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FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned.**

COMBINED SCIENCE

GCE Ordinary Level

Paper 5129/01

Multiple Choice

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

General comments

The May/June 2003 examination candidates had scores which ranged from 8 to 34 producing a mean of 18.39 with a standard deviation of 4.32. No question proved to be particularly difficult and only **Question 11** proved to be very easy. There was evidence from a number of questions that some of the more able candidates resorted to guessing the answers.

Comments on specific questions

Question 1

A clear choice between options **A** and **C**. The majority of candidates correctly chose option **C** with the remainder, mostly less able ones, choosing option **A** – perhaps not reading the question carefully enough? Option **B** proved to be a positive distractor to a small number of more able candidates.

Question 2

Good discrimination with options **A** and **C**, the more popular of the two, attracting those weaker candidates who appeared not to have worked out the individual liquid densities.

Question 3

Indications of uncertainty among candidates, including the more able, with a significant proportion choosing either option **A** or **D** in roughly equal numbers.

Question 4

This question also showed uncertainty among more able candidates with a significant number choosing either **A** or **D** with the former the more popular choice.

Question 5

Another question to show a clear choice between two options with 80% of candidates equally divided between the correct one, option **D**, and the incorrect option **C**.

Question 6

The majority of candidates, approximately 70%, knew the correct value for the speed of electromagnetic radiation in vacuo and were evenly split between options **B** and **D**. Wave type, however, is still a problem with a significant number of more able and a majority of the less able candidates choosing option **B**.

Question 7

Good discrimination with most of the more able candidates correctly choosing option **D** and a majority of the less able ones option **A**.

Questions 8 and 9

These were both correctly answered by the majority of candidates. In **Question 8** a number of more able candidates were attracted to option **D**.

Question 10

Some confusion over the role of individual wires in a 3 core cable, especially among the less able candidates who were, in spite of a slight preference for option **A**, quite evenly spread over all the options. The more able candidates, although biased towards option **D**, the correct one, were also spread over them all with a significant number in favour of option **B**.

Question 12

More candidates chose distractor **B** than the correct option, **A**. This is suggestive of guessing amongst even the more able candidates, significant numbers of whom chose options **B** or **C**.

Question 13

Candidates showed an understanding of proton number with the majority choosing either option **A** or **B**. Nucleon number, however, is better understood by the more able candidates, the majority of whom correctly chose option **B**, than by the less able who were almost equally divided between the two.

Question 14

Over 50% of the candidates correctly selected the required apparatus in order to obtain pure water from seawater. A number of the weaker candidates selected options **A** and **C**, which included the filter funnel.

Question 15

This proved to be an easy question particularly for the better candidates.

Question 16

There is some confusion amongst the candidates about the reason for the high boiling points of ionic compounds. Candidates should be aware that the boiling point of a substance depends on the forces of attraction between the particles.

Question 17

The majority of the candidates correctly stated that the gas produced during photosynthesis is oxygen but the weaker candidates chose option **A**, carbon dioxide.

Question 18

There was evidence of guesswork in this question particularly amongst the weaker candidates. Only 30% of the candidates recognised that in order to produce a neutral solution an acid and an alkali should be mixed together.

Question 19

Once again there was evidence of guesswork. Over a third of the candidates' chose option **D** because they did not recognise that barium sulphate was insoluble in water.

Question 20

The physical properties of the alkali metals are not well known. A significant number of candidates knew that the alkali metals are soft but less than 30% of the candidates knew that alkali metals have low densities. Over a third of the candidates chose option **D**, which indicated the general properties of metals rather than those, which are specific to the metals in Group 1.

Question 21

There was evidence of widespread guesswork amongst all the candidates. Candidates were unable to relate the general properties of Group VII elements to the properties of astatine.

Question 22

This question was very well done particularly by the better candidates.

Question 23

Almost 40% of the candidates recognised that haematite is reduced by carbon monoxide in the blast furnace. A significant proportion of the candidates chose option **B**, not recognising that limestone is used to remove acidic impurities not basic impurities.

Question 24

This question was answered poorly even by the better candidates. Over 75% of the candidates chose options **C** and **D** where the final volume of gas was either zero or 10cm^3 . These candidates did not understand that when iron rusts it reacts with the oxygen in the air and that the air only contains 20% of oxygen.

Question 25

Almost 60% of candidates thought that the main constituent of natural gas was hydrogen rather than methane.

Question 26

Over 50% of the candidates thought that the conversion of paraffin oil into an alkene involved combustion. Only a small proportion of the candidates recognised the process as cracking.

Question 27

This question was well done by a large proportion of the candidates.

Question 28

This was a straightforward question, which worked well in discriminating between candidates.

Question 29

Some of the better candidates opted for **A**, not appreciating that stored food would have to be broken down by enzymes before it can be made available to plants.

Question 30

Some candidates were evidently guessing here, but more than half got the answer right.

Question 31

This question was perfectly sound, but highlighted a common misunderstanding, even among the best candidates, who were tempted by option **B**. However, of course, the kidneys decrease blood urea concentration, not increase it, whereas the liver produces urea from deamination.

Question 32

Surprisingly, fewer than half the candidates knew that most transpiration occurs through the stomata.

Question 33

Some good candidates found this question difficult. They were expected to interpret the diagram, when they would realise that vessel **D**, when blocked, would affect the largest area of heart muscle.

Question 34

Many candidates were simply guessing here. Again, candidates were required to apply their knowledge to the information in the diagram.

Question 35

This should have been an easy question, but over half of candidates guessed incorrectly.

Question 36

This question discriminated well between candidates.

Question 37

This was an easy question, but nevertheless also discriminated well.

Question 38

This question caused some confusion. Candidates simply had to realise that soot represents a physical barrier to diffusion in the lungs (syllabus section 12.h).

Question 39

In the diagram of the buttercup, many candidates mistook the receptacle for a carpel, perhaps because of its central position in the flower.

Question 40

It was pleasing to see that the great majority of candidates understand that HIV is not susceptible to antibiotics.

<p>Paper 5129/02</p>

<p>Theory</p>

General comments

The majority of candidates could make some attempt at most of the questions. The candidate's responses to the Biology section of the Paper were better than in previous years. Many candidates found the calculations in the Physics section easier than in previous years and candidates are becoming more aware that units are required for numerical answers.

Comments on specific questions

Question 1

The diagrammatic representations of atoms and molecules in substances is not well understood by a significant number of candidates. The most commonly recognised substance was C as a compound but the alloy, B, and the elements, A and D, were less well known.

Question 2

This was an easy question for a large number of the candidates. Those candidates who incorrectly calculated the mass and volume of the stone, but used the wrong numbers correctly in the calculation of the density were given credit for the calculation.

Answers: (a) 90g; (b) 30cm^3 ; (c) 3g/cm^3 .

Question 3

- (a) This question proved difficult for the majority of the candidates. Many candidates did not state the required differences between inspired and expired air but simply stated that inspired air contains oxygen and expired air contains carbon dioxide. Candidates were unaware that inspired air and expired contains both gases and that the differences between them is the relative amount of carbon dioxide and oxygen. Only a small number of the candidates recognised that expired air contains more water vapour.
- (b) The majority of candidates identified that the bicarbonate indicator would go yellow in test-tube 2.
- (c)(i) The vast majority of the candidates incorrectly suggested that the bicarbonate indicator changed colour because the plant produced oxygen rather than because it removed carbon dioxide from the apparatus.
- (ii) The process was recognised as photosynthesis by many candidates but a significant number suggested that it was respiration.
- (iii) Only the better candidates could state the word equation for photosynthesis.

Question 4

- (a) The vast majority of the candidates correctly deduced the order of reactivity for the metals.
- (b) Most candidates were unaware that the conditions in all four test-tubes should be the same so that the results could be compared. The idea of a fair test is not well known.
- (c) The gas, hydrogen, and the test for the gas were well known by a large number of the candidates. Candidates should be aware that a burning splint rather than a glowing splint is used in the test for hydrogen.
- (d) Many candidates correctly stated the name of the salt formed when zinc reacts with hydrochloric acid as zinc chloride but only a small number of candidates could state the formula, ZnCl_2 .

Question 5

- (a) The majority of the candidates were able to determine the amplitude of the wave but the wavelength proved more difficult. A large number stated that the wavelength was 8cm rather than 16cm.
- (b)(i) Only the best candidates could state that the frequency was the number of oscillations produced per second.
- (ii) The calculation of the speed of the wave was poorly done by many of the candidates. The equation speed equals frequency times wavelength was not well known. Many candidates used the equation speed equals distance divided by time, using the frequency as the time.

Answers: (a) 16cm; (b) 4mm; (d) 80cm/s.

Question 6

- (a)(i) The majority of candidates were unfamiliar with the different uses of energy within the body, consequently the answers given for this question were related to physical activities such as running or jumping rather than the required responses relating to how energy was used *within* the body. Candidates were expected to state that energy was used for processes such as synthesis of molecules, cell division, growth and breathing. The most common correct answer was that energy is used to heat the body.
- (ii) The ways in which energy was lost from the body were also not well known. The expected answers, for example, conduction, convection, sweat, urine and faeces, were rarely seen. Most candidates simply repeated the answers that they had given in part (a)(i).
- (b) Most of the candidates simply repeated the question and stated that the 45 year old man had a greater energy intake rather than explain there was a difference in energy intake. The candidates were expected to state that the 45 year old man was more active than the 75 year old man.

Question 7

- (a) The majority of the candidates were unable to write the symbol equation for the formation of sulphur dioxide. There appears to be some misunderstanding of the terms equation and formula because some candidates simply stated the formula for sulphur dioxide rather than the equation for its production.
- (b) A significant proportion of the candidates thought that the pH of water increased when sulphur dioxide dissolved in rainwater. Candidates who stated that the water became acidic were given credit even though they did not refer specifically to the pH value.
- (c) The environmental problems caused by acid rain were well known.

Question 8

- (a) The description of convection currents in a kettle was poorly done by many candidates. The idea that the hot water rises due to a decrease in its density and the cold water at the top of the kettle falls was poorly explained by a large number of the candidates. Some candidates described the convection current in terms of air rather than water. The most common answer involved a description of how the element of the kettle heated the water.
- (b) A large number of candidates were able to suggest why the body of the kettle was made of plastic. A number of candidates failed to gain full credit for their answers because they suggested a correct reason for plastic being used and then the converse for the metal body.
- (c) The names of the connections in the mains plug were well known by the majority of the candidates.
- (d) The calculation of the resistance of the heating element was well done by many candidates although some were penalised for not stating the units.

Answer: (d) 28.75 ohms.

Question 9

- (a) Candidates appeared unfamiliar with the diagram and were unable to name the tissue through which water is carried through the leaf.
- (b) The two tissues were not well known and it appeared that many candidates were using guesswork.
- (c) Only a small number of candidates recognised that the process by which water is lost from the leaf is transpiration.

Question 10

- (a) The colour of aqueous bromine was not well known.
- (b) The use of aqueous bromine for distinguishing between saturated and unsaturated hydrocarbons was known only by the very best candidates. Those candidates who did not state that the colour of aqueous bromine was orange or yellow but correctly stated that the colour did not change with ethane or went colourless with ethene were given credit for their observation in part (ii).
- (c) Many candidates recognised that one of the products of the complete combustion of hydrocarbons was carbon dioxide but the fact that the other product was water was not well known. It was disappointing to see that a large number of candidates thought one of the products was hydrogen.

Question 11

- (a) The description of why the metal ball moves when the switch is closed was poorly done by many candidates. Candidates were expected to state that when the switch was closed current flowed in the circuit, which turned on the electromagnet and this attracted the iron. A significant number of candidates were confused by the meaning of open and closed switches and some candidates thought that the current passed through the gong and the metal ball.
- (b) Only a small number of candidates recognised that reversing the cells would have no effect on the working of the electric bell. Most candidates thought that the bell would not work or suggested that the ball would be repelled.
- (c) This was well done by the better candidates but the majority did not recognise that the cells convert chemical energy into electrical energy.

Question 12

- (a) Many candidates simply tried to name the parts of the flower rather than suggest a **use** for the parts.
- (b) The majority of candidates labelled the diagram correctly.
- (c) Many candidates were unaware that the ovule becomes the seed and the ovary becomes the fruit. A significant number of candidates suggested that they became parts of the plant such as the anther.

Question 13

- (a) The diagram to show the bonding in ammonia was unfamiliar to the vast majority of the candidates. The expected diagram included three shared pairs of electrons between the nitrogen and the three hydrogen atoms and a lone pair of electrons.
- (b)(i) Many candidates could name the type of bonding in ammonia as covalent although a significant number stated that it was ionic.
- (ii) This question was poorly answered. The vast majority of the candidates were unfamiliar with the idea that the boiling point of a substance is related to the strength of the forces between the particles in the substance. Ammonia is a molecular compound and the forces of attraction between the molecules weak, which are easily broken, therefore the boiling point of ammonia is low. Many candidates thought that the boiling point was low because it was a compound of nitrogen and hydrogen, which are both gases.

Question 14

- (a) Basic ideas of electromagnetic induction are not well known. The majority of candidates could not state that the size of the induced e.m.f. is affected by the strength of the magnet, the number of turns in the coil and the speed at which the magnet is pushed into the coil. A significant number of candidates stated that the size of the magnet is one of the factors but this is not the same as the strength of the magnet.
- (b) Some candidates were aware that the current is reversed by reversing the magnet. The idea that the current could be reversed by removing the magnet or reversing the winding of the coil was not well known.

Question 15

- (a)(i) The majority of the candidates correctly named the cell as a root hair cell.
- (ii) The process, by which water enters the cell, osmosis, was well known by many candidates.
- (iii) Only a small number of candidates could suggest that cell **X** has a larger surface area and therefore is better at taking in water than cell **Y**.
- (b) The ways in which water is used by plants was not well known. A number of candidates recognised that water is used in photosynthesis but most candidates were unfamiliar with the use of water for turgor, to prevent the plant from wilting, for transporting substances, for making fruit and for cooling by evaporation.

Question 16

- (a) A large number of candidates explained the meaning of the term *isotopes* extremely well. A number of candidates were penalised for referring to the relative atomic mass rather than the mass number of the isotope.
- (b) The majority of the candidates completed the table correctly.
- (c) A large number of the candidates simply re-stated the definition of the term isotope. Candidates did not recognise that the chemical properties of isotopes are the same because the isotopes have the same number of electrons in the outermost shell.

Question 17

- (a) Many candidates recognised that the duster gains a positive charge.
- (b) A large number of candidates recognised that the two balls do not hang vertically because like charges repel. A number of candidates failed to gain credit because they only stated that the balls have like charges without explaining that they would repel.