COMBINED SCIENCE

Paper 5129/01
Multiple Choice

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

Comments on individual questions (Physics)

Candidates found no question to be very easy and only **Question 4** to be very difficult. A number of questions showed uncertainty among candidates, including the better ones.

Question 1 Candidates were uncertain as to how to read a vernier scale, with all options attracting a significant response. Option A was incorrectly chosen by some of the candidates in the top quartile.

Question 2 The incorrect option B (where the axes were reversed) attracted a large number of responses. The key was option D. Candidates must be made aware of the conventional labelling of axes on speed / time graphs.

Question 3 differentiated well, with option B incorrectly favoured by candidates in the lower quartiles. Candidates must be made aware that while weight will change according to the gravitational field that the object is placed within, mass will stay constant.

Question 4 was poorly answered. The majority of candidates considered the original length as part of the extension under the 6N load leading them to chose option A rather than option B, the key.

Question 5 discriminated well. Wrong answers were equally spread over the three options.

Question 6 discriminated well, with option A attracting most of the incorrect responses.

Question 7 Many of the top quartile candidates incorrectly chose option B or option C. It is possible that candidates anticipated the answer before fully reading the question. Candidates should be advised to take care when reading questions.

Question 8 was answered well. Option C was a popular distractor.

Question 9 showed good discrimination. The lowest quartile candidates favoured option C, perhaps having misinterpreted the resistor value unit.

Question 10 was also well answered with weaker candidates favouring option D.

Question 11 34% of candidates were able to correctly work out the most appropriate fuse to be fitted.

Question 12 This was well answered, with the lowest quartile candidates split mainly between options A and D.

Question 13 Candidates showed a better understanding of *half-life* than in previous years. Unfortunately, some of the top quartile candidates did not convert their time for the **total** number of *half-life* periods into a time for **one** half-life.

Comments on individual questions (Chemistry)

Question 14

Only a small proportion of the candidates realised that the boiling point of X is between room temperature and the boiling water. The majority of candidates thought that the boiling point of liquid X is 100°C and chose option **A**.

Question 15

Candidates need to be encouraged to understand the relationship between the number of electron shells and the position of elements in the periodic table.

Question 16

Candidates needed to understand that an ionic substance does not conduct electricity in aqueous solution. Many incorrectly chose option **C**. The properties of sodium chloride, an ionic substance, are not well known.

Question 17

Almost 40% of the candidates thought that an ammonia molecule contains four hydrogen atoms.

Question 18

The lower quartile candidates did not do well on this question.

Question 19

Higher quartile candidates answered this correctly. The most commonly chosen distractor indicated that a large number of candidates thought that salt neutralises excess acid in the stomach.

Question 20

Candidates need to know and apply the ideas relating to the gradation of properties in a Group in the Periodic Table.

Question 21

All options were chosen with a roughly similar frequency, indicating that candidates need to be more familiar with this type of reaction.

Question 22

The chemistry of the blast furnace is well known by many of the candidates.

Question 23

Almost half the candidates thought that oxygen remained in the syringe after the experiment and chose option **C**.

Question 24

Candidates found this question challenging. It may be that the use of relative temperatures and pressures in this question made the question difficult for many candidates.

Question 25

The properties of a homologous series are well known by the candidates who scored well elsewhere. Many candidates thought that the boiling point increases as the relative molecular mass decreases.

Question 26

The candidates in the top quartile correctly identified the formula of ethene as a compound that undergoes addition reactions.

Question 27

The reactions and properties of ethanol are well known by many of the candidates.

Comments on individual questions (Biology)

Question 28

This question discriminated well between candidates.

Question 29

All options were distributed equally amongst the candidates, which may indicate guesswork. Candidates must be familiar with the reasons for osmosis and the movement of water molecules during it.

Question 30

This question worked well.

Question 31

Candidates must be aware of the difference between respiration and photosynthesis.

Question 32

This question was answered well.

Question 33

Candidates found this question on blood flow difficult. Candidates need to be familiar with the structure of veins and the functions of valves in veins.

Question 34

This question was found challenging by candidates of all abilities.

Question 35

This question required candidates to know the functions of several organs in the body.

Question 36

As in previous years, many candidates had the accommodation mechanism of the eye exactly the wrong way round.

Question 37

This question, about alcohol, was better answered than in some previous years.

Question 38

This question discriminated well.

Question 39

This straightforward question on the carbon cycle caused problems for many candidates.

Question 40

Many candidates were able to answer this question correctly.

COMBINED SCIENCE

Paper 5129/02
Theory

General comments

The overall standard of the candidate responses was better than in previous examinations. The Chemistry sections of the paper were not as well answered as in previous examinations, in particular, the questions involving a titration, construction of a formula from the constituent ions and Organic Chemistry. Candidates continue to have difficulty stating the correct units in Physics calculations, with the exception of density. Candidates should be able to change the subject of the equations in Physics calculations. Candidates should also be encouraged to state the equations used in their Physics calculations, using the correct symbols for the quantities involved. The candidates' responses to factual questions in the Biology section were encouraging but questions requiring explanation or interpretation proved challenging for many, the exception to this being **Question 20**.

Comments on specific questions

Question 1

(a) This question proved easy, particularly for the better candidates. The weaker candidates did not recognise that all that was required was to add the two values of current together.

(b) A large proportion of the candidates were aware of the correct equation for calculating the potential difference. Some candidates used incorrect values for the resistance and current.

(c) Once again, a large proportion of the candidates were aware of the equation for calculating the charge passing through the resistor. Unfortunately many candidates did not convert the time into seconds. The units of charge were not well known by many candidates. Candidates who correctly stated the units gained credit independent of their numerical answer.

Answers: **(a)** 0.18A
(b) 1.5V
(c) 45C

Question 2

(a) (i) The colour of Universal Indicator in an alkaline solution was well known by a majority of the candidates.

(ii) Only the better candidates correctly identified the hydroxide ion as the ion in the solution that causes it to be alkaline.

(b) The vast majority of the candidates were unfamiliar with a titration experiment. Candidates are expected to know that an exact volume of the ammonia is measured using a pipette and that the sulfuric acid is added from a burette until the solution is neutral.

(c) (i) The answers to this question indicated that formula construction is not understood by the majority of the candidates.

(ii) Only the better candidates were aware of the role of ammonium sulfate as a fertiliser.

Question 3

(a) A large proportion of the candidates knew the equation for calculating the speed but many of the candidates did not convert the time into seconds and consequently did not gain full credit.

(b) The equation force equals mass times acceleration is well known by many of the candidates but unfortunately many were unable to rearrange the equation correctly and find the acceleration.

Answers: **(a)** 3125 m/s
(b) 0.225 m/s^2

Question 4

(a) A significant number of the candidates were able to correctly name the structures in the diagram of a flower. Some candidates did not recognise the difference between an ovary and an ovum for structure **Z**.

(b) Many candidates knew that the main function of the petals of a flower are brightly coloured in order to attract insects but many candidates did not state that the insects are responsible for the pollination of the flower.

(c) Those candidates who correctly identified the parts of the flower were able to identify the part of the flower where pollen is produced as the anther.

Question 5

(a) The vast majority of the candidates were able to correctly show the arrangement of particles in a gas; the arrangement of particles in a liquid was less well known. Candidates should be aware that a diagram showing the arrangement of particles in liquid should have the particles arranged randomly and touching each other.

(b) This question was very well done by a majority of the candidates.

Question 6

(a) This question proved difficult for many of the candidates. There is some confusion amongst the candidates as to what constitutes a physical property. A significant proportion of the candidates gave the answers ‘laboratory’ and ‘clinical’. There are a number of properties for the candidates to choose including volume, density, resistance, colour, e.m.f., and pressure.

(b) The majority of the candidates stated the uses of laboratory and clinical thermometers, rather than the differences between them. The most common correct differences were the increased sensitivity, smaller range and the constriction in a clinical thermometer.

(c) A large number of candidates simply stated data from the table rather than explain why mercury cannot be used for measuring the temperature. Candidates were expected to state that the mercury freezes or solidifies at the temperature stated in the question.

Question 7

(a) This responses to this question were disappointing. Too many candidates referred to the parts of the alimentary canal rather than the parts of the apparatus in the diagram. The better candidates correctly identified the tubing as representing the small intestine and the water representing the blood. A large proportion of the candidates included the amylase in their response to the food rather than simply stating the starch.

(b) The function of the amylase in the experiment and the fact that it is an enzyme was not well known. Many candidates recognised the significance of the permeable membrane but then stated that osmosis is responsible for the movement of maltose into the water rather than diffusion.

Question 8

(a) Most candidates gained some credit for knowing the equation to calculate the power. Many used minutes rather than seconds in their calculation. Candidates need to ensure that they convert time into seconds in questions such as this. The unit of energy is not well known by the candidates.

(b) The vast majority of the candidates were able to name the earth wire correctly but the neutral wire was less well known. Even so, the question was answered well by the majority of the candidates.

Answer: **(a)** 216 000 J

Question 9

(a) The test for oxygen is quite well known particularly by the better candidates. Some candidates confused the test for oxygen with the test for hydrogen.

(b) The fact that hydrogen is the gas that produces only water when it burns was not well known. A significant number of candidates gave nitrogen as their response.

(c) This absence of hydrogen in the air is not well known. Quite a number of candidates thought that argon is not present in the air.

(d) Almost half of the candidates correctly identified carbon monoxide as the gas produced by the incomplete combustion of hydrocarbons. Some of the candidates answered the question in terms of complete combustion and gave carbon dioxide as their answer.

(e) The use of argon in light bulbs is very well known.

Question 10

(a) This question proved to be easy for the vast majority of the candidates.

(b) The working of an iron-core transformer is not understood by the majority of the candidates. In order to explain the effect of changing from alternating current to direct current, candidates were required to recognise that the direct current remains constant and, as consequence of this, the magnetic field does not change and therefore the transformer has no output.

Question 11

(a) The differences between asexual and sexual reproduction are well known by the better candidates but the majority of the candidates' responses made references to animals and plants rather than to the fact that sexual reproduction requires two parents or involves fusion of gametes and that consequently there are genetic differences in the offspring.

(b) This question was well done by many of the candidates although there appeared to be some confusion about the function of the testes and the sperm duct.

Question 12

(a) This question was well done by the better candidates. While the calculation of the amounts of aluminium and iron in the first line of the calculation proved difficult for many candidates, a number of these candidates gained credit for correctly calculating values in the second and third lines using their incorrectly calculated values of the first part.

(b) Only a small proportion of the candidates correctly identified the type of reaction as oxidation.

Answer: **(a)**

54	112
5.4	11.2
	5.6

Question 13

(a) This question was well done by the majority of the candidates.

(b) (i) A significant proportion of the candidates were able to correctly state the equation for calculating the refractive index.

(ii) Candidates found these calculations, involving sines, to be challenging.

Answers: **(a)** 46°
(b)(ii) 28°

Question 14

(a) The reaction scheme was unfamiliar to a number of candidates. Gas B was the most frequently correctly identified substance. The conversion of ethene to ethanol was known only by the better candidates.

(b) Candidates should know that the structural difference between ethane and ethene is that ethene contains a carbon to carbon double bond. A significant proportion of the candidates answered the question in terms of the type of hydrocarbons or the general formula of the hydrocarbons.

(c) Many candidates knew that a catalyst is used to increase the rate of a chemical reaction.

Question 15

(a) Many candidates were aware that transpiration is the loss of water from plants. Of those candidates who knew the definition of transpiration, most knew that the process occurs through the leaves of the plant. The stomata were only identified by the better candidates.

(b) A large number of candidates identified 6 hours as the time that the water uptake and the water loss are equal. The second time was correctly identified less frequently.

Question 16

(a) The better candidates were able to identify that thermal energy is transferred through the metal rod by conduction.

(b) Quite a number of candidates simply repeated the question or focused on the ring rather than saying that the metal rod expands.

Question 17

(a) (i) The structure of the nucleus of the atom is well understood by the majority of the candidates.

(ii) A large number of candidates did not attempt this question. This may indicate that many of the candidates need to read the question paper more carefully. Of those candidates who did answer the question, responses indicated that the electronic structure is less well understood than the atomic nucleus.

(b) The definition of an isotope was well known, particularly by the better candidates.

(c) This question posed problems for many of the candidates. The majority of the candidates simply stated that oxygen is used for breathing and combustion. The mark scheme indicates that these vague answers were insufficient and candidates were expected to be more specific in their responses. For example, 'breathing' should have been qualified in some way to include diving apparatus or to assist breathing in hospitals. Other responses included the use of oxygen in welding with an oxy-acetylene torch.

Question 18

This question proved easy for many of the better candidates. Many candidates knew that the hormones are carried in the blood and destroyed by the liver. Fewer candidates knew that hormones are produced in a gland and that they are transferred to a target organ.

Question 19

(a) This question was very well answered by the majority of the candidates. Most candidates were able to quote the correct units.

(b) This question was less well answered. Candidates were expected to read the volume of the stone and water from the diagram and then subtract the volume of the stone. Many of the candidates simply stated the volume of the stone that was given in the question.

Question 20

(a) This question was very well answered by the majority of the candidates.

(b) The majority of the candidates were able to correctly select the relevant information from the question. Many candidates were able to gain full marks.

(c) Some of the candidates' responses were vague, but half the candidates correctly stated that the fishermen were in danger because they ate the poisoned fish.