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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

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## GCE Ordinary Level

<p><b>Paper 5129/01</b> <b>Multiple Choice</b></p>
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<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	<b>B</b>	21	<b>B</b>
2	<b>C</b>	22	<b>D</b>
3	<b>B</b>	23	<b>D</b>
4	<b>B</b>	24	<b>B</b>
5	<b>A</b>	25	<b>A</b>
6	<b>A</b>	26	<b>D</b>
7	<b>D</b>	27	<b>C</b>
8	<b>B</b>	28	<b>D</b>
9	<b>D</b>	29	<b>C</b>
10	<b>D</b>	30	<b>C</b>
11	<b>C</b>	31	<b>B</b>
12	<b>B</b>	32	<b>A</b>
13	<b>D</b>	33	<b>B</b>
14	<b>A</b>	34	<b>C</b>
15	<b>C</b>	35	<b>B</b>
16	<b>C</b>	36	<b>A</b>
17	<b>C</b>	37	<b>A</b>
18	<b>D</b>	38	<b>B</b>
19	<b>B</b>	39	<b>C</b>
20	<b>D</b>	40	<b>B</b>

### General comments

A mean score of 18.35 with a standard deviation of 5.17 was obtained.

**Comments on specific questions****Question 1**

This discriminated well with weaker candidates favouring option **A** over option **C**.

**Question 2**

Correctly answered by the majority of candidates with most of the remainder assuming a distance/time plot and choosing option **D**!

**Question 3**

A significant number of more able candidates did not read the question carefully enough and chose option **A**.

**Question 4**

Good discrimination with the less able guessing their answer from the incorrect options.

**Question 5**

This also showed good discrimination although more candidates chose the incorrect option **B** than did the correct one, option **A**. It is possible that these candidates considered reflection from the white surface rather than emission.

**Question 6**

This divided the candidates almost equally between options **A** and **B** with the more able correctly choosing option **A**. The less able preferred the  $\lambda/v$  option, **B**.

**Question 7**

This showed uncertainty and guessing amongst even the better candidates with each incorrect option gaining more responses (option **A** attracted 50% of candidates!) than did the correct one, option **D**.

**Question 8**

Well known with 75% of candidates answering correctly.

**Question 9**

Guessing on a large scale with approximately 25% of candidates choosing each option!

**Question 11**

This also showed uncertainty and guessing among all candidates with both options **A** and **D** gaining more responses than did the correct one, option **C**. Option **B** was a positive distractor to more able candidates who failed to appreciate the question's emphasis on what must be connected.

**Question 12**

Candidates were not put off by the novel presentation of this question with 66% answering correctly.

**Question 13**

Not well known with only a third of candidates correctly choosing option **D**. Both options **B** and **C** registered a substantial response and a number of the better candidates favoured option **A**.

**Question 14**

This proved to be a difficult question for majority of the candidates. Only a small number of the candidates chose the correct option, **A**. Candidates who chose option **C** did not recognise that the question required a sample of dry gas and those candidates who chose option **D** recognised that the gas should be collected by upward delivery but did not understand that an alkaline gas would react with the sulphuric acid.

**Question 15**

This question proved to be an easy question for the better candidates. Almost a third of the candidates chose options **B** and **D**, indicating that they thought that the particles lost energy when the temperature increased.

**Question 16**

An easy question for the better candidates.

**Question 17**

Some of the better candidates recognised that element **X** is a metal and element **Y** is a non-metal and therefore bond together ionically with the formula,  $X_2Y$ . There was evidence of widespread guesswork amongst the majority of the candidates.

**Question 18**

There was evidence of guesswork amongst the candidates. Less than a third of the candidates recognised that the compound is covalent and chose the correct covalent property.

**Question 19**

The better candidates recognised that the reaction was a neutralisation reaction, however there was evidence of guesswork amongst the weaker candidates.

**Question 20**

A large number of the candidates ignored the results from the experiments and chose option **C**, which listed the halogens in the order of reactivity. The better candidates used the results and chose option **D**.

**Question 21**

An easy question particularly for the better candidates

**Question 22**

The production of iron from haematite is well known by the better candidates but there was evidence of guesswork amongst the weaker candidates.

**Question 23**

An easy question for the majority of candidates.

**Question 24**

The majority of the candidates are unable to distinguish between the different types of formulae for organic compounds. Less than a quarter of the candidates knew that all the members of a homologous series have the same general formula whilst almost 40% of the candidates thought that all the members of a homologous series have the same molecular formula.

**Question 25**

There was evidence of widespread guesswork amongst the candidates.

**Question 26**

An easy question for the better candidates. Well over 80% of the candidates knew that the formula of the next member of the homologous series was  $C_3H_8$ , but over 30% of the candidates thought it was called butane.

**Question 27**

The test for an unsaturated hydrocarbon is not well known. There was evidence of guesswork particularly amongst the weaker candidates.

**Question 28**

Candidates coped well with this question on cell structure, despite the unfamiliar context.

**Question 29**

This question discriminated well. Weaker candidates often chose **B**, the exact reverse of the correct answer.

**Question 30**

Over two-thirds of candidates thought that amylase works best in acidic conditions.

**Question 31**

This was a simple question.

**Question 32**

This question should also have been straightforward – although fewer than half the candidates got it right.

**Questions 33 and 34**

These questions discriminated well.

**Question 35**

Weaker candidates were apparently guessing at the correct answer.

**Question 36**

Again, there was evidence of guessing here, although the question was straightforward.

**Question 37**

This was an easy question.

**Question 38**

For some reason, more than two-thirds of candidates thought that salts are not recycled in the ecosystem.

**Question 39**

This question worked well.

**Question 40**

This question on birth control caused some confusion, and there was evidence of widespread guessing.

<p><b>Paper 5129/02</b> <b>Theory</b></p>
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**General comments**

The calculations in the physics questions were done better than in previous years by many candidates but many of the candidates who correctly calculated the numerical answer to the question were unable to state the correct units. In addition, candidates were able to state the equation for a calculation but had difficulty manipulating the equation for the calculation. The biology questions proved difficult for many candidates particularly those which involved explaining biological concepts such as reproduction. Questions which required factual recall were answered well by the better candidates.

**Comments on specific questions****Question 1**

- (a) The charge on the ion was given correctly only by the better candidates and was stated as  $-1$  by a large number of candidates.
- (b)(i) The variation in reactivity down Group 1 of the Periodic Table was not well known.
- (ii) A significant number of candidates knew that hydrogen is produced when Group 1 metals react with water but only the best candidates knew that rubidium hydroxide is the other product in this case.

**Question 2**

This question was answered well by many candidates but the weaker candidates frequently guessed the answers.

- (a) The test for oxygen is often confused with the test for hydrogen.
- (b) The fact that chlorine is a green gas is not well known.
- (c) Many candidates knew that nitrogen is the most abundant gas in the air but oxygen was a common choice.
- (d) This was the least well known by the candidates. Chlorine was a common incorrect answer.
- (e) Nitrogen was a common incorrect answer.

**Question 3**

- (a) This question was extremely well answered by the vast majority of the candidates.
- (b) The majority of the candidates correctly identified the cell as a root hair cell.
- (c)(i) The process by which water moves into the root hair cell was well known by the majority of the candidates.
- (ii) The conditions required for osmosis to occur were not well known. A large number of candidates recognised that a concentration gradient is required but many could not describe the gradient clearly. The fact that a semi-permeable membrane is required was not well known by many of the candidates. The process of osmosis was confused with photosynthesis and these candidates stated the conditions for growth in plants.

**Question 4**

- (a) The majority of the candidates correctly read the volume in the measuring cylinder.
- (b)(i) The calculation of the mass of the paraffin was less well done with many stating the mass of the measuring cylinder and the paraffin.
- (ii) The calculation of the density of the paraffin was very well done by a large number of the candidates but some of the candidates were penalised for stating the incorrect units.

Answers: (a)  $38\text{cm}^3$ ; (b)(i)  $30.4\text{g}$ , (ii)  $0.8\text{g/cm}^3$ .

**Question 5**

- (a)(i) Candidates should be aware that "light" is not the same as low density.
- (ii) This question was poorly answered with many candidates answering in terms of conduction of heat. A large proportion of the candidates suggested that the aluminium did not rust, which did not gain credit as only iron rusts. The expected answer was that aluminium does not corrode or that it is resistant to corrosion.
- (b) This question was poorly answered with the most common answer being iron rather than copper.

**Question 6**

- (a) The use of nucleon number and proton number to calculate the number of protons, neutrons and electrons in an atom of an isotope was well understood by many of the candidates.
- (b) The gain of three electrons by a nitrogen atom to form a nitride ion was well known but the explanation was less well known. Candidates are expected to know that an atom gains electrons in order to achieve a **full outer shell**. It is insufficient to state that the atom becomes stable.
- (c) The construction of the formula for lithium nitride was well done by the better candidates. A number of candidates did not use the given formulae of the ions and constructed the formula for lithium nitrate.

**Question 7**

- (a)(i) There was a great deal of confusion with pollination in this question. All too frequently, candidates did not state types of reproduction but referred to cross-pollination and self-pollination. Of those candidates who referred to reproduction, the answers were often the wrong way round.
- (ii) Many candidates explained the differences between sexual and asexual reproduction in terms of the parents rather than the offspring. Candidates were expected to state that sexual reproduction produces offspring that are genetically different from the parents whereas the offspring from asexual reproduction produces genetically identical offspring.
- (b) Many candidates did not answer the question asked. Candidates frequently discussed how bright red flowers attract insects which then distribute the pollen. The question asked how bright red, soft fruits assist in the colonisation of new areas. Candidates were expected to state that the bright red colour would be easily seen by animals and birds, which would then eat the fruit and excrete the seeds in a new area.
- (c) A large number of candidates recognised that the seeds could be blown by the wind or carried by the water, animals or birds from the river bank to the island.

**Question 8**

- (a) Many candidates correctly calculated the mass of the spacecraft but were penalised for incorrectly stating the units.
- (b) A significant number of candidates stated that there is no gravity or that the gravity was different without stating how it was different on the moon.
- (c)(i) The relationship between force, mass and acceleration was quite well known.
- (ii) Some candidates had difficulty manipulating the equation in order to find the acceleration. The calculation was quite well done but once again candidates were penalised for stating incorrect units.

**Question 9**

- (a)(i) A large number of candidates knew that the volume of the mercury decreases when the thermometer is placed in cold water.
- (ii) The fact that the mass of the mercury stayed the same was less well known and many candidates thought that the mass decreased when the thermometer was placed in cold water.
- (b) The differences between clinical and laboratory thermometers is not well known. A large number of candidates simply stated what each thermometer was used for rather than stating physical differences between them. Candidates were expected to state that clinical thermometers have a constriction, are more sensitive or have a smaller range.

**Question 10**

- (a) Many candidates could not define reduction as the removal of oxygen from a compound.
- (b)(i) It was disappointing to see that a large proportion of the candidates were unable to calculate the molecular mass of copper oxide. A large number of candidates included the hydrogen in the equation in their calculation and produced 82 as the answer.
- (ii) The calculation of the molecular mass of water was done correctly by a greater number of candidates.
- (iii) It was pleasing to see that the process required to calculate the mass of water produced from 4g of copper(II) oxide was understood by a significant number of candidates. Candidates who incorrectly calculated the molecular masses of copper(II) oxide and water but used the numbers correctly in this calculation, were given credit for their answers.

Answers: (b)(i) 80, (ii) 18, (iii) 0.9 g.

**Question 11**

- (a) The changes made by the liver to glucose and amino acids are not well known and were often confused with the processes of digestion, leading to answers concerning the formation of glucose and amino acids.
- (b) The functions of the liver are not well known by the majority of the candidates. The most widely known functions are the breakdown of alcohol and removal of toxins. The large number of candidates suggested that the liver was concerned with the flow of blood through the body.

**Question 12**

- (a) This calculation was done well by many candidates but once again stating the wrong units was quite common. A number of candidates correctly stated the equation for power and then transposed it incorrectly so that they multiplied 30 by 12 instead of dividing 30 by 12.
- (b) The transfer of thermal energy was well known by the majority of the candidates.

Answer. (a) 2.5A.



**Question 13**

- (a)(i) A significant number of candidates thought that the conversion of a liquid to a solid was condensation.
- (ii) This question was well done by the majority of candidates.
- (b) This question was answered well.
- (c) Many candidates were unaware that the particles in a solid are in a fixed position but are able to vibrate about this fixed position. A large number of candidates stated that the particles in a liquid are able to move but only the best candidates were able to state that this movement is random.

**Question 14**

- (a)(i) Many candidates knew that the type of respiration during walking is aerobic.
- (ii) The equation for aerobic respiration was not well known. It was clear from the answers that the candidates had studied the topic of respiration but frequently one of the reactants or products was omitted from the equation and all too often the equation for anaerobic respiration was given, even by those candidates who had correctly identified the type of respiration in (a)(i).
- (iii) The advantage of aerobic respiration to the body was not well known. Candidates were simply required to state that it produces lots of energy.
- (b)(i) The word equation for anaerobic respiration was not well known and some candidates restated the equation that they had given in (a)(ii). A number of candidates knew that the product of this type of respiration is lactic acid but stated that carbon dioxide or water were also products.
- (ii) The fact that oxygen is not required for this type of respiration was not well known by the majority of the candidates.
- (c) A large number of candidates correctly named the gas as carbon dioxide.
- (d) Many candidates simply stated two different types of physical activity rather than how the increase in rate and depth of breathing are helpful to the body. Candidates should be aware that an increase in the rate and depth of breathing causes an increase in gas exchange meaning that more oxygen is taken in and more carbon dioxide is given out.

**Question 15**

- (a) A large number of candidates correctly stated the angle X.
- (b) A large number of candidates correctly stated the angle Y.
- (c) The equation for the refractive index is quite well known but many candidates were unable to use the equation to calculate the value of the refractive for the glass block. A number of candidates were penalised for stating the units of refractive index as degrees.

Answer: (c) 1.52.

**Question 16**

- (a) The calculation was quite well done by a large number of candidates but once again the units caused problems for some candidates.
- (b) This question was well done by many of the candidates.

**Question 17**

- (a) This question was done poorly by a large number of candidates. **D**, carbon dioxide, was the only substance identified correctly by the majority of the candidates.
- (b) The structure of ethanol was well known by the better candidates.
- (c) A large number of candidates were able to state that the colourless liquid **C** is acidic.

**Question 18**

- (a)(i) The name of coil **A** was identified correctly by many of the candidates.
- (ii) The material used for the core was less well known.
- (b) The underlying principles of electromagnetic induction are not well known by the candidates. Candidates should know that an alternating current is used in a transformer because the changing current will cause a change in the magnetic field which will in turn induce an emf in the secondary coil.