

SCIENCE

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

Paper 5124/01 (Physics, Chemistry)

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

Paper 5125/01 (Physics, Biology)

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

Paper 5126/01 (Chemistry, Biology)

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	21	A
2	D	22	A
3	B	23	C
4	B	24	A
5	D	25	B
6	B	26	A
7	B	27	C
8	A	28	D
9	B	29	A
10	D	30	A
11	C	31	D
12	D	32	A
13	B	33	B
14	D	34	A
15	D	35	D

16	C	36	B
17	A	37	A
18	B	38	B
19	A	39	C
20	B	40	B

General comments

The paper produced a mean score of 20.32 and a standard deviation of 6.61. Candidates found, papers 5124 and 5125 **Questions 7, 14 and 15** very easy with **Questions 2 and 5** very difficult. Guessing from among some better candidates was evident from a number of the other questions.

Physics, Paper 5124/5125/01 – Questions 1 to 20

Question 1 was answered correctly by 73% of the candidates. Options **A** and **C** attracted, in equal numbers, most of the remaining candidates.

Question 2

Very difficult with only 3% answering correctly! In choosing option **B**, the majority of candidates either ignored or failed to appreciate the significance of a curved speed-time graph. A number of more able candidates chose option **C**.

Question 3 discriminated well with the more able candidates choosing correctly (option **C**) and the majority of the weaker candidates, ignoring the time periods at rest, the incorrect option, **A**.

Question 4

Excellent discrimination with candidates choosing either option **A** (correct) or option **D**.

Question 5

The majority of candidates failed to consider fully the information given in the responses. A possible correct combination of force and distance acting to the right of the pivot (option **A**) attracted more than twice the number of responses than did the correct response, option **B**. Ignoring the force direction, a significant number of more able candidates chose option **D**.

Question 6

Showed widespread guessing among candidates with option **A** attracting more responses than the correct option **D** and option **C** attracting almost as many as **D**.

Question 7

A surprisingly easy question although a number of more able candidates made the classical error of ignoring the force direction in choosing option **A**.

Question 8 discriminated poorly with options **A** and **B** attracting the majority of candidates, both able and less able, in almost equal numbers.

Question 9

It is pleasing to note that the amplitude of a wave was known by most of the candidates.

Question 10 showed excellent discrimination with option **C** attracting most of the weaker candidates

Question 11

Good discrimination although some more able candidates chose option **C**.

Question 12 also showed excellent discrimination with the less able candidates favouring option **A** slightly more than option **D**.

Question 13

The definition of potential difference was not well known with a significant number of more able candidates attracted to options **A**, in particular, and **B**.

Question 14

The determination of resistance from a V/I graph was well known.

Question 15

Potential difference in a series circuit was also well known although option **A** tempted a significant number of more able candidates.

Question 16 showed widespread guessing among all the candidates.

Question 17

Good discrimination. The true test for a magnet still eludes the weaker candidates whose responses were evenly spread over the three incorrect options.

Question 18

Excellent discrimination with weaker candidates showing a slight bias for option **C** over option **A**.

Question 19

Nuclide notation was well known.

Question 20 provided good discrimination. However the novel approach to half-life posed problems for less able candidates who were equally spread over the three incorrect options.

Chemistry, Paper 5124/01 – Questions 21 to 40 and 5126/01 – Questions 1 to 20

Question 21

An easy question particularly for the better candidates.

Question 22

The arrangement and movement of molecules in ice was extremely well known.

Question 23

Another well answered question. The structure of atoms is well understood by the majority of the candidates

Question 24

Once again the majority of the candidates understood the properties of an ionic compound. A significant number of the candidates thought that sodium chloride did not conduct electricity when it is molten.

Question 25

Covalent bonding is not understood by the majority of the candidates. Over 50% of the candidates answered the question in terms of electron pairs and chose option **B** rather than total number of shared electrons as required by the question.

Question 26

The calculation of the mass of carbon dioxide proved easy for the better candidates. The weaker candidates simply calculated the M_r of carbon dioxide and chose option **D**.

Question 27

This question proved difficult for the majority of the candidates. Many of the candidates, particularly the weaker candidates, chose option **D** which is the correct answer for an exothermic reaction. The better candidates recognised that the temperature of the water decreases during an endothermic reaction.

Question 28

This question proved difficult for even the better candidates. Less than half of the candidates recognised that the mass of zinc is doubled in the second experiment and therefore the volume of hydrogen produced also doubles because the hydrochloric acid is in excess in both experiments.

Question 29

An easy question for the majority of the candidates.

Question 30

The trends in the elements in Group I of the Periodic Table are well known by the majority of the candidates, however a significant number of candidates thought that the elements become less metallic as the Group is descended.

Question 31

The majority of the candidates were able to interpret the experimental results and correctly deduce the order of reactivity of the metals. A significant number of candidate chose option **B** where the metals were listed with the least reactive first.

Question 32

The majority of the better candidates know that magnesium is used to prevent rusting by sacrificial protection however there was evidence of guesswork amongst the weaker candidates.

Question 33

The better candidates found this question easy. Many of the weaker candidates answered the question in terms of properties which are important for the use of aluminium for cooking utensils

Question 34

This question was poorly answered by the majority of the candidates. The majority of the candidates chose option **A**, thinking that methane is responsible for the depletion of the ozone layer rather than global warming.

Question 35

The better candidates know that the main constituent of natural gas is methane but the majority of the candidates thought that the gas is hydrogen.

Question 36

Another easy question particularly for the better candidates. Many of the weaker candidates chose option **B**, the molecular formula of an alkene rather than an alkane.

Question 37

The majority of the candidates recognised the process as cracking although dehydrogenation and polymerisation were popular distracters amongst the weaker candidates.

Question 38

The majority of the candidates recognised the hydrocarbon as an alkene and were able to correctly identify the correct test for an alkene.

Question 39

This question proved difficult for many candidates. The most popular response was option **D**, propanoic acid and was given by significant proportion of the better candidates. Candidates should know that oxidation of ethanol does not increase the number of carbon atoms in the chain.

Question 40

The better candidates were able to identify the linkage as an amide link and knew that nylon contains this link. There was evidence of guesswork amongst the weaker candidates.

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

Question 21

This relatively easy question was correctly answered by most candidates.

Question 22

This question caused problems. Candidates needed to recognise the role of the cell membrane in controlling water uptake.

Question 23

Most candidates understood that osmosis always involves water movement.

Question 24

Answer **C** was a popular choice here: many candidates apparently think that the optimum pH for an enzyme is always 7.

Question 25

Candidates had difficulty in interpreting this experiment, and they were apparently guessing.

Question 26 and Question 27

Few candidates understood the role of nitrate ions (in plants) or of extra food energy for cold conditions (in animals).

Question 28

Candidates needed to understand the difference between absorption and assimilation; and to recognise the role of the liver, in secreting bile to aid digestion.

Question 29 and Question 30

These were easy questions.

Question 31

Only a minority of candidates realised that the carbon dioxide concentration is highest in blood entering the lungs.

Question 32

This simple question proved surprisingly difficult. Carbon dioxide is not produced by anaerobic respiration in animals.

Question 33

Many candidates were apparently guessing here.

Question 34

This question was one of simple factual recall.

Question 35

This question was very easy.

Question 36

Significant numbers of candidates think that plant respiration uses up carbon dioxide.

Question 37

Even the better candidates had difficulty in linking sulphur dioxide pollution to acid rain and the acidification of rivers.

Question 38

Many candidates failed to realise that the outcome of plant sexual reproduction (from seeds) is unpredictable.

Question 39

Option **A** (that egg cells contain a Y chromosome) was a surprisingly popular wrong answer here.

Question 40

This question caused problems, even for some of the better candidates. They needed to recognise that continuous variation is along a range, and is therefore without distinct types.

SCIENCE

<p>Paper 5126/03 Chemistry</p>
--

General comments

Section A

1. (a) Well answered, though a significant number of candidates gave 'hydrogen' as a component of clean, dry air.
 - (b) Both a pollutant and the means whereby it entered the atmosphere were needed for these three marks to be earned
2. (a) 'Fractional distillation' was not accepted as a correct description of this process. 'Condensing' was the change taking place in the condenser though a description such as 'changing steam/water vapour to water' was accepted for full marks
 - (b) A unit was expected when giving the temperature of boiling water.
 - (c) Most candidates realised that the impurity, salt in this instance, remained in the flask and was not somehow trapped by the condenser.
3. (a) While '-CH₂.CH₂-' is considered to be the correct repeating unit in this structure, '[-CH₂.CH₂-]_n' was also accepted for the full mark. A double bond drawn within the repeating unit caused the mark to be lost. 'Nylon' is the commonly accepted name for this structure, see syllabus, but the term 'polyamide' was also considered acceptable. Nylon is used in very many ways and this was reflected in the responses of candidates.
 - (b) Responses that described a property of these polymers and a property of iron and steel was needed to explain why, when carelessly disposed of, objects made of plastics are a longer-term problem than objects made of iron and steel. 'Plastics are non-biodegradable while iron and steel rust away' was sufficient.
4. (a) Balancing of the given equation was generally well accomplished.
 - (b) Relative molecular mass usually correctly calculated
 - (c) Most candidates found this fairly elementary calculation difficult. Many made no attempt to base their calculations upon the chemical equation previously balanced.
 - (d) Just using litmus paper was accepted as being a sufficient test to show that all acid had been removed.
 - (e) Few candidates realised that an advantage of using slaked lime to neutralise sulphuric acid the product, described in the question as being insoluble, is that it cannot be washed in solution into rivers and drains and so cause pollution.
5. Well answered.
 - (a) Most candidates could identify halogens and alkali metals from the Periodic Table provided.
 - (b/c) Both tested the ability of candidates to use the Periodic Table's trends, both physical and chemical.
 - (d) As the chemicals chosen for this question were not necessarily common, candidates were required to determine, rather than remember, the formula of two chemical compounds.

6. (a) While a fairly wide range of response was accepted for the estimated boiling point of pentan-1-ol only the response '88' was accepted for its molecular mass.
- (b) All bonds had to be shown in drawing the structural formula of ethanol, including 'O-H'.
- (c) Many candidates realised that, in excess oxygen, ethanol will burn to form only carbon dioxide and water.
7. (a) Candidates found it relatively easy to identify the correct order of reactivity of the four elements in a table of reactions as **C, D, B, A**.
- (b/c) Few of the metals listed in this syllabus will not react with either cold water or dilute hydrochloric acid. Identification of C, probably copper, as being the least reactive of these metals and so the easiest to extract from its naturally occurring ore was not well completed.
8. (a) Many candidates could interpret these graphs as showing that the reaction was initially fast, then less fast and eventually at a halt. However, several candidates decided that point 'E' on the graph indicated that the rate of the decomposition was increasing when in fact it was decreasing. Candidates who identified the rate as being constant at point G did not earn the mark available for 'the decomposition has stopped'.
- (b) That the rate of reaction in this particular volume of solution depends upon the number of molecules of hydrogen peroxide present, i.e. more molecules give a faster reaction, was well understood. Usually, though this need not have been specified in this case, it is the concentration of molecules/ions that determines the rate of the reaction.

Section B

9. (a) (i) Ammonia, carbon dioxide, calcium carbonate and silver chloride were the substances that had to be identified. Calcium carbonate and silver chloride were commonly identified correctly.
- (ii) Candidates had to realise that, when testing for a chloride ion, hydrochloric acid should not be added during the investigation as it itself contains chloride ions.
- (b) The mixture 'H' contained both a nitrate and a carbonate/hydrogen carbonate
- (c) Several candidates chose to give chemical equations for reactions that were not part of the description and so failed to earn these two marks.
- 10.(a) For some unknown reason ammonia (it had been an answer to part of the previous question) was often given as an example of a gaseous mixture. While 'air' was the expected response, 'natural gas' and 'car exhaust fumes' were also acceptable. Such mixtures as hydrochloric acid were often given, incorrectly, as examples of a liquid compound. 'Water' was the expected response, though occasionally ethanol and ethanoic acid were given and accepted.
- (b) The differences between the movement of particles within solids, liquids and gases was well described. 'The molecules have **moved** further apart' was accepted when describing a liquid.
- 11.(a/b) Any ore of iron was given the mark available. A good knowledge was shown of the chemistry that goes on within a blast furnace. Many correct chemical equations were included: at least two were needed for full marks to be awarded.
- (c) Either steel or brass was usually specified as an example of an alloy. While there are many different steels, iron and carbon had to be included in listing the components of a steel.

SCIENCE (CHEMISTRY, BIOLOGY)

Paper 5126/04
Theory (Biology)

General comments

In general the performance of candidates on this paper was very disappointing. Few managed to score more than ten marks. For the majority knowledge of the syllabus was sparse, with most candidates showing little grasp of key concepts involved. In addition, most candidates showed a very poor ability to use or interpret information provided in the question. For the majority of candidates the few marks they obtained came from simple recall. It was clear that many failed to understand what was being asked for in many of the questions, giving answers with little or no relevance. Many answers simply repeated part of the question. A few candidates showed some familiarity with one or two parts of the syllabus, but no candidate showed knowledge and understanding across the whole syllabus. Although performance in **Section A** was poor, that in **Section B** was even worse. Given the freedom to frame answers themselves, most candidates wrote vague and irrelevant attempts that gained no credit. Many candidates scored no marks at all in **Section B**. As in previous years a few candidates attempted only one **Section B** question, though there was no evidence that this resulted from a lack of time.

Comments on specific questions

Section A

Question 1

This question was answered well by almost all candidates. The simple recall required in **(a)(i)** and **(b)(i)** earned many candidates full marks for these sections. A lack of ability to use information to frame answers lost most, or all, of the other marks in this question for the majority of candidates. For many candidates this question gained almost all of their marks for the paper.

- (a) (i)** Most candidates gained two or three marks from this question. The most common errors were chloroplast for **A** and cell wall for **C**.
- (ii)** Only the more able candidates mentioned control of entry of substances. Many wrote incorrect answers based on entry of water by osmosis or protection of cell contents.
- (b) (i)** Most candidates had learned the syllabus definition of osmosis and gained three marks. Many weaker candidates omitted to mention either water of the semi-permeable membrane.
- (ii)** Very few candidates mentioned surface area. Most simply wrote about osmosis, gaining no credit.

Question 2

Only the more able candidate showed a good knowledge of this area of the syllabus. Many candidates scored no marks for this question.

- (a) (i)** Only the most able candidates could correctly define the term hormone. Many candidates wrote incorrect answers based on gastric juice and actions in the stomach.
- (ii)** Difference in the speed and/or length of action of nerves and hormones was mentioned by only a tiny number of candidates. Most had little idea of what the question asked.
- (iii)** Very few candidates showed any knowledge of reflex action. The majority wrote irrelevant sentences containing the words given in the question. A few candidates re-ordered the words with no further explanation.

- (b) (i) A few of the more able candidates knew that digestion breaks larger molecules into smaller ones. Incorrect answers commonly included details of food requirements or reference to enzymes.
- (ii) More able candidates knew that amylase converts starch to maltose. Common incorrect answers referred to proteins or to conditions required for enzyme action.

Question 3

Most candidates showed a complete lack of the ability to interpret the information given to them in this question. Many had great difficulty in understanding the requirements of the questions.

- (a) Whilst a few candidates realised that both frequency and depth of breathing increase, most had little idea of what was required in the answers. Many quoted numbers from the table.
- (b) (i) The correct answer, $30 \times 4.2 = 126 \text{ dm}^3/\text{min}$, was never seen. Many candidates multiplied 8.0 by 12, or gave a meaningless jumble of figures.
- (ii) Most answers were long and vague, with mention of the need for oxygen during exercise but no attempt to answer the question. Mention of respiration was seldom seen.

Question 4

Again the majority of candidates could not interpret the information given to form the basis for their answers. Most scored no marks for this question.

- (a) Very few candidates realised that water shrimp require a high concentration of dissolved oxygen to live, although this information was provided in the stem. Most wrote vague answers about dirty water. No candidate mentioned the bacteria that feed on materials in sewage, or the effect that these bacteria have on the oxygen content of the water.
- (b) A few candidates realised that the oxygen content increased with distance from the sewage outlet pipe, gaining one mark. Most wrote vague answers about the water being less polluted or further away from the pipe.
- (c) No candidates suggested that this was a control or for comparison. Many referred to this part of the river having no pollution, gaining no credit. Others simply mentioned that this was where the scientist could find fresh water shrimp.
- (d) Few candidates made sensible suggestions. Common incorrect answers referred to rubbish thrown into the river or made vague reference to pollution from factories.

Question 5

Most candidates gained some marks from this question, usually from (a)(i) and (b). Though most knew how to construct a diagram to work out the inheritance of recessive and dominant alleles, few had a clear understanding of the process.

- (a) (i) Most candidates gained this mark, with nn being the most popular answer.
- (ii) Most candidates wrote vague answers that gained no credit. Many referred to the alleles of parents but none mentioned inheritance of the recessive allele from both parents. Many thought that the lack of night blindness was simply inherited from the mother.
- (b) Most candidates could construct a suitable diagram to work out the genotypes of the offspring, gaining three marks. Few managed to infer the chance of night blindness from their diagram. Some of the weaker candidates used incorrect parent genotypes, despite these being given in the question. These candidates usually gained some marks on an 'error carried forward' basis.
- (c) No candidates showed knowledge of sex determination as a result of the combination of X and Y chromosomes. Most gave vague answers referring to inheritance of gender being determined by the father, gaining no credit.

Section B

Question 6

Whilst some candidates gained a few marks from this question, most wrote vague and rambling answers that gained little or no credit. Many scored zero marks.

- (a) Only a few candidates knew that HIV is the virus that, after infection, can lead to the symptoms associated with AIDS. Many thought that they were two different diseases that spread in different ways. Many candidates gained a mark for mention that HIV is spread amongst addicts by sharing of needles, but the significance of blood transfer was never seen. Fewer could explain how alcohol increases promiscuity and therefore increases the spread of HIV by sexual contact.
- (b) Most candidates based their answers on draconian measures they thought should be taken against drug dealers and users, gaining no credit. Only the most able made sensible suggestions based on education or use of the media to spread knowledge. Ideas of issuing free condoms or sterile needles were not seen. Some candidates made sensible comments about the problems in developing countries, including the effects of a lack of resources and poor communications. However, most simply described the extent of the problem rather than referring to control or treatment.

Question 7

No candidate showed a good knowledge and understanding of the carbon cycle. Some candidates managed to score a few marks, but many failed to score any.

- (a) Very few candidates had any clear ideas of what the carbon cycle is. Many tried to draw a diagram, but almost all had no reference to carbon dioxide in the air. In most diagrams the terms were placed and/or joined in an illogical manner. A large number of candidates simply wrote a sentence about each term, with no reference to the carbon cycle at all.
- (b) Some candidates gained a mark or two by referring to deforestation and its effect on the removal of carbon dioxide from the air. Few candidates gave a coherent enough explanation of the combustion of fossil fuels and consequent release of carbon dioxide to be worth any marks. A small number of candidates scored marks by a correct reference to global warming and its effects. Many made incorrect reference to the ozone layer or to the effect of using greenhouses.

Question 8

This question was a disaster for most candidates. Knowledge of the carbon cycle was generally poor, and the ability to frame an answer to the question asked was shown by only the most able. Few candidates scored more than one mark, and many did not score.

- (a) Most candidates simply repeated the information provided in the question. Many showed considerable confusion as to from where the plant gains each component for photosynthesis. Only the most able mentioned stomata, and none mentioned xylem. The only mark gained by a significant number of candidates was for the idea of energy being obtained from sunlight. There was similar confusion about the fate of the products of photosynthesis, with only the most able making sensible suggestions involving release of oxygen through stomata and conversion of glucose to starch.
- (b) Most candidates misunderstood this question, not realising that they were required to write about an experiment they could perform. None of the few who did realise that this is what the question was asking managed to put together a sensible suggestion. No candidate mentioned use of a plant such as elodea, a means of varying light intensity, e.g. distance from a lamp, or a method to measure the rate of photosynthesis e.g. counting oxygen bubbles. Most candidates scored zero.