

COMBINED SCIENCE

| |
|--|
| <p>Paper 5129/01 Multiple Choice</p> |
|--|

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

General comments

A total of 1413 candidates produced scores in the range 4 to 40 with a mean score of 15.69 and a standard deviation of 4.67.

Comments on individual questions (Physics)

No question proved to be very easy with **Questions 4, 6, 8, 10** and **11** very difficult with widespread guessing evident.

Question 1

Showed good discrimination with the more able candidates correctly choosing option **A**. Vernier calipers was the most popular choice of the less able.

Question 2

Well answered by the majority of candidates.

Question 3

The majority of candidates correctly identified the use of a balance to distinguish between mass and weight with more choosing option **D** (correct) than option **C**.

Question 4

Indications of widespread guessing among candidates with almost twice as many choosing option **C** as the correct option **A**.

Question 5

This was well known by the candidates. The favoured incorrect response was option **D**.

Question 6

This showed widespread guessing among candidates with the majority of responses almost equally divided between options **B**, **C** (correct) and **D**.

Question 7

In past years it was amplitude which troubled candidates but this year it appeared to be wavelength! Most candidates choose options **A** or **B**, with more of the responses for option **A** (correct).

Question 8

Showed good discrimination with more able candidates correctly choosing option **D** and the less able ones option **B**. Options **A** and **B** attracted a significantly greater number of responses than option **D**.

Question 9

A number of more able candidates incorrectly chose option **C**, perhaps by not reading the question carefully enough.

Question 10 and Question 13

These questions showed uncertainty and guessing among candidates with all four options drawing a significant number of responses. In **Question 10** the more able candidates correctly chose option **D** but were also attracted to option **C**. In **Question 13** a number of the more able preferred options **A** and **B** to the correct option, **D**.

Question 11

There was a clear lack of understanding of induced magnetism with option **D** attracting 44% of responses, including a significant number of the more able! The remaining candidates were divided equally between options **A**, **B** and **C**.

Question 12

This question showed good discrimination.

Comments on individual questions (Chemistry)

Question 14

This question was well done by the better candidates but a large proportion of the weaker candidates thought that the molecules are furthest apart in liquid water and chose either option **C** or option **D**.

Question 15

Many candidates understand the structure of isotopes.

Question 16

Less than a third of the candidates identified that sodium chloride conducts electricity both as a liquid and as an aqueous solution. There was evidence of guesswork particularly amongst the weaker candidates.

Question 17

The better candidates found this to be an easy question.

Question 18

There was evidence of widespread guesswork amongst all of the candidates. Options **B** and **C** were the most popular choices and this suggests that candidates did not use the Periodic Table to find the relative atomic mass of oxygen.

Question 19

A disappointingly large number of candidates thought that ammonium sulfate could be used to neutralise the waste water.

Question 20

There was evidence of widespread guesswork. Candidates should know that rubidium chloride is an ionic substance and therefore has a high melting point, and is soluble in water.

Question 21

An easy question for the majority of the candidates.

Question 22

A majority of the candidates chose option **B**, which was the reverse order of the correct answer option **C**.

Question 23

A number of the better candidates recognised that the nail painted on one side rusts when it is placed in tap water but the weaker candidates, in particular, did not know that rusting can be prevented by either greasing or galvanising.

Question 24

There was evidence of guesswork amongst the weaker candidates but the majority of the better candidates knew the conditions used in the Haber process.

Question 25

Many of the candidates chose option **C**, a temperature at which the road surface would melt in a hot climate, rather than option **D**, a temperature at which the road surface would remain solid in most countries.

Question 26

Over 70% of the candidates did not recognise that an unsaturated organic compound decolourises aqueous bromine water.

Question 27

The vast majority of the candidates knew that acidified potassium dichromate oxidises ethanol to ethanoic acid and chose option **A** or option **B**, but less than half of these candidates identified compound W as ethene.

Comments on individual questions (Biology)

Question 28

It appears that many candidates were guessing at this question.

Question 29

Some candidates failed to realise that starch is broken (not synthesised) during germination.

Question 30

Even the better candidates found this question difficult.

Question 31

This question worked well, although a significant number of candidates thought that the data showed that males work harder than females.

Question 32

This was a straightforward question.

Question 33

This question worked well.

Question 34

Evidently, many candidates were guessing here.

Question 35

Even the better candidates were unsure of the focusing mechanism of the eye.

Question 36

This was an easy question.

Question 37

Weaker candidates thought that the decomposers were receiving more energy in the food chain than the producers.

Question 38

This question discriminated well.

Question 39

Few candidates could identify the pericarp correctly.

Question 40

All methods of birth control prevent fertilisation and/or implantation. Few candidates could identify the coil as working specifically to prevent implantation.

COMBINED SCIENCE

Paper 5129/02

Theory

General comments

It was pleasing to note that candidates' answers to the questions on the Biology section of the syllabus were much better than in previous sessions. However, many responses indicated a lack of understanding of magnetism and waves. A significant number of the candidates were unable to rearrange equations in calculations, particularly in the Physics section of the syllabus. Candidates should also be encouraged to show all their working in calculations.

Comments on specific questions

Question 1

- (a) This question was poorly done by the majority of the candidates. The most commonly correct response was gas **B**, hydrogen. Alkaline solution **A** and salt **C** were not identified by many of the candidates. Gas **D** was incorrectly named as ammonium by some of the candidates.
- (b) Only the better candidates were able to name the hydroxide ion as the ion which makes the solution alkaline.
- (c) The majority of the candidates were able to state the colour of the Universal Indicator.

Question 2

- (a) The vast majority of the candidates were able to calculate the weight of the stone on the Earth's surface.
- (b)(i) A large number of the candidates knew that the mass of the stone was unchanged on the moon. Candidates who gave the numerical answer, 2.0 kg, were given credit.
- (ii) Many candidates knew that the weight of the stone changed on the Moon but did not state how the weight changed and so gained no credit. Once again correct numerical answers were given credit.

Question 3

- (a) Many candidates did not know that reversing the current in the electromagnet had no effect on the attraction of the soft iron. Candidates' responses indicated that there was some confusion between magnetic force and charge.
- (b) Responses to this question were disappointing. The magnetic properties of iron and steel are poorly understood by the majority of the candidates.

Question 4

- (a) The definition of osmosis was well known by many of the candidates.
- (b) The majority of the candidates answered this question by describing the absorption of water through the root hair cell without making any reference to the relative concentrations of water in the plant or in the soil.

- (c) The majority of the candidates' responses lacked any clear explanation. Many responses thought that the plants absorbed too much water. Very few candidates knew that the concentration of water in the plant is higher than in the salt water and water is lost by the plant, which results in the plant wilting. A significant number of the candidates thought that the flooding would result in the better growth of the crops.

Question 5

- (a) This question was poorly answered and there was evidence of guesswork by many of the candidates.
- (b) The majority of the candidates were able to identify either copper or zinc as a metal that is present in brass.

Question 6

- (a) A significant number of candidates were able to read the wavelength from the graph but a surprising number of candidates gave the answer 440 mm, obtained from the graph where the label line touched the wave. These candidates did not understand the question.
- (b) A disappointingly small number of candidates were able to draw wave Y on the graph.
- (c) (i) The unit of frequency was not well known. Some of the candidates gave the answer f or λ , which are the symbols used for frequency and wavelength in equations, indicating that there is some confusion over the word 'unit'.
- (ii) The calculation was done well by many of the candidates although some candidates multiplied the speed and wavelength rather than dividing the speed by the wavelength.

Answer: (c)(ii) 200Hz

Question 7

- (a) (i) Many candidates knew that the nucleus is not present in blood cells.
- (ii) This question was quite well done by many of the candidates. Some candidates thought that chlorophyll was a structure rather than a substance in the chloroplast.
- (b) Many candidates were able to state the function of the white blood cells and the platelets. The function of the plasma was less well known.

Question 8

- (a) The candidates' responses to this question were very disappointing and illustrated a lack of understanding of relative reactivity. Candidates were expected to state that magnesium is more reactive than hydrogen.
- (b) The test for hydrogen was quite well known but a significant number of candidates thought the test used a glowing splint rather than a lighted splint and gained no credit for their answer.
- (c) The better candidates found this an easy question.
- (d) (i) A large number of candidates were able to calculate the relative molecular mass of magnesium oxide.
- (ii) The calculation was less well done with many candidates using a value for the relative molecular mass of magnesium oxide different to the one calculated in (d)(i).

Answers: (d)(i) 40 (d)(ii) 3g

Question 9

- (a) Large numbers of candidates did not recognise that the potential difference across resistor **P** is the difference between the readings on voltmeter **X** and voltmeter **Y**.
- (b) Many of the candidates knew the formula, $V = IR$, but were unable to rearrange it to calculate the resistance.
- (c) The formula for calculating the charge was known by a large number of the candidates but the majority of the candidates failed to convert the time into seconds. The unit of charge is not well known.

Answers: (a) 0.8V (b) 6Ω (c) 24C

Question 10

- (a) (i) Many candidates were able to name two essential components of a balanced diet.
- (ii) The majority of the candidates could not explain the importance of fibre in a balanced diet. Many candidates thought that the fibre provided energy rather than prevent constipation.
- (b) (i) The majority of the candidates simply restated the information given in the table rather than state a reason for the difference in the amounts of energy used. Candidates should be aware that the amount of energy used depends on the age, size, gender of the person and the amount of exercise the person does.
- (ii) A significant number of candidates correctly stated that Sanjay would become obese but a surprising number of candidates thought that Sanjay would lose weight or had a balanced diet. Candidates who stated an effect on health of obesity were awarded credit.

Question 11

Many candidates simply restated the information given in the question. A number of the candidates recognised that the carbon and sulfur can be removed by filtration and the solution evaporated to obtain potassium nitrate but did not state that the gunpowder should be dissolved in water. Some excellent answers were seen from the better candidates.

Question 12

- (a) Many candidates appeared not to read the question and simply stated that the thermometer was placed in the ice and the boiling water to read the temperature. The thermometer is placed in the melting ice and the boiling water in order to calibrate it and mark the fixed points, 0°C and 100°C .
- (b) The fact that the capillary tube should be made narrower in order to make the thermometer more sensitive was not well known by the majority of the candidates.
- (c) Many candidates were unable to state a physical property that changes with temperature. There is a misconception amongst many of the candidates that mass changes with temperature.

Question 13

- (a) This question was well answered by many of the candidates. Most candidates recognised that the incidence of HIV/AIDS increased between 1985 and 2005 and that women were more affected than men, but a large number of candidates stated that the number of adults with HIV/AIDS decreased between 1995 and 2005 rather than the rate of increase slowed down.
- (b) This was a well answered question. The majority of the candidates were aware of the ways in which the spread of HIV/AIDS may be reduced.
- (c) A majority of the candidates knew that the spread of HIV/AIDS amongst heroin users was caused by sharing needles.

Question 14

- (a) (i) The majority of the candidates knew that the number 9 represents the atomic/proton number but the number 19 was less well known as the nucleon/mass number. A large number of candidates incorrectly identified 19 as the neutron number or the relative atomic mass.
- (ii) This question was well answered by the better candidates. The relationship between the atomic structure of an element and its properties is not well known. Candidates were expected to state that fluorine has seven electrons in its outer shell and is in Group VII of the Periodic Table or that it is situated on the right of the Periodic Table.
- (iii) A large number of the candidates were able to draw the electronic structure of fluorine.
- (b) A significant number of the candidates were able to name the compound formed between fluorine and sodium but the type of bonding was less well known.

Question 15

- (a) The apparatus used to detect alpha-particles was not well known.
- (b) This question was quite well done by many of the candidates.

Question 16

- (a) A large number of the candidates knew the formula for calculating the amount of energy but many of these candidates did not change the time into seconds and obtained an answer 40 000. The unit of energy was less well known.
- (b) Many of the candidates were aware that the hazard associated with a damaged cable is an electric shock or a fire but almost all the candidates were unable to state that the exposure of the live cable caused this hazard.

Answer: (a) 2400 000 J

Question 17

- (a) This question was very well answered by a large proportion of the candidates.
- (b) (i) A large number of candidates knew that either the amount of carbon dioxide in the atmosphere increased or the amount of oxygen in the atmosphere decreased. Candidates who stated that the result of deforestation was global warming also received credit.
- (ii) Candidates were expected to state that the animals would lose either their food or their habitat. Those candidates who stated that the animals would die, without giving the reason why, did not receive credit as did those candidates who stated that the animals become extinct.
- (iii) The effect of deforestation on the soil was less well known by the candidates. Those candidates who answered the question in terms of soil fertility did not receive credit.

Question 18

- (a) (i) The process of cracking was not well known by many of the candidates.
- (ii) This question was well answered by a large number of the candidates.
- (iii) The better candidates were able to draw the structure of ethene. A number of the candidates drew the correct number of atoms in the structure but omitted to include the double bond between the carbon atoms.
- (b) The addition of water to ethene to make ethanol was not well known by the candidates.
- (c) Many of the candidates were able to state a use of ethanol.

Question 19

- (a) This question was very well answered by the majority of the candidates.
- (b) A significant proportion of the candidates were able to state the formula for refractive index but many of the candidates were unable to rearrange the equation correctly and could not perform the appropriate mathematical operations to calculate the angle of refraction.

Question 20

- (a) This question was poorly answered by the majority of the candidates. Many of the candidates answered the question in terms of growth of the plants and made no reference to how the plant uses the nitrogen to make amino acids, proteins etc.
- (b)(i) The vast majority of the candidates did not know the effect of low nitrogen levels on the plant. Candidates should know that low nitrogen levels in the soil cause the leaves of the plant to turn yellow.
- (ii) A large number of the candidates simply stated that the nitrogen level should be increased without stating that in order to do this fertilisers should be added to the soil.
- (c)(i) Many candidates answered this question in terms of famine and the causes of famine. The candidates were expected to state that the problem of lack of food is an increase in the population.
- (ii) The candidates' responses indicate that there is a lack of understanding of food chains. The majority of the candidates did not refer to the loss of energy along the food chain and that by eating plant crops, people would receive more of the energy than by eating meat, because the food chain is shorter.