

# COMBINED SCIENCE

**Paper 5129/11**  
**Multiple Choice**

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

## Comments on specific questions: Biology

### Question 1

This question worked well although a significant number of candidates incorrectly selected option C. Candidates knew that plant cells contain chloroplasts, but were less confident about the other plant cell features.

### Question 3

Most candidates answered this correctly. A significant number of the weaker candidates incorrectly selected option A.

#### Question 4

Candidates struggled with this question. Option A proved to be a strong distractor which suggests that candidates may need some support with how minerals affect plant growth.

#### Question 5

Option D was a very strong distractor for the weaker candidates, suggesting some gaps in understanding about digestion and absorption.

#### Question 7

This question worked well although a significant number of weaker candidates incorrectly selected option C.

#### Question 8

This question discriminated well between candidates, with the stronger candidates demonstrating a very clear understanding of lactic acid build-up in muscles.

#### Question 9

Candidates found this question difficult. Option C was a strong distractor.

#### Question 10

Many candidates knew that ciliary muscles are involved in focussing an image on the retina, but a significant number of the weaker candidates selected option C, involving the circular muscles in the iris.

#### Question 11

This question discriminated well between candidates.

#### Question 13

Candidates also found this question relatively easy. Option A was a strong distractor for the weaker candidates suggesting confusion between chemical and hormonal contraceptive methods.

#### Comments on specific questions: Chemistry

#### Question 14

This question was well answered by the better candidates although a significant proportion of the candidates indicated that a filter funnel was required and chose option **A**.

#### Question 16

A majority of the candidates recognised that elements **X** and **Y** combine together to form a compound but a significant minority of the candidates thought the compound is covalent, choosing option **A**.

#### Question 17

The 'dot and cross' diagram for phosgene was identified by the better candidates. Most candidates were able to assign the bonding pairs of electron correctly but a significant number chose option **B** where there were no lone pairs of electrons on the chlorine atoms.

**Question 18**

Many candidates found this question challenging.

**Question 19**

The properties of acids and pH are well known by many of the candidates.

**Question 20**

A majority of the candidates were able to determine the melting point and boiling point of sodium.

**Question 21**

The fact that metals are malleable is not well known by a majority of the candidates.

**Question 22**

There was evidence of widespread guesswork amongst the candidates.

**Question 23**

The uses of oxygen are not well known by the vast majority of the candidates.

**Question 24**

The conditions used for the manufacture of ammonia are well known by the better candidates,

**Question 25**

Candidates found this question challenging. Candidates are expected to be able to identify different homologous series by names and structures.

**Question 26**

Many candidates identified decane as a saturated alkane but a significant proportion of the weaker candidates thought that the alkane was unsaturated and chose option C.

**Question 27**

There was evidence of widespread guesswork even amongst the better candidates. Candidates were expected to recognise that alkenes decolourise aqueous bromine water and then identify W and Z as alkenes from their formulas.

**Comments on specific questions: Physics**

Candidates found Question 28 to be very easy with no question to be very difficult. There was evidence of guessing from among the better candidates in a number of questions.

**Question 29**

This question showed good discrimination. Wrong answers were almost equally divided between options B and C.

**Question 30**

There was evidence of widespread guesswork amongst the candidates.

**Question 32**

Higher achieving candidates answering incorrectly were distracted by option D; weaker candidates were divided between options A and B.

**Question 34**

Candidates are becoming more aware that the amplitude of a wave is from the equilibrium position to the peak or trough (the wave displacement), not from the peak to the trough.

**Question 35**

That electromagnetic waves can travel in a vacuum was well known but their nature as transverse waves was not well known.

**Question 36**

There was evidence of widespread guesswork from the candidates.

**Question 37**

Candidates needed to examine the diagram carefully to determine that the current of 6A into the junction was shared between three outgoing branches.

**Question 38**

Candidates needed to be aware that glass is not a conductor.

**Question 39**

Candidates need to be able to relate nuclide notation to the particles represented by that notation.

**Question 40**

This question showed good discrimination although some of the better candidates chose option C, indicating a confusion as to the nature of an alpha-particle.

# COMBINED SCIENCE

**Paper 5129/12**  
**Multiple Choice**

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11	<b>D</b>	31	<b>B</b>
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13	<b>C</b>	33	<b>C</b>
14	<b>B</b>	34	<b>B</b>
15	<b>B</b>	35	<b>C</b>
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17	<b>D</b>	37	<b>A</b>
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# COMBINED SCIENCE

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Paper 5129/21  
Theory

## **Key message**

Candidates must take care that their answers are not simply a rephrasing of the information given in the question stem.

## **General comments**

It is pleasing to note that a number of the candidates are showing their working in Physics calculations. Candidates should be made aware that when doing a calculation they should write down the correct formula for the calculation, using the correct symbols, and then show how they reach their answer. The responses to the Chemistry calculation were encouraging with a greater proportion of candidates demonstrating an understanding of ideas about chemical equations. Questions which required explanation of an observation or phenomenon were not well done by many of the candidates. Candidates frequently repeat the question in their response without providing an additional knowledge or insight.

## **Comments on specific questions**

### **Question 1**

- (a) There was some confusion amongst the candidates about structure **A**. A significant proportion of the candidates thought that structure **A** is the cell membrane rather than the cell wall.
- (b) The responses to this question were disappointing. Candidates were expected to state that the differences between the two cells were shape and the presence of chloroplasts in the plant cell. A large proportion of the candidates did not state as a difference the obvious disparity in the shape of the two cells.

### **Question 2**

There was some misunderstanding about what was required to answer this question by many of the candidates. The stem indicated that candidates were expected to identify the specific point on the speed-time graph at which the motion changed; many candidates answered both parts of the question in terms of a range rather than a specific point.

### **Question 3**

- (a) The transfer of energy needs to be better-understood by many of the candidates. Only the better candidates recognised that the energy stored in the boy's muscles is chemical energy and the ball gains potential energy as it rises and loses kinetic energy as it rises.
- (b)(i) The calculation of the power of the kick was well done by many of the candidates.
- (ii) The calculation of the vertical distance travelled by the ball proved more difficult for many of the candidates.

#### Question 4

- (a) This question was well done by the vast majority of the candidates.
- (b) The idea that a pure substance only shows one spot on a chromatogram is well known by a majority of the candidates.
- (c) (i) The fact that a pencil is used to draw the base line on the chromatography paper because it is insoluble in the solvent is less well known by the candidates.  
(ii) A few candidates recognised that ink **R** contains a colour which is insoluble in the solvent because there is a spot on the chromatogram on the base line.

#### Question 5

- (a) (i) This question was well answered by the majority of candidates.  
(ii) Many candidates had difficulty identifying both the trends shown in the bar chart. A significant proportion of the better candidates recognised that the mass of maize cobs increased as the amount of fertiliser increased. Very few candidates appreciated the fact that the effect of increasing the fertiliser becomes less as more fertiliser is added.
- (b) The better candidates were able to state that the rate of photosynthesis is affected by the light intensity or temperature or the concentration of carbon dioxide.

#### Question 6

- (a) Candidates were expected to add up the temperatures obtained in the three rests for the shiny can and divide their answer by three. Candidates need to know how to calculate an average from experimental results.
- (b) The ways in which energy is transferred are well known by the better candidates.
- (c) Candidates are aware of the type of surface that is the better absorber of thermal energy.

#### Question 7

- (a) The calculation was well done by the better candidates.
- (b) The test for oxygen was known by many candidates. Some were confused between the test for oxygen and the test for hydrogen.
- (c) The question asked candidates to state an industrial use of oxygen. Many suggested that it is used during respiration or combustion. These are not specifically industrial uses.
- (d) Candidates need to understand the use of state symbols in equations.

#### Question 8

This question was well answered by the majority, but a few candidates confused the functions of arteries and veins.

#### Question 9

- (a) Many candidates were able to draw the ray of light emerging from the glass block correctly.
- (b) A large proportion of the candidates were able to write the equation for calculating the refractive index but a significant proportion appeared unfamiliar with the mathematical concept of sines.

### Question 10

- (a) (i) This question was well done by the candidates.
- (ii) Candidates need to know the relationship between the proton number and the nucleon number.
- (b) Many of the candidates drew the correct electronic structure of the fluorine atom.
- (c) (i) The general name given to the elements in Group VII of the Periodic Table was well known by the better candidates.
- (ii) The trend in reactivity down Group VII of the Periodic Table was not well known.

### Question 11

- (a) (i) A large proportion of the candidates simply described the experiments rather than identify the environmental conditions that are investigated in the experiments. Candidates were expected to state three of the four factors being investigated, namely light, water, temperature and oxygen.
- (ii) Many candidates identified tube **E** as one of the test-tubes where germination occurs. Tube **G** was less frequently identified.
- (b) The responses to this question were disappointing. The role of amylase in the germination of seeds is not well understood. Candidates were expected to state that the starch stored in the cotyledon is broken down by the amylase to maltose or glucose which is used during respiration providing energy for the growth of the seed.

### Question 12

- (a) This was an easy question for a majority of the candidates.
- (b) (i) Many of the candidates were able to calculate the potential difference across resistor P, with many of these showing their working, as well.
- (ii) Another question which was well answered by many of the candidates.
- (c) Candidates struggled to explain that a higher resistance takes a higher voltage for the same current. The better candidates recognised that the current passing through the circuit is constant and therefore the resistor with the highest resistance has the highest potential difference because voltage and resistance are directly proportional to one another. Candidates should be encouraged to articulate the implications of equations on the syllabus beyond their use for simple calculations.

### Question 13

- (a) Only a few candidates correctly identified process **A** as an oxidation reaction. Many candidates were able to correctly identify Process **B**.
- (b) The use of a catalyst to speed up a chemical reaction was well known by many of the candidates.
- (c) The structure of poly(ethane) is not well known.

#### Question 14

- (a) Many of the candidates simply stated the factors which can affect the magnitude of the induced e.m.f. without stating how these factors should be changed in order to increase the magnitude of the e.m.f.
- (b) (i) This question was extremely well answered with most candidates showing the working for their calculation.
- (ii) The question asked the candidates to draw two complete periods for a wave described as having constant amplitude and frequency. A large proportion of the candidates did not draw two complete periods and so were unable to gain credit for demonstrating an understanding of constant amplitude and frequency. It is important for the candidates to realise that care is required when drawing this type of diagram.

#### Question 15

Many candidates recognised that tooth decay is caused when the enamel of the teeth is attacked. Only the better candidates knew that it was acid produced by bacteria acting on the sugary food left in between the teeth, that causes the decay.

#### Question 16

- (a) The formula of hydrogen gas was not well known by the candidates.
- (b) The uses of hydrogen as a rocket fuel and manufacture of margarine are not well known by many of the candidates.
- (c) Candidates were expected to describe how magnesium chloride crystals are obtained from aqueous magnesium chloride and not simply state the name of the process used (crystallisation).
- (d) The general physical properties of metals are well known only by the better candidates. Many candidates focussed on magnesium rather than the fact that it is a metal and answered the question in terms of its position in the Periodic Table.

#### Question 17

This question was well answered by many of the candidates.

#### Question 18

- (a) Many candidates stated that another property of a magnet is repulsion.
- (b) The ideas about induced magnetism are not well understood by many of the candidates. The better candidates recognised that the steel bar becomes magnetised by the magnet in Fig.18.1a).
- (c) There was some confusion amongst the candidates about this question. Many of the candidates answered the question in terms of the steel bar or the magnet rather than a bar of soft iron. The candidates were expected to recognise that a soft iron bar does not retain its magnetism and therefore the iron nail is either not attracted or there is a weaker attraction to the soft iron.

#### Question 18

- (a) Only the best candidates were able to state the sources of nitrogen and hydrogen as the air and the cracking of hydrocarbons.
- (b) The use of iron as the catalyst in the Haber Process is not well known.
- (c) (i) The better candidates were able to name the hydroxide ion as the ion which causes a solution to be alkaline.
- (ii) This question was well answered by a majority of the candidates.

### Question 20

A large proportion of the candidates answered this question by describing the short-term effects of drinking alcohol rather than the long-term medical problems the question required.

### Question 21

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- (b)(i) Most candidates were unable to use the equation to determine that the type of emission is a beta particle or an electron.
- (ii) This question was not well answered. The candidates were expected to state that a neutron in the nucleus is converted to a proton and an electron. A number of the candidates gave a partial answer by saying that the number of protons increases by one but did not state how this occurred.

# COMBINED SCIENCE

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Paper 5129/22  
Theory

## **Key message**

Candidates must take care that their answers are not simply a rephrasing of the information given in the question stem.

## **General comments**

It is pleasing to note that a number of the candidates are showing their working in Physics calculations. Candidates should be made aware that when doing a calculation they should write down the correct formula for the calculation, using the correct symbols, and then show how they reach their answer. The responses to the Chemistry calculation were encouraging with a greater proportion of candidates demonstrating an understanding of ideas about chemical equations. Questions which required explanation of an observation or phenomenon were not well done by many of the candidates. Candidates frequently repeat the question in their response without providing an additional knowledge or insight.

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