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

General comments

The May/June 2005 examination produced a mean of 17.39 with a standard deviation of 4.74. No question proved to be particularly easy and only **Question 8** could be considered very difficult. 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

Well known by the majority of candidates.

Question 2

Good discrimination with the less able candidates equally divided between options **B** and **D**.

Question 3

This also discriminated well with candidates either choosing option **B** (correct) or option **A**; the latter chosen by the lower ability candidates.

Question 4

The majority of candidates were aware that the use of $E = Pt$ was required but most, once again, failed to convert the time into seconds!

Question 5

Uncertainty and guessing among candidates, including the more able, with almost twice as many choosing option **A** as did the correct option, **C**. More than half of all candidates chose either option **A** or option **B**.

Question 6

Poor discrimination between candidates who were almost equally divided between option **A** and the correct option, **B**; the former attracting some of the more able.

Question 7

More candidates chose either of options **B** or **C** than did choose correctly option **A**. Option **C**, with 60° as the angle of incidence, attracted a number of the more able candidates.

Question 8

Over half of the candidates, including some of the more able, did not read the resistance information carefully enough and incorrectly chose option **D**.

Question 9

Another question in which a distractor, option **B**, attracted a significantly greater response than did the correct option, **D**, having missed that the change in brightness was *gradual*.

Question 10

Options **C** and **D**, with **D** appealing to some more able candidates, were almost as popular as the correct option, **B**!

Question 11

The role of a step up transformer was not well known with both options **B** and **D** attracting a significant number of candidates.

Question 12

This part of the syllabus continues to be well known.

Question 13

Half-life, however, continues to generate uncertainty among candidates, including the more able, with a significant number choosing each of the three incorrect options.

Question 14

Over 70% of the candidates chose options **B** and **C** where the gas is collected over water. Of these candidates about 40% chose the correct sequence for the first three steps. The question asked how a dry sample of gas **X** could be collected and these candidates did not realise that collecting over water does not produce a dry sample of gas.

Question 15

The majority of the candidates correctly defined the nucleon number.

Question 16

Option **A** was chosen by only a third of the candidates. A large proportion of the candidates chose **C** which is the electronic structure of an element in the same group of the Periodic Table as chlorine. This was evidence of guesswork particularly amongst the weaker candidates.

Question 17

An easy question for the better candidates but once again there was evidence of guesswork amongst the weaker candidates.

Question 18

Another easy question for the better candidates. The majority of the weaker candidates chose option **C** where y was 1, meaning that there were insufficient hydrogen atoms on the left hand side of the equation.

Question 19

The majority of candidates recognised that soils **P** and **Q** were alkaline.

Question 20

Almost a third of the candidates thought that astatine forms a basic oxide, which is a characteristic of a metal oxide not a non-metal oxide.

Question 21

The properties of metals are not well known by the candidates and there was evidence of guesswork amongst all the candidates. A large proportion of the candidates chose option **B** indicating that metals are soluble in water.

Question 22

The majority of candidates knew that steam and zinc react together to produce hydrogen. The weaker candidates, however, thought that the other product was zinc hydroxide and chose option **B**.

Question 23

The conditions for the Haber process were well known by the better candidates but there was evidence of guesswork amongst the weaker candidates.

Question 24

Over 40% of the candidates were unaware that a reaction occurred between the oxygen in the air and the hot iron and chose option **A** where the volume of air is unchanged. The question required the candidates to know that 20% of the air is oxygen which reacts with the iron thereby reducing the volume of gas in the syringe.

Question 25

An easy question for the majority of the candidates.

Question 26

An easy question for the better candidates. A surprising number of candidates chose option **C**, which is the test for carbon dioxide.

Question 27

There was evidence of widespread guesswork amongst the candidates. Over a third of the candidates chose option **A**, carbon dioxide, as the gas which oxidises ethanol to vinegar.

Questions 28 and 29

These were fairly simple questions, although they discriminated well between candidates. In fact, case, fewer than half the candidates chose the correct answer.

Question 30

This question about the chloroplasts in the leaf was found by candidates to be quite easy.

Question 31

Many candidates – even the better ones – think that the gall bladder produces (rather than stores) bile.

Question 32

A common misconception was that the upper surface of the leaf loses more water than the lower surface.

Question 33

Although this question was quite complicated, it was pleasing that half the candidates chose the correct answer.

Question 34

This question was found to be easy.

Question 35

The most popular answer here was **B** – the exact reverse of the correct answer. Candidates seem to be confused about the production and removal of urea.

Question 36

This question highlighted some confusion over the role of the circular (as opposed to radial) muscles in the iris.

Question 37

Some candidates still do not understand that alcohol is a depressant.

Questions 38-40

These were all relatively straightforward questions, but they discriminated effectively between candidates.

Paper 5129/02

Theory

General comments

Most candidates could make an attempt at all the questions. The calculations on the paper were answered better than in previous years but the units still cause problems for a large number of the candidates. The concept of half life is not well understood by a majority of the candidates. A number of the Biology questions proved difficult for a large number of the candidates due in part to the unfamiliarity with the vocabulary and biological terms. In the Chemistry questions, candidates had difficulty with the specific details of the answers required, particularly the definition of relative atomic mass. Calculations involving chemical equations and proportions are difficult for many candidates. Questions involving Organic Chemistry were answered disappointingly by the majority of the candidates.

Comments on specific questions**Question 1**

- (a)(i) The majority of the candidates correctly stated that chlorine is placed in Group 7 of the Periodic Table.
- (ii) This question was well done by many candidates but it was answered less well than part (i).
- (b) The majority of candidates were unable to draw the electronic structure of a chlorine molecule. A number of candidates simply drew the diagram of a chlorine atom or a chloride ion.
- (c) This question proved difficult for the vast majority of the candidates.
- (i) The type of reaction was not well known by all but the better candidates. Candidates were expected to know that the reaction is an example of a redox reaction but both oxidation and reduction were accepted as correct responses.
- (ii) The vast majority of the candidates were unable to construct the equation for the reaction despite being given the names of the reactants and products. Many candidates seem unaware of the meaning of the word equation and those who did find it difficult to write the formulae of the compounds in the equation.

Question 2

- (a)(i) The majority of the candidates recognised that fertilisers are the way in which nitrogen containing compounds are added to plants, however the fact that these fertilisers contain the nitrate ion was not well known. A significant number of candidates incorrectly identified the ammonium ion as the ion essential to plants.
- (ii) Many candidates simply stated that the nitrate ion increases the growth of plants rather than stating the use of the ion in a growing plant. Candidates were expected to state that the nitrate ion is used by the plant to make protein or amino acids.
- (b) A large number of candidates simply stated the word fertilisers as their answer rather than naming a compound containing the nitrate ion.
- (c) Many candidates recognised that the nitrate ion in *fertilisers* was soluble in water and therefore was washed out of the soil by rain water.

Question 3

- (a) This question proved difficult for the majority of the candidates. The most common answer was to indicate on the diagram the amplitude and the wavelength. Candidates were expected to draw another wave on the diagram which had the same amplitude and half the wavelength.
- (b) Candidates did not know the regions of the electromagnetic spectrum. Candidate's responses indicated that there was guesswork in their answers.

Question 4

This question was answered exceptionally well by the vast majority of the candidates.

- (a) The majority of the candidates correctly identified lamp **P**.
- (b) Switches **A** and **B** were stated by a large number of the candidates.
- (c) The calculation of the current from the cell was well done by many candidates.
- (d) The majority of candidates correctly placed the ammeter in the circuit.

Answer: (c) 0.75 A.

Question 5

- (a) A significant number of candidates correctly stated an alkaline colour for the solution of magnesium carbonate.
- (b)(i) Only the better candidates were able to identify the hydrogen ion as the ion present in all acidic solutions. A significant number of candidates stated both the ions present in hydrochloric acid (H^+ and Cl^-), which was not given credit as all acids do not contain the chloride ion.
- (ii) Many candidates did not recognise that the reaction between hydrochloric acid and magnesium carbonate is a neutralisation reaction.
- (iii) The test for carbon dioxide was not as well known as expected. Some candidates confused the test for carbon dioxide with the tests for hydrogen or oxygen.

Question 6

- (a) Many candidates identified part **A** as the mouth rather than the tongue but parts **B**, **C** and **D** were well known by the majority of the candidates.
- (b) The effects of saliva on bread were not well known. Candidates were expected to state that saliva softens the bread or lubricates the bread making it easier to swallow or that the starch in the bread is broken down. A number of candidates incorrectly stated that the bread is dissolved rather than the soluble materials in the bread.
- (c)(i) A significant number of candidates correctly named the process as peristalsis.
- (ii) A significant number of candidates were able to state that the muscles of the intestine contract at point **X** and relax at point **Y**.

Question 7

- (a) A large number of candidates recognised that component **A** is a resistor but failed to gain credit because they were unaware that it is a *variable* resistor.
- (b) The ways in which the strength of an electromagnet can be increased were well known.
- (c) The difference between the magnetic properties of iron and steel were not well known. A number of candidates simply stated the general properties of metals. Candidates were expected to state either that iron is easier to magnetise or that it does not retain its magnetism.

Question 8

A number of candidates simply restated the question rather than explaining why the balloon moved towards the acetate strip. Many candidates recognised that the strip is positively charged but did not explain that opposite charges attract one another.

Question 9

- (a) The majority of candidates were able to name a fuel that produces carbon monoxide as it burns but fewer candidates were aware that only petrol, out of the fuels named, produces sulphur dioxide as it burns.
- (b) The effects of sulphur dioxide on the environment are well known by a large number of candidates.
- (c) A surprising number of candidates were unable to state that oxygen is the gas that is required for any fuel to burn.
- (d) The similarities between combustion of fuels and respiration were not well known. A number of candidates stated that carbon dioxide is produced in both processes but the fact that oxygen is used and heat is produced was known only by the best candidates.

Question 10

- (a) A majority of the candidates were able to correctly balance the equation for the production of ammonia.
- (b) The conditions used in the Haber Process for the manufacture of ammonia were not well known. Candidates are expected to be able to state the actual temperatures and pressures used in the process.
- (c)(i) The majority of the candidates were unable to state that iron is the catalyst used in the manufacture of ammonia.
- (ii) It is disappointing to note that the majority of candidates were unable to state why a catalyst is used in the Haber Process. Candidates were required to state that the catalyst is used to speed up the reaction.

Question 11

- (a) The names of the structures, particularly structures **B** and **C**, were not very well known by many of the candidates, however the functions of the structures were known by more of the candidates. These candidates received credit as the functions were marked independently of the names. The function of structure **A** was most frequently correct.
- (b)(i) Many candidates' responses were insufficiently precise to gain credit. Candidates were expected to state that the procedure prevents sperm from leaving the body via the penis. A large number of candidates thought that a vasectomy prevents sperm from being produced in the testes.
- (ii) This question was poorly done by many candidates. Candidates should be aware that the advantages of a vasectomy are that it is a very effective form of contraception or that it is a simple operation which only needs to be performed once. The disadvantage of a vasectomy as a form of contraception is that it does not prevent the transmission of sexually transmitted diseases such as AIDS or that it cannot be reversed easily.

Question 12

Many candidates were able to draw the plane mirrors in the correct place and at the correct angle on the rays shown in the question, however large numbers of candidates were unable to draw a plane mirror. The diagram should be a straight line with hatching on the non-reflective side of the mirror.

Question 13

- (a) The majority of the candidates were able to calculate the number of neutrons in the nucleus.
- (b) The effects of the emission of a beta-particle on the number of different nucleons in the nucleus of the iodine atom were not well known. Candidates did not know that the number of neutrons is reduced by one unit and the number of protons increased by one unit on emission of a beta-particle.
- (c) The concept of half life is not well understood by the vast majority of the candidates.

Answers: (c)(i) 2, (ii) 4000 beta-particles per second.

Question 14

- (a) The definition of relative atomic mass was not well known by the majority of the candidates. The response required was that relative atomic mass is the mass of one atom of the element compared to one atom of carbon 12. A large number of candidates gave the definition in terms of the number of protons and neutrons in the nucleus confusing relative atomic mass with mass number.
- (b) The calculation was well done by the very best candidates but many candidates were unable to attempt this part of the question.

Answers: (b)(i) 56, (ii) 1.8 g.

Question 15

This question proved difficult for many of the candidates.

- (a)(i) A large number of candidates did not answer the question in terms of what is present in breast milk that specifically helps muscles grow but in general terms as to the nutrients present in breast milk. Candidates should know that protein in breast milk helps muscles to grow.
- (ii) Again this was poorly answered with a large number of candidates stating calcium instead of iron.
- (iii) Only a small number of candidates were aware that antibodies in breast milk help a baby to overcome diseases like influenza.
- (b)(i) The advantages of breast milk rather than powdered milk mixed with water were not well known by the majority of candidates. Candidates were expected to suggest ideas such as breast milk is free or at the correct temperature/pH/concentration or even that water is not required to dilute breast milk.
- (ii) The idea that disease, such as AIDS, can be spread by breast feeding was rarely suggested by the candidates.

Question 16

- (a) This question was well answered by many candidates although a significant number of candidates confused the correct equation with the equation *force equals mass times acceleration*.
- (b) The calculation was well done by a large number of candidates but all too often the responses were spoiled by incorrect units.

Answers: (b) 6 Nm.

Question 17

- (a) Many candidates did not understand that the power rating of an electrical appliance is an expression of the amount of energy passed per second. Many candidates simply stated that the power rating was given in watts.
- (b) A significant number of candidates knew that the fuse in a plug is connected to the live lead.
- (c) The majority of candidates were aware that hot water rises when water is heated in a kettle but only a small number of candidates could explain why the water rose.

Question 18

- (a) Many candidates did not know that the process which converts an alkane to an alkene (ethane) was cracking. Polymerisation was more widely known but only by the better candidates.
- (b) Many candidates identified substance **B** as water but substances **C** and **E** were only rarely correct.
- (c) The structure of ethane was only drawn correctly by the better candidates.

Question 19

- (a) The majority of the candidates could name a carbon containing compound present in the Earth's atmosphere.
- (b) This question was well answered by many of the candidates indicating that the carbon cycle is well understood.

Question 20

- (a) Many candidates were unable to explain clearly why the path of the ball indicated that a force was acting upon the ball.
- (b) This was poorly done by many of the candidates. The majority of candidates drew an arrow which followed the path of the ball instead of a vertical arrow.
- (c) A large number of candidates thought that the ball lost kinetic energy and gained potential energy as it fell to the ground rather than the other way round.