CONTENTS

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

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

General comments

A small increase in the number of candidates taking the examination coincided with an encouraging increase in the mean score from 15.64, in 2002, to 18.09, with a standard deviation of 4.43. A number of questions, in particular **Questions 11**, **12** and **13**, proved to be difficult with, again, the suggestion of uncertainty and guessing among the better candidates. No questions were found to be particularly easy.

Calculations involving reacting masses proved difficult for the majority of the candidates in the Chemistry section of the paper. Questions involving interpretation of experimental results proved difficult for many of the candidates.

Comments on specific questions

Question 1

This question produced a clear distinction between candidates who understood, and those who did not, that the term 'acceleration' can be applied to objects *slowing* down as well as to those whose speed is increasing. The better candidates correctly chose option **A** while the weaker candidates chose option **D**.

Question 2

Although most of the able candidates correctly chose option **B**, a significant number also chose either option **A** or option **D**.

Question 3

This question illustrated the ease with which the close incorrect option can be chosen if candidates are careless in reading the question; 70% chose option **B**!

Question 4

Application of the Principle of Moments is not well known with more candidates, including the more able, choosing options **B** and **C** than chose the correct one, option **A**. More able candidates actually chose option **C** than did option **A** and they also made a significant contribution to both options **B** and **D**.

Question 5

Weaker candidates showed their lack of understanding of the various forms of energy by making a significant contribution to *all* the options with option **D** the most popular of the incorrect options; it also attracted a large number of more able candidates.

Question 6

The thermocouple is clearly not well known with over half of all candidates choosing option **A**. The majority of the remainder correctly chose option **D**.

Question 7

Each option attracted a significant number of responses showing uncertainty and guessing among candidates, including the more able.

Question 8

It is encouraging to note that the majority of candidates know more than one non-magnetic material.

Question 9

A situation requiring the application of Ohm's Law was recognised and used correctly by only 50% of candidates with the remainder guessing between the three incorrect options.

Question 10

Well known and correctly answered by most candidates.

Questions 11, 12 and 13

These were all poorly answered and showed widespread guessing, especially in **Question 13**, even among the better candidates. In **Question 11** the classic problem of candidates failing to convert the time to seconds was not even evident; only 9% chose option **B** and 15% the correct option, **D**! The use of slip rings in an a.c. generator was not well known with option **D** (they reduce friction) being the most popular answer. In **Question 13** candidates' answers were distributed equally over all the options!

Question 14

The limited accuracy of the measuring cylinder was not appreciated by over a third of the candidates. The better candidates recognised that a burette measured exact volumes.

Question 15

There is some confusion about the meaning of the numbers on the symbol because a large number of candidates thought that the mass number, 4, represents the number of neutrons and chose option **B**.

Question 16

An easy question for the better candidates but the many of the weaker candidates thought that copper dissolved in a solution of hydrochloric acid.

Question 17

A difficult question for the majority of candidates. Calculations involving reacting masses are poorly understood.

Question 18

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

Question 19

Another easy question.

Question 20

A large number of candidates did not appreciate that the reaction between an acid and a carbonate produces carbon dioxide in addition to a salt and water.

Question 21

The majority of candidates recognised that the gas used to fill light bulbs was an inert gas, argon, and therefore has eight electrons in the outermost shell.

Question 22

The better candidates knew that the order of the elements in the Periodic Table is determined by the proton number, but a significant proportion of the weaker candidates thought that it was the relative atomic mass.

Question 23

The reactivity series is well understood by the majority of the candidates.

Question 24

There was evidence of large scale guesswork in this question even amongst the better candidates. When iron rusts the oxygen in the air is used up and because oxygen makes up 20% of the air the water will rise up the tube to position **D**.

Question 25

There was evidence of guesswork in this question. Less than 30% of the candidates recognised that the first few test tubes would be contaminated with air from the apparatus. Option **B**, hydrogen, was the most popular distractor.

Question 26

Once again there was evidence of guesswork particularly amongst the weaker candidates. A significant proportion of the candidates thought that carbon monoxide is an acidic gas.

Question 27

The correct order of boiling points for the fractions was not well known.

Question 28

This was an easy question to start off this section of the paper, but nevertheless approximately one-third of candidates answered incorrectly.

Question 29

This question, on cell specialisation, was answered correctly by the great majority of candidates.

Question 30

Half the candidates were confused by this question on osmosis; they simply had to realise that the water will flow from higher to lower water concentration.

Questions 31 and 32

It was pleasing to see that nearly all candidates show a good understanding of the essential concepts of enzyme action and photosynthesis.

Question 33

Many candidates chose **C** (the pancreas) as a source of protease, despite the fact that an acidic digestive juice was specified.

Question 34

This question proved difficult. Candidates apparently do not understand that blood will only flow down a pressure gradient.

Question 35

Many candidates were disconcerted by the unfamiliar context of this question.

Question 36

This was difficult, with many candidates being misled by the word ‘flowers’ in the question, and so choosing **A**. Candidates had to read the question carefully, and then understand that a failure of pollination will prevent formation of *fruits*.

Question 37

Confusion about plant gas exchange was evident here, even amongst the better candidates.

Question 38

This question discriminated well, only the better candidates linking sulphur dioxide to acid rain and the acidification of rivers.

Questions 39 and 40

Surprisingly, these straightforward questions were only answered correctly by about half, and about one-third, of candidates, respectively.

Paper 5129/02

Theory

General comments

It was pleasing to see that the majority of candidates were able to plot a graph accurately and join the points with a smooth curve. The calculations in the Physics question were poorly done by many candidates and even those candidates who correctly calculated the numerical answer to the question were unable to state the correct units. The Biology questions proved difficult for many candidates particularly those which involved explaining a biological concept. Questions which required factual recall were answered well by the better candidates.

Comments on specific questions

Question 1

(a) A majority of candidates recognised that sodium chloride dissolves to produce a solution and that sand is insoluble in water but only the better candidates identified that sodium chloride acted as the solute. Many candidates stated that sodium chloride was the solvent.

(b) The process by which sand is separated from the solution was not very well known. Distillation was often stated rather than filtration.

Question 2

(a) The graph was well drawn by many candidates, however, a number of candidates had difficulty plotting the points at 30 and 90 minutes. The majority of candidates gained credit for joining the points with a smooth curve.

(b) A large number of candidates were able to read the graph accurately and quote a time for a count rate of 25 counts per second.

(c) The concept of half life is not well understood. Only the better candidates recognised that half life is defined as the time taken for the count rate to reach half the initial rate and that the value found in **(b)** was the value for two half lives. The expected answer for half life was therefore half the value obtained from the graph.

Question 3

(a) Many candidates knew that the energy source for the ecosystem was the sun but a significant number of candidates thought that the energy source was grass.

(b) The producer in the ecosystem was well known.

(c) A large number of candidates recognised that the list of organisms contained four herbivores.

(d) Many candidates struggled to construct the food chain from the information given in the question. A large number of candidates stated the inverted order of organisms in the food chain and received no credit for their answers. A number of candidates listed the general terms producer, herbivore and carnivore without identifying them from list given in the question.

Question 4

(a) Only a small number of candidates could name the catalyst used in the manufacture of ammonia but the majority of the candidates were aware that the catalyst was used to speed up the reaction.

(b) This part of the question was very well answered. The vast majority of the candidates could balance the equation and knew that the state symbol (g) represented a gaseous reactant.

(c)(i) The better candidates knew that the acid required to make a nitrate was nitric acid but many candidates simply guessed the name of an acid.

(ii) Only a small number of candidates recognised that the reaction between an acid and an alkali, ammonia, was a neutralisation reaction.

(d) The better candidates could name potassium and phosphorus as the elements essential for the growth of plants. The concept of elements is not well known by many candidates, as was shown by those candidates who stated that the elements were carbon dioxide and water, which are compounds not elements and those candidates who stated that the elements were sunlight and warm temperature, which are conditions.

Question 5

(a) The majority of candidates were able to identify the areas of constant speed and constant acceleration from the graph.

(b) The difference between speed and velocity was not well known. Many candidates stated that speed was either a time or a distance. The required answer was that speed has magnitude and velocity has magnitude and direction. The better candidates stated correctly that speed is a scalar quantity and velocity is a vector.

(c) Many candidates recognised that a moving car has kinetic energy but were unable to state that when the car stops this energy is converted into heat or sound. A large number of candidates thought that the kinetic energy was converted into potential energy.

(d) The calculation was very poorly done. Candidates who could state the equation $F = ma$, frequently rearranged the equation incorrectly and stated that $a = m/F$, which produced the numerical answer 4. Only the best candidates could correctly state the units of acceleration as m/s^2.

Answer: **(c)** $0.25 m/s^2$.

Question 6

(a) The concept of a balanced diet is not well known. Many candidates focused on the idea of diet and answered the question in terms a diet to maintain health and fitness or to prevent obesity.

(b) All the parts in this question were well answered by the majority of the candidates.

(c) The advantages of breast feeding were not known by the majority of the candidates. A number of candidates gave one correct answer such as “forming a bond between mother and baby” or “it is cheaper” but the majority of answers were extremely vague.

Question 7

(a) This was well done by many candidates.

(b) Many candidates correctly identified one or both of the metallic elements (**B** and **C**) but the explanations frequently simply listed all the properties rather than state that the elements are metals because they conduct electricity.

(c) Many candidates correctly identified **C** as the element in Group I of the Periodic Table.

(d) Most candidates could not identify **E** as the inert gas. Of those candidates who could identify the inert gas very few correctly stated that **E** has a full outer shell of electrons.

Question 8

(a) Only the best candidates could name the coils as the primary and secondary coils.

(b) A majority of the candidates recognised that the core was made from iron.

(c) This was the most poorly answered question on the paper. Very few candidates understood how a simple transformer works. Many candidates wrote in terms of there being too high a current in the lamp or that the lamp overheated.

(d)(i) Once again candidates who knew the equation $V = IR$ either manipulated the equation incorrectly or substituted the number incorrectly to obtain an answer 24/6 = 4. The units were stated correctly by the best candidates.

(ii) The equation for power was less well known and candidates who knew the equation frequently substituted the wrong numbers into the equation. Candidates who used an incorrect answer from **(d)(i)** to calculate the power correctly were given credit. The units of power were not well known.

Answers: **(d)(i)** 0.25A, **(ii)** 1.5W.

Question 9

(a)(i) Photosynthesis was well known by many candidates.

(ii) The green pigment was named correctly by the majority of the candidates but a significant number of candidates stated that the green pigment was a chloroplast which is where the chlorophyll is found.

(iii) The type of cell where photosynthesis occurs was not well known. The answer "plant cell" stated by many candidates was not given credit as it was not a specific enough answer.

(b) Many candidates correctly identified the cells where photosynthesis occurs as **B** despite being unable to name the cells in **(a)(iii)**.

(c)(i) **C** was correctly identified, by many candidates, as the cell where gaseous exchange with the atmosphere occurs.

(ii) This was well done by many candidates.

(iii) The majority of candidates correctly identified the gases which are involved in gaseous exchange but a significant number of candidates stated the gases the wrong way round. Candidates who did not identify carbon dioxide and oxygen frequently thought water was one of the gases.

Question 10

(a) This question was not very well done. Many candidates knew that the gas produced in the reaction was hydrogen but could not give the formula of hydrogen as H_2.

(b) The concept of oxidation and reduction was not well understood by the majority of the candidates.

(c)(i) Many candidates correctly calculated the relative molecular mass of magnesium oxide, although a number of candidates multiplied the relative atomic masses of magnesium and oxygen rather than adding them together.

(ii) Only the better candidates were able to calculate the mass of magnesium oxide produced by 1.2g of magnesium.

Answers: **(c)(i)** 40, **(ii)** 2g.

Question 11

(a) Both parts of this question were answered very poorly by the majority of the candidates. The idea that conduction does not occur because air, between the metal plate and the heater, is a bad conductor and the idea that hot air between the heater and the metal plate rises thereby preventing transfer to the plate by convection occurring were not well known. Most candidates thought that the lack if conduction or convection was a function of the metal plate.

(b) The transfer of thermal energy by radiation was well known by many candidates.

(c) The large majority of candidates identified black as the colour to paint the metal plate but only a small proportion of these candidates could state a correct reason. Many candidates stated that the black colour was a good conductor of heat rather than black being the best absorber of heat.

Question 12

(a) Many candidates used all four letters to answer the questions in parts **(a)(i)** and **(a)(ii)** and therefore scored two marks. This suggested that the majority of the candidates did not understand that chambers **A** and **D**, right atrium and right ventricle, were the ones that red blood cells passed from the liver to the lungs and therefore contained blood with the highest concentration of carbon dioxide.

(iii) The good candidates recognised that **C**, the left ventricle, as the chamber with the highest blood pressure.

(iv) Good candidates could identify that the tricuspid and bicuspid valves close when chambers **C** and **D** contract. Many candidates identified the semi-lunar valve or the septum.

(b) Only a small number of candidates could state that the type of tissue was muscle. Many candidates appeared to guess the answer stating various part of the heart.

(c) A large number of candidates gave the answer adrenaline rather than answer the question and state the *type of substance*, hormone.

Question 13

(a) Many candidates correctly stated the change of state as evaporation. Candidates should be aware that boiling is a process and not a description of a change of state.

(b) This question proved difficult for many candidates. The question required candidates to describe the arrangement and movement of particles in a liquid, in contact with one another and free to move, and in a gas, far apart from one another and in rapid random motion. The arrangement of the particles was only rarely given correctly but many candidates recognised that particles in a gas move more rapidly than in a liquid.

(c) The homologous series, alkanes, was known by many candidates but a significant number simply named a particular compound in the homologous series.

(d) The poisonous gas, carbon monoxide, produced by burning alkanes in a limited supply of oxygen was well known, particularly by the better candidates. Both carbon dioxide and sulphur dioxide were quite common incorrect answers.

Question 14

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

(b) Most candidates were aware that the region of the electromagnetic spectrum with the longest wavelength would be at the extreme of the spectrum. The majority of the candidates chose radio waves.

(c) The property that is the same for all electromagnetic waves in a vacuum was not well understood by many candidates. Many candidates simply stated that they were able to pass through a vacuum.

(d) The majority of candidates could not state two differences between sound and light. The most common correct answer was that light travels faster than sound but the majority of answers were in terms of sound being heard and light being seen.

Question 15

This question was answered very well by the majority of the candidates. It was disappointing to note, however, that a significant number of candidates thought that the use of contraceptive pills would prevent the transmission of HIV.