

COMBINED SCIENCE

Paper 5129/11
Multiple Choice

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

Comments on Specific Questions: Biology

Question 1

This question worked well but **B** was a strong distractor for the weaker candidates.

Question 2

Candidates found this question difficult. Many candidates were unclear what would happen to the cells, with the majority of weaker candidates selecting options **A** or **D**.

Question 3

This question also proved to be difficult. **C** was the strongest distractor suggesting that candidates are confused about the products made from the action of amylase on starch.

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Question 4

This question discriminated well between candidates. Over half of the weaker candidates incorrectly selected **C**, suggesting some confusion about which gas is made and which gas used in photosynthesis.

Question 5

Candidates generally answered this question well.

Question 6

A few candidates seemed to confuse transpiration with respiration and incorrectly selected option **A**.

Question 7

D proved to be a very strong distractor for the weaker candidates.

Question 8

This question was difficult with many candidates incorrectly choosing option **D**. This suggests these candidates may not be clear about the need to bubble the gas through the limewater to test for the presence of CO_2 .

Question 9

This question was well answered by the majority of candidates although some of the weaker candidates confused the roles of the liver and kidneys.

Question 10

Candidates performed well on this question.

Question 11

Candidates performed less well on this question and option **C** was a strong distractor for all levels. Heroin is a depressant and so is likely to slow all body functions.

Question 12

Candidates know the carbon cycle very well.

Question 13

Candidates performed extremely well on this question.

Comments on Specific Questions: Chemistry**Question 14**

This question was well answered particularly by the better candidates.

Question 15

The idea that the nucleon number is the sum of the number of protons and number of neutrons is not well understood. A significant number of the candidates thought that the number of neutrons is the sum of the proton and nucleon numbers and chose option **A**.

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Question 16

There was evidence of guesswork particularly by the weaker candidates.

Question 17

The 'dot and cross' diagram for the ammonia molecule was well known by the better candidates, however the idea that the outer shell of nitrogen contains eight electrons in a molecule of ammonia was less well known and a significant proportion of the candidates chose option **A**.

Question 18

A majority of the candidates were able to balance the equation correctly.

Question 19

The concept of an amphoteric oxide is not well understood by a large number of candidates. There was evidence of widespread guesswork.

Question 20

A large number of the candidates recognise that molecules of the elements in Group VII of the Periodic Table are diatomic but the trends observed as the group is descended are less well known.

Question 21

Candidates answered this question very well.

Question 22

The concept of reactivity series is well understood by a large proportion of the candidates.

Question 23

There was evidence of guesswork particularly amongst the weaker candidates. The reactions of acids that produce hydrogen are not well known.

Question 24

The idea that boiling water removes the dissolved oxygen from the water is not well understood. In order for iron to rust both water and oxygen are required.

Question 25

Almost a third of the candidates thought that members of the same homologous series contained the same number of carbon atoms and chose option **C**.

Question 26

The boiling ranges of the fractions obtained from the fractional distillation of petroleum are not well known by many of the candidates.

Question 27

Almost half the candidates were able to recognise that the general formula of alkenes is C_nH_{2n} and were able to identify option **C** as the non-alkene. The lower-scoring candidates tended to get this question wrong.

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Comments on Specific Questions: Physics

Question 28

A significant number of the better candidates chose option **C** rather than the key, option **A**. Weaker candidates favoured option **B**.

Question 29

The weaker candidates showed uncertainty in this part of the syllabus by choosing each distractor in almost equal numbers.

Question 30

The better candidates chose the key, option **B**. The weaker candidates tended to choose option **D**.

Question 31

Option D proved the main distractor, where all of the numbers are simply multiplied together.

Question 32

Those who answered this incorrectly were divided equally between all of the distractors.

Question 33

Many candidates at all levels chose the option that defines a wavelength as half a wave cycle.

Question 34

Candidates who answered this incorrectly tended to believe that the image is on the surface of the mirror.

Question 35

This was well answered by the better candidates: those who made a wrong choice tended to go for distractor **C**.

Question 36

Many candidates answered this question incorrectly, selecting option **D** rather than option **A**.

Question 37

Many of the better candidates chose option **C** rather than the correct answer, option **B**.

Question 38

Candidates need to be more aware of the fact that the earth wire is connected to the metal case of an appliance.

Question 39

This was well answered and showed good discrimination although those choosing a distractor instead of the correct answer often chose option **A**.

Question 40 was well answered. Many of those who answered incorrectly subtracted the alpha particle only once.

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Paper 5129/12
Multiple Choice

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

Comments on Specific Questions: Biology

Question 1

This question was answered well but **B** and **C** were strong distractors for the weaker candidates.

Question 2

Many weaker candidates incorrectly selected **D**.

Question 3

Candidates found this question difficult. **C** was the strongest distractor, suggesting that candidates are confused about the products made from the action of amylase on starch.

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Question 4

Those who answered incorrectly selected option **D**, suggesting that there is some confusion about which gas is made and which gas is used in photosynthesis.

Question 5

Only a few candidates answered this correctly. **B** was a strong distractor suggesting that candidates do not understand the link between more fibre in the diet and reduced risk of constipation.

Question 6

Candidates were also challenged by this question. Option **A** was a strong distractor for all candidates, regardless of ability.

Question 7

A was a strong distractor for all candidates.

Question 8

Many candidates incorrectly chose option **D**. This suggests that those candidates are not clear about the need to bubble the gas through the limewater to test for the presence of CO_2 .

Question 9

Many candidates incorrectly selected **B**, suggesting some confusion about the role of the liver.

Question 10

Candidates were challenged by this question, indicating that many are unsure of the meaning of the phrase 'target organ'.

Question 11

This question was answered well.

Question 12

D was a strong distractor for all levels of candidates, suggesting confusion about the processes of photosynthesis and respiration.

Question 13

This question was well answered.

Comments on Specific Questions: Chemistry**Question 14**

This question was well answered particularly by the better candidates but there was evidence of guesswork by the weaker candidates.

Question 15

The idea that the nucleon number is the sum of the number of protons and number of neutrons is not well understood. A significant number of the candidates thought that the number of neutrons is the sum of the proton and nucleon numbers and chose option **A**.

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Question 16

This question proved challenging for all candidates. Many of the candidates chose option **A** or **D**, both of which produce a compound with the formula XY .

Question 17

The properties of ionic and covalent compounds are well understood, particularly by the better candidates.

Question 18

A majority of the candidates recognised that the value of x is 2 but almost half of these candidates did not appreciate that the sodium hydroxide will contain some of the hydrogen provided by water, and chose the distractor option **C**.

Question 19

A significant proportion of the candidates thought that acids have a pH greater than 7 and chose option **D**.

Question 20

The trends shown by the elements in a period of the Periodic Table are not well understood by many of the candidates. There was evidence of widespread guesswork.

Question 21

The random distribution of the second element in the structure of alloys was not well known and many of the candidates chose the regular distribution of the elements, option **D**.

Question 22

The concept of reactivity series is well understood by a large proportion of the candidates.

Question 23

The substances that cause acid rain are not well known. A large proportion of the candidates think that carbon monoxide causes acid rain.

Question 24

Many candidates did not realise that copper is unreactive. There was evidence of guesswork amongst the candidates.

Question 25

This question proved difficult for a majority of the candidates. Candidates should be able to recognise an alkane, option **C**, undergoes cracking to form an alkene and hydrogen.

Question 26

The use of bitumen for making roads is well known by the better candidates.

Question 27

The properties of alkenes are not well known by many of the candidates and there was evidence of guesswork particularly by the weaker candidates.

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Comments on Specific Questions: Physics

Question 28

Option A proved to be the strong distractor.

Question 29

There was evidence of some guesswork from the candidates. Candidates should be aware of the effects of forces.

Question 30

The weaker candidates chose option **D**

Question 31

Some better candidates chose option **D** rather than option **C**, the key. The distractors were equally chosen by the weaker candidates.

Question 32

This was a challenging question, requiring that the candidates be aware of relative rates of expansion of the three states of matter. Solids expand more slowly than liquids which expand more slowly than gases.

Question 33

This was well answered by the better candidates although some selected the option which indicated that a wavelength is half a wave cycle.

Question 34

This question was answered well by the better candidates. Option **B** (using $50/1.5$) was the most popular distractor.

Question 35

Candidates need to know that all components of the electromagnetic spectrum travel with the same speed in vacuum.

Question 36

This question was well answered with option **D** the most popular distractor.

Question 37

The question asked which option was **not** correct. Candidates need to pay attention to the wording of a question. Wrong answers were distributed evenly among the three distractors.

Question 38

The better candidates were able to answer this question. There was evidence that the weaker candidates were simply guessing.

Question 39

Many candidates believed that the electron is a positive particle.

Question 40

Candidates struggled with this question indicating a lack of knowledge of the properties of radiation.

COMBINED SCIENCE

Paper 5129/21

Theory

Key Message

Candidates need to show their working in Physics calculations.

General Comments

There are still a number of candidates who do not show their working in Physics calculations. Candidates should be aware that marks can be gained for a correct equation even when the calculation is incorrect. Candidates are not confident when it comes to explaining observations from experiments, particularly in the Biology questions

Comments on Specific Questions

Section A

Question 1

- (a) The name of an ore of iron was not well known by the candidates.
- (b) A large proportion of the candidates repeated the question stating that the limestone removes the acidic impurities. Candidates were expected to explain that the limestone decomposes in the furnace to calcium oxide which reacts with the acidic impurities (sand) to produce slag (calcium silicate).
- (c) The better candidates had no difficulty balancing the equation.
- (d) A large proportion of the candidates knew that potassium is more reactive than iron but the reason that potassium is not extracted from its ore using carbon is that it is more reactive than carbon.

Question 2

- (a) This question was well answered by the vast majority of the candidates.
- (b) The better candidates found the calculation easy. A number of candidates knew the formula $s = d/t$ but were unable to rearrange the formula to make distance the subject of the equation.
- (c) Many of the candidates referred to constant speed rather than the acceleration. The graph indicates constant acceleration because it is a straight line from 0 to 4s.
- (d) Well done by the majority of the candidates.

Question 3

- (a) A large proportion of the candidates were able to define excretion as the removal of toxic waste products from the body.
- (b) Candidates should be aware that water and carbon dioxide are produced by any organ or cell in the body and urea is produced in the liver. There is a degree of misunderstanding by a number of candidates that urea is produced in the kidneys. The organs of excretion were better known by the candidates.

Question 4

- (a) (i) A large proportion of the candidates were able to calculate the relative molecular mass of ammonium chloride and sodium hydroxide.
- (ii) Many of the weaker candidates had difficulty calculating the amount of sodium hydroxide that produces 34g of ammonia but a large number of these candidates were able to calculate that the amount of sodium hydroxide that produces 0.85g of ammonia is 1/40 of the first answer.
- (b) The use of ammonia to make fertilisers is well known by many of the candidates.
- (c) The 'dot and cross' diagram was well answered by many of the candidates.

Question 5

This calculation was well done by the majority of the candidates.

Question 6

- (a) (i) Large numbers of candidates were aware that an unsaturated hydrocarbon contains a double covalent bond but most of the candidates did not state that the double bond is between two carbon atoms.
- (ii) The idea of polymerisation is not well understood by a large number of the candidates. Candidates were expected to state that polymerisation is the joining of many monomer molecules to form a long chain compound.
- (b) The structure of a poly(ethene) was known by the better candidates.

Question 7

- (a) The better candidates had no difficulty calculating the surface area of the shaded area of the strips. A number of candidates calculated the total surface area of the strips rather than the shaded area.
- (b) (i) The better candidates were able to explain that the strips gained mass due to the absorption of water by osmosis due to the differences in water concentration.
- (ii) Most candidates realised that there is a difference in the two strips of yam but the majority did not appreciate that the difference in surface area between the strips was the reason why strip B gained more mass than strip A.
- (c) (i) Most of the candidates knew that the red colour of red blood cells is caused by the presence of haemoglobin.
- (ii) Many of the candidates recognised that water enters the red blood cells and causes them to swell and burst. A number of candidates thought that the red blood cells dissolved in the water causing it to turn pink.

Question 8

Many candidates knew that a mixture of hydrocarbons is separated by fractional distillation but the other methods of separation were less well known, particularly chromatography and crystallisation.

Question 9

The apparatus used to measure the current and the unit of current were well known by many of the candidates but the definition of electric current was less well known.

Question 10

- (a) Only the best candidates were able to identify the wires Q and R and name the colours of the two wires.
- (b) Many candidates recognised that a double insulated appliance does not require an earth wire.
- (c) The formula used to calculate the power of the kettle was well known by the better candidates. Most candidates were able to state the formula $E = Pt$ but were unable to rearrange the formula to make power the subject of the formula or did not convert the time into seconds.

Question 11

- (a) This question was well answered by many of the candidates.
- (b) (i) Candidates were expected to state either that the oviduct transfers the ovum to the uterus or state that fertilisation occurs in the uterus. There was some confusion amongst the weaker candidates who thought that the ovaries were transferred through the oviduct.
 - (ii) The idea that implantation of the fertilised ovum is implanted on the uterus is well understood by many of the candidates.
- (c) (i) The definition of a hormone is well known by the candidates.
 - (ii) The factors that affect the length of a menstrual cycle are well known by a large number of the candidates.

Question 12

Many responses to this question were insufficiently detailed for credit. The most commonly-seen correct answer was that copper is not attracted to a magnet. Candidates were expected to explain that copper is never attracted to the magnet, iron is attracted to both poles of the magnet and the permanent magnet is attracted and repelled by the magnet depending on the arrangement of poles.

Question 13

- (a) A number of candidates thought that copper reacted with sulfuric acid.
- (b) The production of hydrogen from the reaction of a metal and an acid is well known by many of the candidates.
- (c) (i) A large proportion of the candidates recognised that the test for an acidic solution is to use either Universal Indicator or litmus.
 - (ii) Only the better candidates were able to state the ions present in dilute sulfuric acid.

Question 14

- (a) (i) Many of the candidates answered this question in terms of movement of the magnets rather than the wire. Candidates were expected to state that the size of the induced electromotive force is reduced by either moving the wire more slowly or by moving the wire sideways at an angle.
 - (ii) Many candidates did not realise that the direction of the induced electromotive force is reversed by moving the wire upwards or in the opposite direction.
- (b) The operation of a transformer is not well understood by the vast majority of the candidates. An alternating voltage is used in a transformer so that the current through the primary coil is continually changing, which in turn causes the magnetic field associated with the current to change continually which therefore continually induces a voltage in the secondary coil.

Question 15

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

Question 16

- (a) The definition of isotopes is well known by the majority of the candidates.
- (b) A majority of the candidates were able to give the correct electronic configuration of the phosphorus atom.
- (c) Many candidates correctly stated that the bonding between phosphorus and chlorine is covalent but the reason was less well understood. Candidates should know that covalent bonding is formed when non-metals combine together.

Question 17

- (a) Many of the candidates knew the formula for calculating the frequency but a significant proportion found difficulty with the number involved in the calculation.
- (b)(i) The component of the electromagnetic spectrum was well known, particularly by the better candidates.
 - (ii) Most candidates were able to identify sound as a longitudinal wave.

Question 18

The first three processes were well known by many of the candidates. The final process was less well understood.

Question 19

- (a) This question was well answered by the vast majority of the candidates.
- (b)(i) The fact that an beta particles are electrons is not well known by the candidates.
 - (ii) A large number of candidates were unable to suggest that the number of protons in the nucleus increases by one when a beta particle is emitted.
- (c) A few candidates were able to use half life to calculate the time for the activity of the sample to drop to an eighth of the original activity.

COMBINED SCIENCE

Paper 5129/22

Theory

Key Message

Candidates need to show their working in Physics calculations.

General Comments

There are still a number of candidates who do not show their working in Physics calculations. Candidates should be aware that marks can be gained for a correct equation even when the calculation is incorrect. Candidates are not confident when it comes to explaining observations from experiments, particularly in the Biology questions.

Comments on Specific Questions

Section A

Question 1

- (a) The question is about an element that is required to make proteins. Many candidates referred to the conditions required for a plant to grow rather than the specific element. Candidates were expected to state that the required element is nitrogen and that it is obtained by the nitrogen containing ions in the soil being absorbed by the plant through the roots by diffusion.
- (ii) This question was poorly answered by many of the candidates. Candidates were expected to state that enzymes are a type of protein produced by plants.
- (b) The dependence of animals on plants is well understood by a large proportion of the candidates.

Question 2

- (a) (i) The general name given to Group I elements is not well known by the candidates.
- (b) (i) A large number of the candidates were able to balance the equation correctly.
- (ii) The colour of the solution when Universal Indicator is added was well known by the candidates.
- (c) Candidates were expected to state a **visual** difference in the reaction between lithium and potassium with water.

Question 3

- (a) There was considerable confusion amongst the candidates about the difference between mass and weight.
- (b) Many candidates appreciated that the density of a solid decreased when it is heated.

Question 4

- (a) The reasons for chewing food are well known by many of the candidates but there was some confusion particularly amongst the weaker candidates about the differences between mechanical and chemical digestion.
- (b)(i) This question was poorly answered by a large proportion of the candidates who answered the question in terms of how tooth decay can be avoided rather than state the cause of tooth decay. Candidates were expected to state that food stuck between the teeth encourages the growth of bacteria which produce acid that dissolve the tooth enamel.
- (ii) Many candidates did not explain that using a brush or twig removes any food stuck between the teeth. A majority of the candidates knew that sweet foods can cause tooth decay but most of the candidates did not explain that avoiding sweet foods prevents the growth of bacteria.

Question 5

- (a)(i) A large proportion of the candidates calculated the relative molecular mass of sulfur dioxide.
- (ii) The calculation of the relative molecular mass of hydrogen sulfide was less well done. Many of the candidates included the stoichiometric coefficient in their calculation.
- (b) Only the better candidates were able to calculate the mass of sulfur produced by 34g of hydrogen sulphide, however a large number of the candidates recognised that 1.7g of hydrogen sulfide produces a twentieth of the mass of sulfur produced by 34g of hydrogen sulfide.
- (c)(i) The source of sulfur dioxide was not well known by the candidates.
- (ii) This question was well answered by a large proportion of the candidates.

Question 6

- (a)(i) The responses to this question were extremely pleasing. Even the candidates who had difficulty with calculation were able to state the formula for calculating the refractive index.
- (ii) The change in the angle of refraction was not well known by many of the candidates.
- (b) This question was well answered by a large proportion of the candidates.

Question 7

- (a) Many candidates were able to recognise the three parts of the male reproductive system.
- (b)(i) The function of the penis during sexual reproduction was not well known by the candidates. Candidates were expected to state that the penis deposits sperm in the vagina.
- (ii) The function of the prostate gland was also not well known by many of the candidates. There is a misconception amongst many of the candidates that the prostate gland produces sperm.

Question 8

- (a)(i) The structure of atoms is well known by many of the candidates.
- (ii) The fact that the number of protons and electrons are equal in a neutral atom is less well known by the candidates.
- (iii) Many candidates are unaware of the fact that a negative ion contains more electrons than protons.
- (iv) The loss of electrons by a metal to form an ion is not well understood by the candidates.
- (b) This question was well answered by the vast majority of the candidates.

Question 9

- (a) The symbol for a variable resistor is well known by the better candidates.
- (b)(i) The calculation of the potential difference across the resistor was well done by many of the candidates.
- (ii) The calculation of the potential difference across the variable resistor proved difficult for many of the candidates.

Question 10

- (a) The definition of transpiration was well known by many of the candidates although a number of the candidates did not state that the loss of water is through the stoma.
- (b) The candidates' responses to this question were disappointing. Many of the candidates answered the question in terms of the conditions required for a healthy plant to grow instead of stating how the conditions should change in order to prevent the plant from wilting. Candidates were expected to state that the plant should be watered or reduce the light or temperature or increase the humidity around the plant. These changes in conditions would mean that the rate of transpiration becomes less than the rate of absorption of water through the roots of the plant.

Question 11

- (a) This question was well answered by the candidates.
- (b) A large proportion of the candidates recognised that the particles in a liquid are able to move but the fact that the particles in a liquid have more energy than the particles in a solid was less well known.
- (c) The names of the two processes were well known by many of the candidates.

Question 12

- (a) A majority of the candidates were able to calculate the distance travelled by the wave but many of the candidates did not recognise that the wave travels to the sea bed and back to the boat and therefore did not divide their answer by two.
- (b)(i) The definition of frequency is not well known by the candidates.
- (ii) The better candidates were able to calculate the wavelength of the sound but the unit for wavelength was less well known.

Question 13

This question was answered well by many of the candidates.

Question 14

- (a) The dot and cross diagram for ammonia is well known by many of the candidates.
- (b)(i) The ion responsible for the making the solution alkaline is not well known by the candidates.
- (ii) Only the best candidates were able to suggest the pH value of ammonium hydroxide solution.
- (c) The concept of combining ions to construct the formula of a compound is not understood by many of the candidates.

Question 15

- (a) Properties that can be used to measure temperature are not well known by the candidates.
- (b) The idea that the size of the bore of a thermometer determines the sensitivity is not well understood by the candidates.
- (c) (i) The transfer of heat energy through the air by radiation is not well known.
(ii) The transfer of heat energy through a metal by conduction is well known, particularly by the better candidates.
- (d) The idea that a black colour is a good absorber of heat energy is well understood by many of the candidates.
- (e) The concept of convection currents is well understood by many of the candidates.
- (f) The difference between sound and infra-red radiation is well known by many of the candidates.

Question 16

- (a) The idea that alkenes contain a double bond is well known by a majority of the candidates however many of the candidates did not state that the double bond is between carbon atoms.
- (b) The test for carbon dioxide is well known by many of the candidates.
- (c) The substance used to distinguish between alkanes and alkenes is not well known.
- (d) The concept of polymerisation is not understood by many of the candidates. Candidates were expected to state that during polymerisation many monomer molecules bond together to form a long chain molecule.

Question 17

The nucleon number and proton number of an alpha particle are not well known by many of the candidates. A significant proportion of the candidates used the Periodic Table to find the nucleon number (232) and proton number (90) of thorium and then worked out that the nucleon and proton numbers of an alpha particle are 6 and 2 respectively.

Question 18

Many candidates knew that alcohol is broken down by the liver and that the kidney is responsible for the removal of water and urea but the other three processes were less well known, in particular, the production of glycogen and urea formation.