COMBINED SCIENCE

Paper 5129/01
Multiple Choice

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

Comments on individual questions (Physics)

A total of 5370 candidates produced scores in the range 0 to 40, with a mean score of 17.13 and a standard deviation of 5.16 (16.19 and 5.38 in 2008). Candidates found no question to be very easy and found **Questions 8, 10** and **13** very challenging. **Questions 2, 5** and **9** allowed most candidates to demonstrate their knowledge positively, each question returning a 70-80% correct response.

Question 1 was answered well, with an indication that some better candidates chose option C.

Question 2 discriminated well with options C favoured by the weaker candidates.

Question 3 had some better candidates choosing either option B or C suggesting uncertainty and a lack of understanding of the term *moment*.

Question 4 discriminated well, with weaker candidates divided equally between the incorrect options A, B and D.

Question 5 and Question 9 were both found to be easy by 75% of candidates with a small number of better candidates choosing option D in **Question 5** and option C in **Question 9**.

Question 6 showed good discrimination with weaker candidates, ever eager to *multiply* two numbers, favouring option D.

Question 7 had a significant number of better candidates thinking that the refractive index = i/r, opting for option D! Weaker candidates resorted to guessing and favoured either option A or B.

Question 8 The definition of electromotive force was not well known with only 22% answering correctly.

Question 10 showed widespread guessing, particularly among the better candidates! The most popular response was option B followed by option A; only 18% chose the key, option C.

Question 11 The correct statement, option A, was reasonably well known but there were significant numbers opting for the three incorrect options with option D attracting a number of the better candidates.

Question 12 showed good discrimination with option B attracting almost as many responses as the key, option C.

Question 13 A lack of understanding of the true nature of *half-life* led 65% of candidates, including a significant number of the better ones, to chose option A with only 10% choosing the key, option D.

Comments on individual questions (Chemistry)

Question 14

This question proved easy for the better candidates, however a significant number of the candidates thought that the mixture of two solids could be separated by filtration alone and chose option **A**.

Question 15

An easy question for the better candidates.

Question 16

Almost half of the candidates chose options **B** and **D**, the combination of a metal and a non-metal, which are combined by ionic bonding.

Question 17

The better candidates found this question easy.

Question 18

There was evidence of widespread guesswork amongst the candidates indicating a lack of understanding about the methods of preparation of salts.

Question 19

There was widespread guesswork particularly amongst the weaker candidates.

Question 20

The use of aluminium in the manufacture of aircraft is well known by the better candidates, however almost a quarter of the candidates thought that mild steel is used to make cutlery.

Question 21

The reactivity series is not well understood, particularly by the weaker candidates, as there was evidence of guesswork.

Question 22

The source and effect of pollutant gases is not well understood by the majority of the candidate disappointing to record that over 60% of the candidates, including a large number of the better cand think that carbon monoxide is the cause of global warming.

Question 23

The majority of the better candidates knew that potassium nitrate contains nitrogen and potassium, which are elements essential for plant growth.

Question 24

Less than half of the candidates knew that methane is the main constituent of natural gas. There was evidence of guesswork amongst the weaker candidates.

Question 25

Almost half of the candidates chose option **A**, indicating that there is a misunderstanding about the addition of a bromine molecule to an alkene.

Question 26

The weaker candidates were unfamiliar with the ball and stick representation of an ethanol molecule and this led to a degree of guesswork amongst the candidates.

Question 27

The better candidates recognised that alkanes have the same general formula but over a quarter of the candidates chose option **B**, which is not an answer exclusive to alkanes.

Comments on individual questions (Biology)

Question 28

Evidently, weaker candidates were guessing at the answer here.

Question 29

As in previous years, the question on osmosis caused difficulty for some candidates.

Question 30

Weaker candidates were put off by the unusual format of this question.

Question 31

Candidates tended to focus (wrongly) on the heat of the underwater springs, and so chose option A.

Question 32

This question worked well.

Question 33

This question (on blood circulation) proved to be difficult.

Question 34

It was surprising that so many candidates did not know that exercise increases both the rate and depth of breathing.

Question 35 – **36**

These questions worked well.

Question 37

This question, about food webs, proved to be challenging.

Question 38 – 39

These questions discriminated well between candidates.

Question 40

This was an easy question.

COMBINED SCIENCE

Paper 5129/02

Theory

General comments

The overall standard of the candidate responses was better than in previous examinations. The combustion of hydrocarbons and the causes of pollution are not well understood by a large number of candidates. The Chemistry sections of the paper were not as well answered as in previous examinations, in particular the questions involving the Periodic Table and the structure of atoms. Candidates continue to have difficulty stating the correct units in Physics calculations.

Comments on specific questions

Question 1

(a) The definition of a hydrocarbon was not well known. Candidates do not appreciate the difference between a compound and a mixture

(b) A disappointing number of candidates recognised oxygen as the gas in the air that is used when a fuel is burned. A large proportion of the candidates thought that the gas used was either carbon dioxide or carbon monoxide.

(c) (i) A large number of candidates knew that carbon dioxide is produced when a fuel is burned but it was disappointing to note that many of the candidates thought that the second product is hydrogen rather than water.

(ii) This question was poorly answered by many of the candidates. The production of carbon monoxide by incomplete combustion of a fuel is not well known by many candidates.

(iii) Quite a number of the candidates stated carbon monoxide in this part of the question rather than the **other** pollutant produced by burning fuel in a car engine.

Question 2

(a) The word equation for photosynthesis was well known by a large number of the candidates.

(b) (i) This question was poorly answered by many of the candidates. A large number of candidates made reference to the light intensity or the distance of the lamp from the plant, which was the variable for the experiment. Only the best candidates knew that the temperature of the water or the carbon dioxide concentration in the water is kept constant during the experiment.

(ii) The vast majority of the candidates knew that the number of bubbles increased as the light intensity increased but far too many of the candidates thought that the number of bubbles decreased at high light intensity.

(c) A large number of the candidates were aware of the dependency of animals on plants for oxygen and food.

Question 3

(a) (i) This was well answered by the better candidates but there were some confused answ quite a number of candidates. A number of candidates simply marked the two points on th and did not draw the graph lines on the graph.

(ii) The better candidates found this question easy but the overall impression is that the difference between velocity and speed is not well understood. There is also confusion between velocity and acceleration.

(b) The calculation was well done by many of the candidates although a large number of the candidates were unable to state the units.

Answer: **(b)** 3.4 m/s^2

Question 4

(a) Many candidates correctly identified **B** as the substance which is not a solid at room temperature.

(b) Those candidates, who correctly identified **C** as the Group I metal invariably stated that the reason was that the substance reacted with water. A large number of candidates thought that solubility in water was the same as reacting with water and chose substance **E** as the Group I metal.

(c) It was disappointing that only a small number of candidates were able to correctly identify the ionic compound. It would appear that candidates are aware of the solubility of ionic compounds in water but they are less aware that ionic compounds have high melting points because these candidates chose substance **B** as the ionic compound.

Question 5

(a) Only the very best candidates knew that the pericarp is the wall of the fruit.

(b) Good candidates were able to identify the parts of the bean seed.

(c) Many candidates stated that the importance of seed dispersal for plants is that they can grow. This response was insufficient and candidates were expected to include in their answer that the dispersal of seeds prevents overcrowding or the colonisation of new areas.

Question 6

This question was well answered by a large number of the candidates.

Question 7

(a) Only a small number of candidates were able to identify the Group VII elements as the halogens. A large number of the candidates simply stated the names of the elements.

(b) This question was poorly answered. Candidates did not understand the expression change of state and answered the question in terms of reactivity.

(c) The better candidates were able to identify the products of the reaction as potassium bromide and iodine but it was clear that the vast majority of the candidates were guessing the answers.

(d) The use of chlorine on the purification of water supplies was well known by the majority of the candidates. Those candidates who failed to gain credit did not make specific reference to the killing of micro-organisms or bacteria.

Question 8

(a) A large number of candidates were able to state that the blood in coronary arteries contains more oxygen than coronary veins but only a small number of candidates were able to state a second difference. Candidates should be aware that the blood in the coronary arteries contains less carbon dioxide and the blood is at a higher pressure. A number of candidates failed to gain credit because they simply stated that the blood in the coronary arteries carries oxygen without making any reference to the difference between the blood in the arteries and the veins.

(b) A number of the candidates did not gain credit in this question because their responses were too vague. Candidates were expected to state that the arteries had thicker walls, a narrower lumen, contained no valves etc. instead of stating that the arteries were thick or big.

(c) A large number of candidates were able to give features of lifestyle that would lead to an increased risk of a heart attack.

Question 9

(a) The vast majority of the candidates were able to read the values from the graph.

(b) This question was poorly done by the majority of the candidates. The factors which affect the magnitude of the induced e.m.f. are not well known. Many candidates gave answers that apply to the induced e.m.f. when a bar magnet is being pushed into a coil, instead of the situation in the question.

Answers: **(a)(i)** 0.4 **(a)(ii)** 0.8

Question 10

(a) Many candidates gained full marks for drawing the graph. A disappointing number of candidates correctly plotted the points and failed to draw the line of best fit. A significant proportion of the candidates had difficulty drawing the points at 150 cm^3 and 450 cm^3 because they were unable to read the scale on the graph correctly.

(b) (i) The fact that many candidates did not extrapolate the graph to 1.0 g meant that they had difficulty reading the volume from the graph. However, there were many correct answers.

(ii) There was little understanding of how to calculate the volume of 32 g of oxygen by many of the candidates.

(c) A disappointingly small number of candidates were able to state the correct test for oxygen and the result of the test. Many candidates confused the test for oxygen with the test for hydrogen.

Answers: **(b)(i)** 750 cm^3 **(b)(ii)** 24000 cm^3

Question 11

This question was well answered by a majority of the candidates although some of the weaker candidates stated oxygen and carbon dioxide the wrong way round, whilst others confused diffusion with osmosis.

Question 12

(a) The vast majority of the candidates were able to name an insulator.

(b) The process of convection is not well understood by the candidates. A significant proportion of the candidates referred to the movement of energy rather than the movement of particles of air. Those candidates who understood that hot air rises and cool air falls could not state the reason why this occurs.

(c) This question was well answered although there were a number of candidates who confused conduction with absorption.

Question 13

(a) The fact that ink is composed of coloured dyes that would interfere with the chromatogram well known by thee candidates.

(b) The answers to this question were disappointing. A large number of the candidates stated that there were four colours present in dye **X**, namely red, yellow green and blue, whilst other candidates combined the correct colours red and yellow and gave their answer as orange.

(c) The impression that the majority of candidates are confused about the interpretation of chromatograms was confirmed by the answers to this question. A large number of candidates stated that the coloured dye with a unique substance was blue rather than brown.

Question 14

(a) (i) A large number of candidates were unable to correctly identify the tube in which the sugar was produced most quickly. Many candidates chose tube **D**, which suggests that they were aware that the optimum pH was 7. Of those candidates who correctly identified tube **C** many did not explain that the both the temperature and the pH were at the optimum values in that tube.

(b) The better candidates scored well on this question but it was clear that many of the weaker candidates were guessing their answers.

Question 15

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

(b) (i) This proved to be another easy question, particularly for the better candidates.

(ii) Only a small number of the candidates were familiar with the name 'refractive index'.

(c) The components are quite well known by a large number of the candidates.

Question 16

(a) The answers to this question were disappointing. The constitution of the nucleus, the formation of ions and the definition of an isotope were not well known by many of the candidates, By contrast the fact that a neutral atom has the same number of electrons and protons was known by a greater number of the candidates.

(b) This question was well done by a large number of candidates.

Answer: **(b)** 136

Question 17

(a) Only a small number of candidates were able to mark the position of the cervix.

(b) The better candidates found this question relatively easy but it was clear that there was confusion amongst many of the candidates as to where the processes occurred.

(c) A majority of the candidates were unable to explain the meaning of fertilisation. Candidates were required to state that the process involved the fusion or joining of the male sex gamete and the female sex gamete.

Question 18

(a) Only a small number of candidates were able to indicate the direction of the gravitational f... significant number of candidates indicated the force with an upward arrow rather than a v... downward arrow indicating a misunderstanding of gravitational force.

(b) The answers to this question indicated a general misunderstanding of the principle of moment amongst the candidates. Of those candidates who correctly calculated the moment of the weight many were unable to state the correct unit. The unit was often seen as N/m rather than Nm.

(c) The majority of the candidates were unable to calculate the minimum force required to prevent the metre rule from tipping.

Answers: **(b)** 2.4Nm **(c)** 4N