice.

Question 16 showed very good discrimination with options **A** and **C** attracting the less able.

Questions 18 and 19 were well-known with many correct responses.

Question 20 was not well-known, with options **B** and **C** attracting a significant response from more able candidates.

Chemistry, Paper 5124/01 – Questions 21 to 40.

Question 21

A large number of candidates did not recognise that a pipette measures whole number volumes of liquid and chose option **D**, whilst other candidates did not appreciate that a measuring cylinder only has limited accuracy.

Question 22

The better candidates found this question easy. A large number of the weaker candidates did not understand the significance of the nucleon and proton numbers, and simply added the two together and chose option **D**.

Question 23

This question was well-answered, particularly by the better candidates.

Question 24

Another easy question for the majority of the candidates.

Question 25

Many of the candidates were unable to deduce the charge on the uranium, or did not know that oxygen and chlorine have different charges. Over half of the candidates chose option **A**, which simply replaced O in the formula with C*l*.

Question 26

An easy question for the majority of the candidates.

Question 27

Another easy question for the majority of the candidates.

Question 28

There was evidence of guesswork, particularly amongst the weaker candidates. Candidates should understand that it is the presence of hydrogen ions in a solution that causes the solution to be acidic.

Question 29

Almost 80% of the candidates recognised option **D** as the electronic structure of argon and the fact that it is used to fill light bulbs.

Question 30

Over 50% of the candidates thought that the regular structure in option **C**, an ionic substance, represents the structure of an alloy. Candidates should be aware that an alloy is a mixture of two elements arranged in an irregular pattern.

Question 31

There was evidence of widespread guesswork in this question. Candidates should know that a metal oxide is more difficult to reduce as the reactivity of the metal increases.

Question 32

The majority of the candidates recognised option **C** as the acid base reaction, but a significant proportion, particularly the weaker candidates, chose option **D**, the reduction of iron(III) oxide by carbon monoxide.

Question 33

There was evidence of guesswork, particularly amongst the weaker candidates, but the better candidates knew that oxygen reacts with the copper in the apparatus and that there is approximately 20% of oxygen in the air so that 80 cm^3 of gas remains at the end of the experiment.

Question 34

An easy question particularly for the better candidate.

Question 35

This question was poorly answered. Almost half of the candidates, including many of the better candidates, thought that slaked lime is produced when limestone is heated and chose option **D**. Less than a third of the candidates knew that lime and carbon dioxide are produced when limestone is decomposed by heat.

Question 36

Almost half of the candidates identified lubricating oil as the source of polishes and waxes. A significant proportion of the candidates thought that gasoline is the feedstock for the chemical industry and did not recognise that it is used as fuel for motor vehicles.

Question 37

The better candidates found this an easy question. A large proportion of the weaker candidates thought that substance **X** is ethane rather than ethene and chose option **A**.

Question 38

An easy question for the majority of the candidates.

Question 39

Another easy question for many of the candidates.

Question 40

This question proved difficult for many candidates. A significant proportion chose option **A**, a carbohydrate. Candidates should be able to identify a carboxylic acid and an alcohol and know that they react to produce an ester.

Biology, Paper 5125/01 and 5126/01 – Questions 21 to 40

Question 21

Candidates needed to recognise that plants produce starch in their chloroplasts.

Questions 22-23

These questions worked well.

Question 24

Candidates were unclear as to which leaf cells contained chloroplasts.

Question 25

Some candidates thought that amylase converts starch to glucose.

Question 26

This was an easy question.

Questions 27-28

These questions worked well.

Question 29

Some candidates confused aerobic and anaerobic respiration.

Question 30

This proved to be a difficult question.

Question 31

Candidates seemed to believe that water moves up a plant stem by osmosis.

Question 32

This was an easy question.

Question 33

This question discriminated well.

Question 34

Some candidates picked the peak of the graph, instead of the section with the steepest decline.

Question 35

This question, about a control experiment, proved to be difficult.

Question 36

This question worked well.

Question 37

Evidently, candidates were guessing at the answer here.

Questions 38-40

These questions discriminated well.

SCIENCE

Paper 5126/03
Theory (Chemistry)

General comments

Section A

Question 1

The constituents of air. Uses of nitrogen and oxygen. Poorly answered.

Many candidates gave two inert gases. Many candidates believed there to be more oxygen by volume in the air than there is nitrogen. Uses were well remembered, though some candidates incorrectly described nitrogen gas as being a fertiliser.

Question 2

Test for hydrochloric acid. Neutralisation. Fairly well answered.

(a) Tests for acids using some type of indicator or even a pH meter were well described. Tests for a chloride rarely given correctly. Many candidates described a test for chlorine, by bleaching, rather than a chloride, using silver nitrate solution.

(b) The dangers of adding large and excessive amounts of alkali to neutralise spilt acid were well understood.

(c) Naming and giving the formula for any one of the products of the reaction of hydrochloric acid with calcium carbonate earned these marks. So 'water' and 'H_2O' would have been sufficient.

Question 3

Nuclear structure and a calculation. Well answered.

(a) Most candidates could determine the number of neutrons present in a nucleus when provided with the nucleon number and atomic number. Most could then proceed to determine the number of electrons that would, as a result, be in orbit around this neutral atom.

No problems were found in balancing the equation provided but few candidates could then proceed, using a supplied equation, to determine the mass of materials needed to manufacture 10 tonnes of uranium.

Question 4

Homologous series, organic names, structures and types of reaction. Very well answered.

(a) A general formula was expected though many candidates gave 'identical chemical formula' and earned zero marks. Specific trends in physical properties, such as increasing boiling point with increasing relative molecular mass, were accepted for one mark when describing features of all members of the same homologous series.

(b) Several names were accepted for an 'ethene to ethane' type of reaction, including reduction, hydrogenation and addition. Hydration was often given and earned zero marks. Chemical structures were well known.

Question 5

Periodic Table and members of Group I. Well answered.

(a) 'Alkali metals' was correctly given as the collective name for the elements in Group I.

(b) Most candidates could use the Periodic Table supplied on the examination paper to identify correctly the members of Group I, and excluded copper. Any description of the reaction of water with rubidium as being anything implying more than just 'very fast', the description of the reaction of potassium with water, was accepted for the mark available.

Question 6

Identifying the drawings of various particles as any combination of mixtures, elements, compounds, solids, liquids and gases. Extremely well answered.

Candidates were asked to identify the drawing that 'best' represented a particular combination of the above. The particle-spacings of F and E indicated both to be liquids but only E contained a mixture of substances and so could, from these drawings, be a liquid mixture.

Question 7

Reaction rate and interpretation of a graph (metal with acid).

(a) Many candidates interpreted the reaction represented by the graph as one which was increasing in rate.

(b) Most candidates realised that with a fixed mass of metal – the concentration of acid used does not vary the amount of gas produced as long as the acid is in excess, and using a more dilute acid will affect the rate of gas production, and hence the gradient of the curve.

(c) This section was not well answered. There was some confusion between the results from changes in temperature and from changes in concentration: candidates often wrongly attributed the change in the shape of the curve to be the result of increases/decreases in the speed at which the particles move – which is a temperature effect. An answer involving 'particles' was required for full marks to be obtained.

Question 8

Non-biodegradable materials and recycling.

(a) Many candidates understood the term 'non-biodegradable', particularly with reference to plastics.

(b) Many candidates believed that all metals are non-biodegradable and so used this as a reason why metals should be recycled. There are at least four basis reasons why metals are recycled. These include: shortage of natural resources; the economics of manufacture and recycling; the potential for pollution; the conservation of energy. A response had to contain some form of 'reason' before the mark available could be earned, for example, just writing 'pollution', 'cost', 'saving the Earth', 'being environmentally friendly' were not enough.

Section B

Question 9

Covalent and ionic bonding. Well answered.

(a) Good accurate drawings of both covalent and ionic substances, containing chlorine, were commonplace. Charges were usually included correctly in drawings of the structures of ionic substances. Chlorine was, of course, accepted as a covalent substance containing chlorine atoms.

(b) Good knowledge was shown of the differences between the substances chose. However, the electrical conduction of molten ionic substances continues to be wrongly attributed to 'mobile electrons'.

Question 10

Ethanol by fermentation. Calculation. Fairly well completed.

(a) Most candidates could give an adequate description of how to ferment glucose to produce ethanol. Many underlined the importance of not allowing the temperature to rise above a certain point and so not 'killing' the yeast.

(b) Few candidates failed to determine the relative molecular mass of glucose and most could proceed to determine the percentage by mass of oxygen in each molecule.

Question 11

The reactions of gases. Well answered.

(a) The properties of common gases were well known and the gases correctly identified. An acidic liquid that produces a white precipitate with acidified barium nitrate solution was not often recognised as probably being dilute sulphuric acid.

(b) Equations for changes were rarely supplied with correct formulae for reactants and products, and even fewer were balanced.

(c) The uses of hydrogen and ammonium sulphate were well remembered.

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Paper 5126/04
Theory (Biology)

General comments

The number of candidates taking this component was small. The majority managed to gain a few marks, mainly from recalled facts, but most could rarely give interpretations or explanations that were worthy of marks. Many of the answers that required the writing of sentences were incoherent. It was often difficult to discern what the candidate was trying to say. Many wrote answers that had little relevance to the question or showed misinterpretation of the information given. The standard of English was often poor and must have contributed significantly to the very low scores achieved by many candidates. Performance was particularly poor in ***Section B***, where candidates were given less guidance in how to frame their answers. The time allowed was adequate for candidates to complete all of the questions, but a number attempted only one question from ***Section B***.

Comments on specific questions

Section A

Question 1

Most candidates showed a poor knowledge of experimental design and the process of photosynthesis.

(a) (i) Few candidates had any idea of the concept of fair testing. Many simply described the experiment.

(b) (i) Most candidates successfully plotted all of the points.

(ii) The majority of candidates joined the points free hand rather than drawing a best fit line using a ruler.

(c) (i) Only the more able candidates correctly described the relationship between light intensity and rate of photosynthesis.

(ii) Few candidates knew that light provides the energy for photosynthesis. Many simply suggested that photosynthesis takes place in light.

(iii) Only a few candidates gave the correct word equation. Some included oxygen on the left or water on the right. Some attempted a symbol equation but this was rarely correct. A number of candidates did not attempt the question.

Question 2

Leaf structure and function were poorly understood by the majority of candidates.

(a) (i) Only the more able candidates chose the correct letter F. The most common incorrect answer was E.

(ii) Most candidates scored one mark, with the more able getting both. Correct answers related to transport of water and minerals and support of the plant.

(b) (i) Only the more able candidates correctly suggested stomata. A variety of incorrect answers were seen, including guard cell, epidermis and mitochondrion.

(ii) Most candidates ignored the reference to carbon dioxide in the question, writing about oxygen or water. Only a few correctly described entry and diffusion of carbon dioxide.

(iii) Few candidates could describe another function of stomata. Incorrect answers included absorption of water and excretion of sweat.

Question 3

Most candidates showed some knowledge, though many lost marks by not reading or understanding the questions.

(a) (i) Most candidates scored at least two marks. Common errors were urethra and scrotum.

(b) (i) The function of the testis in producing sperms was well known.

(ii) Few candidates mentioned delivery of sperms into the vagina. Despite the stem clearly stating 'reproductive functions', some candidates mentioned transport of urine.

(iii) Again transport of urine was seen. This lost the mark for most candidates.

(c) Few candidates could correctly name the prostate gland.

(d) (i) Most candidates correctly described cutting of the sperm duct, but fewer could explain how this works as a method of birth control. Some candidates suggested removal of the reproductive organs.

(ii) Most candidates who suggested cutting of the sperm duct placed one or two crosses correctly to gain this mark.

Question 4

Most candidates showed some knowledge and scored some marks in this question.

(a) (i) Only the more able gave the correct sequence to gain all three marks, but most gained two.

(b) (i) Most candidates gave the correct enzyme - amylase.

(ii) Fewer candidates could name the product correctly.

(iii) Most candidates gave answers that lacked the precision to score more than one mark.

(c) (i) Most candidates gained this mark for energy store or for insulation.

(ii) Obesity and heart disease were common correct answers. Only the weaker candidates failed to score at least one mark.

Question 5

Knowledge and understanding of the causes and effects of mutation was poor.

(a) Few candidates could explain what is meant by the term mutation.

(b) Most candidates gained one mark for realising that weed plants increased after each spraying. Few could take their explanation further than this.

(c) Few candidates knew that mutation may also be caused by radiation.

Section B

Question 6

Candidates scored their marks almost exclusively from **part (b)**.

(a) Few candidates could name the parts indicated or explain how they are involved in the reflex arc.

(b) The other harmful effects of alcohol were well known.

Question 7

Only the more able showed enough knowledge and understanding to make a reasonable attempt at this question.

(a) More able candidates could explain how oxygen, carbon dioxide, water and nutrients enter, or leave the cell.

(b) Few candidates could name a specialised plant cell, and therefore most could proceed no further in the question. Some suggested animal cells.

Question 8

Candidates showed a poor understanding of food webs and trophic levels.

(a) Most candidates managed to complete part of the food web to gain one or two marks. Many made numerous errors or drew arrows the wrong way round. The idea of numbers decreasing as energy is lost between trophic levels was not presented by candidates.

(b) Few could give sensible suggestions as to the effect of cutting down trees on this food web. Most suggested total disappearance of all living organisms.