

COMBINED SCIENCE

Paper 5129/11
Multiple Choice

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

General comments

Candidates found **Questions 28** and **32** to be very challenging. A number of the questions, particularly **Questions 28** and **32**, showed uncertainty and guessing among the stronger candidates.

Comments on specific questions

Question 1

This question proved challenging for many of the candidates who did not know that red blood cells do not have a nucleus in order to transport more haemoglobin.

Question 2

This question was generally well answered and many of the candidates knew which way the water would move by osmosis and the reason why.

Question 3

Many candidates knew that the role of amylase was to break down starch into sugar, although many thought that sugar was converted to starch and therefore **D** proved to be a strong distractor.

Question 4

This question was generally well answered.

Question 5

This was a very well answered question and many of the candidates knew that acidic materials produced by bacteria caused tooth decay.

Question 6

Many of the candidates knew the function of both the xylem and the phloem.

Question 7

Many candidates knew that the right-hand side of the heart transported deoxygenated blood.

Question 8

This question proved challenging for many of the candidates and many of them had not associated the build-up of lactic acid with anaerobic respiration.

Question 9

This was a well answered question with many of the candidates knowing that the kidney excretes urea.

Question 10

The majority of candidates knew that hormones were transported around the body in the blood stream and destroyed in the liver.

Question 11

This question proved challenging for many candidates. Just over half of the candidates knew that the pupil would become smaller when the eyes were in bright light.

Question 12

This question proved challenging to candidates with **D** proving to be a strong distractor.

Question 13

This question required candidates to know which tube in the male reproductive system needs to be cut during surgical contraception. All of the distractors proved challenging.

Question 14

A large proportion of even the stronger candidates answered the question in terms of obtaining salt from the salt solution and chose option **B**.

Question 15

The stronger candidates understand the relationship between nucleon number and proton number in terms of the number of protons, neutrons and electrons present in an atom of an element.

Question 16

A majority of the candidates were able to recognise the electronic diagram for calcium oxide. There was evidence of some guesswork amongst the weaker candidates.

Question 17

The general properties of covalent compounds needs to be better understood by many of the candidates.

Question 18

A significant proportion of the candidates chose option **B**. Candidates must ensure that they understand the meaning of a subscript in a formula.

Question 19

Many of the weaker candidates answered the question in terms of the sodium carbonate rather than the colourless solution and chose option **C**.

Question 20

This question was well answered by the stronger candidates.

Question 21

A majority of the candidates recognised that X is the most reactive metal but almost half of the candidates had difficulty determining the relative reactivity of the other metals.

Question 22

This proved to be a straightforward question for most of the candidates.

Question 23

The amount of “other gases” present in a sample of clean air needs to be better known by candidates. A majority of the candidates assumed that the volume of the sample of air is 100 cm^3 and chose options **C** and **D**.

Question 24

The vast majority of the candidates knew that hydrogen and nitrogen are required to manufacture ammonia. Of these candidates it was the stronger candidates who recognised that iron is the catalyst used in the manufacture of ammonia and chose option **B**.

Question 25

The vast majority of the candidates knew that petroleum is a mixture of hydrocarbons but a significant proportion of these candidates thought that petroleum is used as a fuel and chose option **B**.

Question 26

Many of the candidates know that alkenes are unsaturated hydrocarbons.

Question 27

The conditions of temperature and pressure used in the addition of steam to ethene are well known by a large proportion of the candidates. The use of a phosphoric acid catalyst is less well known.

Question 28

Question 28 was found to be very challenging, with a large majority of candidates choosing option **B** which showed decreasing velocity not acceleration.

Question 29

In this question option **A** attracted almost as many responses as option **C**, the key. Option **D** was also chosen by a number of stronger candidates.

Question 30

Question 30 was very well answered.

Questions 31 and 35

Most candidates were divided between two options, **C** and **D** (the key) in **Question 31** and between **B** (the key) and **D** in **Question 35**. The majority chose the key in both questions.

Question 32

Question 32 was found challenging by candidates, with many of the stronger candidates choosing option **C**. Candidates should be clear that it is the distance between atoms, not the atoms themselves, that expand when heated.

Questions 33 and 34

Question 33 and **34** were well answered. In **Question 33** the most popular distractor was option **D** whereas in **Question 34** all three distractors attracted an equal response.

Question 36

The majority of candidates, correctly identifying the symbol for a fuse, chose either option **A** or option **D**. Candidates were less clear when it came to identifying which circuits were parallel arrangements.

Question 37

Option **B** attracted almost as many responses as the option **C**, the key. Options **A** and **D** both attracted a number of stronger candidates.

Question 38

Almost half of the candidates chose option **C**, the key, with option **B** attracting most of the remainder, including some stronger ones.

Questions 39 and 40

Both atomic structure and the charge of radioactive emissions were well known although in **Question 40** a significant number of stronger candidates incorrectly chose option **A**. In **Question 39**, option **B** was the most popular distractor.

COMBINED SCIENCE

Paper 5129/12
Multiple Choice

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

General comments

Candidates found a number of questions, particularly **Questions 31** and **38**, to be very straightforward with no question too challenging.

Comments on specific questions

Question 1

This question was very well answered. It was encouraging to see that all candidates knew that both plant and animal cells have a nucleus.

Question 2

This question was well answered, many of the candidates knew which way the water would move by osmosis and the reason why.

Question 3

Many candidates knew that enzymes were classified as proteins.

Question 4

This question was generally well answered. Some candidates did not recognise 1 as the vascular bundle.

Question 5

All of the candidates knew that brushing teeth regularly was important in preventing tooth decay.

Question 6

Many candidates knew the function of the xylem and the phloem, all three distractors were chosen by a significant proportion of the candidates.

Question 7

Many candidates knew that the right-hand side of the heart transported deoxygenated blood.

Question 8

This question proved challenging for some of the candidates. Option C was a strong distractor.

Question 9

Many of the candidates knew that the liver forms urea and that the kidney removes it.

Question 10

The majority of candidates knew that hormones were transported around the body in the blood stream.

Question 11

The majority of candidates knew that alcohol had a depressant effect.

Question 12

This question proved more challenging to candidates with option **D** proving to be a strong distractor.

Question 13

This question required candidates to know which tube in the male reproductive system needs to be cut during surgical contraception.

Question 14

This question was well answered particularly by the stronger candidates.

Question 15

The relationship between nucleon number and proton number and the number of protons, neutrons and electrons present in an atom of an element is well understood by the vast majority of the candidates.

Question 16

Ideas about the formation of ionic bonds between a metal and a non-metal are well understood by many of the candidates.

Question 17

The stronger candidates recognised that there are three shared pairs of electrons in a molecule of nitrogen.

Question 18

A majority of the candidates were able to determine the total number of atoms present in the molecule.

Question 19

The stronger candidates knew that a hydrogen ion causes the sulfur dioxide solution to be acidic.

Question 20

This question was well answered by the vast majority of the candidates.

Question 21

This question proved to be a straightforward question for the stronger candidates.

Question 22

A majority of the candidates recognised that calcium carbonate is used to remove impurities in the blast furnace. A significant proportion of the weaker candidates thought that coke removes impurities and chose option **C**.

Question 23

The fact that carbon monoxide is produced when octane is burned in a limited supply of oxygen was well known by almost all of the candidates. A significant number of the candidates thought that the pure octane would be contaminated with sulfur compounds and chose option **C**.

Question 24

Most candidates knew that the result of the test for hydrogen is that it pops. Candidates need to be able to distinguish between the tests using a glowing and a lighted splint.

Question 25

The uses of the fractions obtained from the fractional distillation needed to be better known by a significant proportion of the candidates.

Question 26

The fact that ethene decolourises aqueous bromine is well known by the vast majority of the candidates.

Question 27

The conditions used in the production of ethanol from ethene are well known by a large proportion of the candidates.

Question 28

This question was found to be very straightforward and showed excellent discrimination.

Question 29

This question showed good discrimination and was very well known with option **D** the most popular distractor.

Questions 30 and 35

Question 30 and **Question 35** were both well answered. The weaker candidates chose option **A**, in **Question 30** and option **D** in **Question 35**.

Question 31 and Question 38

Both questions were very straightforward with a correct response by almost all candidates.

Questions 32 and 33

Question 32 and **Question 33** were also found very straightforward with a correct response by a very large proportion of candidates in both questions. Option **B** in **Question 32** and option **C** in **Question 33** were the most popular distractors.

Question 34

Question 34 was answered well by candidates with option **A** the most popular distractor.

Question 36

Candidates found **Question 36** straightforward with option **D** the most popular distractor.

Questions 37 and 39

Weaker candidates were challenged by **Question 37** and **Question 39**. The favoured incorrect responses were option **B**, in **Question 37**, and options **C** and **D** in **Question 39**.

Question 40

Question 40 showed very good discrimination and that radioactive decay was well known by the candidates. The most popular distractor was option **A** (absorption of a beta-particle).

COMBINED SCIENCE

<p>Paper 5129/21 Theory</p>

General comments

Candidates' responses to recall questions, particularly in the Biology section of the paper, were well answered. The questions in both the Physics section and Biology section of the paper that required a description of an experiment or an explanation needed to contain more detail and be more clearly expressed.

Candidates found difficulty with calculations using standard notation. Candidates need to ensure that they understand all areas of the syllabus.

Comments on specific questions

Question 1

This question was well answered by the stronger candidates. Candidates need to be able to distinguish between solvent and solute. The strongest candidates were able to state that the sodium chloride crystallises when the solution is evaporated to a smaller volume and allowed to cool.

Question 2

- (a) Most of the candidates were able to determine the change in speed of the car between 1.0 s and 4.0 s.
- (b) A large proportion of the candidates were able to indicate that the car moves with constant speed between 4.0 s and 7.0 s and that the car decreases in speed between 12.0 s and 15.0 s. A significant proportion of the candidates recognised that the speed of the car increases between 7.0 s and 12.0 s but did not indicate that the speed increase is non-constant.

Question 3

The similarity and differences between osmosis and diffusion are well understood by a large proportion of the candidates.

Question 4

- (a) Most of the candidates were able to complete the electronic structure of sulfur.
- (b) The type of bonding in hydrogen sulfide, a compound formed between two non-metallic elements, was well known by many of the candidates.
- (c) (i) Most of the candidates were able to calculate the relative molecular mass of sulfur dioxide.

Answer: 64

- (ii) Most candidates understood the proportionality of a chemical equation.

Answer: 128 36
6.4

- (d) A significant number of the candidates had difficulty relating the colour of universal indicator to a particular pH value.

Question 5

- (a) Many of the candidates recognised that a stopwatch was used to measure the time for the pendulum bob to swing. They needed to be clear about the meaning of the period of the pendulum. Candidates were expected to indicate that the bob should be displaced and allowed to swing. The stopwatch is started as the bob is released and stopped when the bob returns to its original position after completing a number of complete oscillations.
- (b) This question was well answered by most of the candidates.

Question 6

- (a) The link between the number of electron shells and the period number in the Periodic Table needed to be better known by a large proportion of the candidates.
- (b) The stronger candidates understood that the group number of an element is the same as the number of electrons in the outer shell of an atom of the element.
- (c) The general name for element in Group I of the Periodic Table was not well known by many of the candidates.
- (d) (i) Many of the candidates answered this question in terms of proton number or neutron number rather than the characteristics of the elements themselves. Candidates need to know that the elements change from metallic to non-metallic across a period from left to right.
- (ii) The acidic or basic nature of different types of oxide needs to be better understood by a large proportion of the candidates.
- (e) The stronger candidates recognised that the significance of the noble gas electronic structure is that it is stable.

Question 7

- (a) (i) Most of the candidates were able to read the diagram to determine the average leaf surface area for species **C** grown in a light intensity of 100 arbitrary units.

Answer: 3100 mm²

- (ii) This question was well answered by most of the candidates.

Answer: 10 arbitrary units

- (iii) Many of the candidates were able to interpret the information in the diagram for plant species **C**, however, the descriptions for plant species **D** were less well done. Candidates were expected to indicate that for plant species **D** the average surface area of the leaf increased but as the light intensity increased further the average surface of the leaf decreased.
- (b) Many the candidates simply repeated the information shown in the diagram. Only the strongest candidates recognised that the size of the average surface area of the leaf is related to the amount of photosynthesis the plant species can perform.

Question 8

- (a) The principle of moments was understood by the stronger candidates. Candidates were expected to state that the clockwise moments equal the anti-clockwise moments.
- (b) The calculation of the moment of the counterweight was well done by the stronger candidates.

Answer: 1 250 000 Nm

- (c) The stronger candidates were able to use the principle of moments to calculate the distance between the counterweight and the pivot needed to balance the load.

Answer: 10 m

Question 9

- (a) The vast majority of the candidates were able to indicate where the processes in the digestive system take place.
- (b) A large proportion of the candidates knew the name of an enzyme, but many were unable to name the substrate that the enzyme acts upon.

Question 10

- (a) The percentage composition of clean air was well known by many of the candidates.
- (b) Most of the candidates were able to state a use of ammonia.
- (c) There is a misconception amongst a large proportion of the candidates that oxides of nitrogen cause global warming or cause depletion of the ozone layer.
- (d)(i) The strongest candidates were able to construct a balanced chemical equation.
- (ii) A large proportion of the candidates found deducing the formula of lithium nitride very challenging.

Question 11

- (a) Many of the candidates were able to label the diagram to show the melting and boiling points of water.
- (b)(i) The vast majority of the candidates were able to take the reading from the thermometer.
- (ii) The explanation of how the hot water causes the reading on the thermometer to increase proved challenging for many the candidates. The candidates were expected to explain that thermal energy is transferred from the hot water to the liquid in the thermometer, which causes the liquid in the thermometer to expand.
- (c) The idea that using a narrower bore in the thermometer increases the sensitivity of the thermometer needs to be better understood by a large proportion of the candidates.

Question 12

The processes involved in aerobic and anaerobic respiration are well known by many of the candidates.

Question 13

- (a) Many of the candidates were able to identify gas **A** as hydrogen and liquid **B** as water, solid **C** was less well known.
- (b)(i) Candidates should be aware that an unsaturated hydrocarbon contains a double bond between two carbon atoms. It is insufficient to state that they contain a double bond.
- (ii) The fact that aqueous bromine is used to distinguish between saturated and unsaturated hydrocarbons needs to be better known by most of the candidates.
- (c) The stronger candidates recognised that a reaction that produces energy is known as an exothermic reaction.
- (d) The structure of ethane was well known by the stronger candidates.

Question 14

- (a) (i) Only a small proportion of the candidates indicated the amplitude of the radiation on the diagram.
- (ii) The stronger candidates were able use the diagram to determine the wavelength of the radiation.
- (b) The names of the radiations **P** and **Q** needed to be better known by a large proportion of the candidates. Candidates needed to know that the radiation on either side of visible light in the spectrum are ultraviolet and infra-red radiation.
- (c) A number of the candidates knew the formula for calculating the frequency of the radiation but found the use of standard notation challenging.

Question 15

The functions of plant structures are well known by most of the candidates. The weaker candidates were able to indicate the function of the root and xylem, but they needed to be clearer about the function of the anther and the carpel.

Question 16

The stronger candidates were able to deduce the order of reactivity of the four metals from the reactions.

Question 17

- (a) The name of the device shown in the diagram was known only by a small proportion of the candidates.
- (b) The strongest candidates were able to explain how the device changes the voltage from input to output. There is a misconception that the current passes from the primary coil to the secondary coil through the iron core.

Question 18

- (a) Many of the candidates were able to identify the blood vessel as a capillary.
- (b) The characteristics of veins are well known by most of the candidates.

Question 19

The methods of birth control are understood by a large proportion of the candidates.

COMBINED SCIENCE

<p>Paper 5129/22 Theory</p>

General comments

The responses to recall questions were generally very good.

Comments on specific questions

Question 1

Most of the candidates understand ideas about the electronic structure of the elements and can interpret information from these electronic structures.

(a) – (e) These questions were well answered by most of the candidates.

Question 2

The functions of the parts of the male and female reproductive system are well known by a large proportion of the candidates.

Question 3

(a) Many of the candidates recognised that a stopwatch is required to measure the time. A number of candidates did not understand that all that sand should be in the bottom bulb and the stopwatch is started when the apparatus is turned over and stopped when all the sand has been transferred to the other bulb.

(b) Many of the candidates chose the micrometer as the most suitable piece of apparatus to measure the diameter of the grains of sand. A significant proportion of these candidates were unable to explain that the micrometer is able to measure a size that is much less than the size of the grain of sand or state that the measurement would be more precise.

Question 4

Many of the candidates understand the properties of hydrocarbons and a homologous series. Candidates need to be clear about the products of combustion of hydrocarbons in a limited supply of oxygen.

Question 5

Ideas about dental decay are well understood by most of the candidates.

Question 6

(a) This question was well answered by most of the candidates.

(b) Some of the candidates found it challenging to read the graph to determine the duration of the non-constant deceleration. Most of these candidates were able to determine the change in speed and the amount of time the car takes to return to its maximum speed.

Question 7

(a) (i) The calculation of the relative molecular mass of lithium oxide was well done by most of the candidates.

Answer: 30

- (ii) Ideas using the stoichiometry of the equation need to be better understood by a significant proportion of the candidates. Most candidates understood the proportionality of a chemical equation.

Answer: 60 32
1.5

- (b)(i) Candidates need to be able to construct a balanced symbol equation given the reactants and the products..
- (ii) The trend in reactivity of the Group I elements is well known by many of the candidates.

Question 8

- (a)(i) The name of the structure that develops from **Z** was not well known by many of the candidates.
- (ii) The fact that the cotyledon is the part of the plant embryo that is covered by the testa was known by the stronger candidates.
- (b) The environmental conditions required for the germination of seeds is well known by many of the candidates.
- (c) The majority of the candidates were able to draw two conclusions from the graph showing the effect of pH on the germination of seeds.
- (d) The fact that nitrogen-containing ions from the soil are used to make amino acids and/or proteins needs to be better understood by many of the candidates.

Question 9

- (a) Most of the candidates knew the formula, moment = force x distance, and were able to calculate the moment. Some weaker candidates were unable to state the correct units.

Answer: 0.2Ncm

- (b) A large proportion of the candidates were able to indicate how bears **A** and **B** should be moved. The movement of bears **C** and **D** was correct less frequently.

Question 10

- (a) Many of the candidates were able to identify the three gases but the colour of universal indicator with the calcium hydroxide proved challenging for some of the candidates.
- (b) A majority of the candidates recognised that calcium chloride is formed by the combination of a metal and a non-metal and identified the bonding as ionic.

Question 11

- (a) The differences between an artery and a vein are well known by most of the candidates.
- (b) The functions of blood capillaries need to be better understood by a large proportion of the candidates. Candidates were expected to state that the blood capillaries allow transfer of oxygen and glucose from the blood to the tissue/cell and allow transfer of carbon dioxide and urea from the tissue/cell to the blood.

Question 12

- (a) The stronger candidates were able to interpret the data stated in the question and state that the length of the copper wire changes as the temperature changes.

- (b) Most of the candidates were able to use the data to estimate the resistance of the copper wire from the data given in the question.

Answer: 1.7Ω

- (c) A large proportion of the candidates knew that the current and voltage are quantities that need to be measured to calculate the resistance of the copper wire.

Question 13

The properties of the named substances were well known by many of the candidates.

Question 14

- (a) Most of the candidates were able to complete the sentences in the definition of a drug.
- (b) The long-term effects of excessive consumption of alcohol were well known by most of the candidates.
- (c) (i) Most of the candidates recognised that alcohol is transported to the liver by the blood.
- (ii) The functions of the liver are well known by most of the candidates.

Question 15

- (a) This proved to be a straightforward question for the candidates.
- (b) The effect of a negatively charged rod on the negative charges on the sphere is well understood by many of the candidates.
- (c) The stronger candidates were able to explain what is meant by the term “one coulomb per second”. Candidates were expected to state that it means the amount of charge that produces a current of one amp.

Question 16

- (a) The vast majority of the candidates identified process **A** as condensation.
- (b) A large proportion of the candidates recognised that the particles become closer together during process **A** but the fact that the kinetic energy of the particles decreases was less well known.

Question 17

- (a) The structures in the alimentary canal are well known by most of the candidates.
- (b) The process of peristalsis needs to be better understood by the weaker candidates.

Question 18

- (a) The stronger candidates were able to draw one complete wavelength of the radiation between zero and 15×10^{-6} with the appropriate amplitude.
- (b) (i) A large proportion of the candidates found the scale on the diagram challenging to interpret. The strongest candidates were able to draw a vertical line in the appropriate position on the diagram.
- (ii) The areas of the electromagnetic spectrum need to be better known by many of the candidates. Only the stronger candidates were able to identify the types of radiation in areas **P** and **Q**.
- (c) Only a small number of the candidates were able to suggest the effect of infra-red radiation on carbon dioxide molecules. Candidates were expected to suggest that the thermal energy of the molecules increases.

Question 19

- (a) Most of the candidates were able to state one use of mild steel.
- (b) The stronger candidates were able to suggest two properties of stainless steel which make it better than mild steel for making cutlery. Candidates were expected to know that stainless steel is harder and more resistant to corrosion than mild steel.