

COMBINED SCIENCE

Paper 5129/01
Multiple Choice

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

Comments on specific questions (Physics)

No question proved to be either very easy or very difficult. **Questions 10** and **11** were most challenging with **Question 10** proving more of a problem for the more able candidates than it did for the less able. In **Question 11** widespread guessing was evident from all the candidates.

Question 1

The period of a pendulum was well known among the more able candidates, although some did choose option **A**. Less able candidates were evenly divided between options **C** and **D**.

Question 2

This again highlighted candidates' confusion, possibly caused by not reading the question carefully, in interpreting distance/time and speed/time graphs, with many more choosing option **A** (distance/time) than did the key, option **B** (speed/time).

Question 3

Less able candidates' responses were equally divided between options **B** and **D**.

Question 4

Option **B** attracted most of the incorrect responses.

Question 5

The incorrect answers were almost equally divided between options **A** and **D**.

Question 6

Candidates appeared to be unsure as to what determines the sensitivity of a liquid-in-glass thermometer with the majority of responses equally divided between option **A**, including some of the more able, and the key, option **D**. The remainder were also equally divided between options **B** and **C**.

Question 7

Both options **A** and **D** attracted responses from a number of the more able candidates.

Question 8

This question highlighted again that it is, generally, the more able candidates who remember to use $\sin i / \sin r$ (option **D**) for refractive index and not just i/r (option **A**).

Question 9

Uncertainty was shown by some of the more able candidates who chose either option **A** or option **D**. Option **B** attracted a significant response from less able candidates.

Question 10

This was correctly answered by the majority of candidates, including a large number of the less able. Option **B** proved to be a 'positive distractor', one which positively correlates with success in the test and indicates that some of the more able candidates chose this option.

Question 11

Some uncertainty and guessing was shown here among the candidates with more choosing option **B** than did the key, option **C**. Both options **A** and **D** also attracted a significant response.

Question 12

The composition of the nucleus was well known with option **A** the favoured incorrect response.

Question 13

The majority of the responses were almost equally divided between the key, option **B**, and option **C**.

Comments on specific questions (Chemistry)

Question 14

This was an easy question for the vast majority of the candidates.

Question 15

A large number of the weaker candidates chose option **A**, indicating that there was a degree of misunderstanding of atomic and ionic structure.

Question 16

There was evidence of guesswork amongst the weaker candidates. The better candidates recognised that the elements are in Group 1 and Group 7 of the Periodic Table and form an ionic compound with a formula XY. Candidates should be reminded to use the Periodic Table supplied on the back of the examination paper.

Question 17

A significant proportion of the candidates thought that a typical covalent compound conducts electricity in aqueous solution, and chose option **A**.

Question 18

This was an easy question, particularly for the better candidates.

Question 19

A large number of candidates, including a significant proportion of the better candidates, thought that an aqueous solution of sodium chloride has a pH of 14.

Question 20

There was evidence of guesswork amongst the candidates. Candidates were expected to recognise that W and Y are in Group 7 of the Periodic Table and that the reactivities of the elements decrease as the Group is descended. As in question **16**, candidates should be reminded to use the Periodic Table supplied on the back of the examination paper.

Question 21

The properties of the alkali metals were not well known by the majority of candidates. The majority thought that the metals have a high melting point and chose options **A** and **B**.

Question 22

There was evidence of guesswork amongst the weaker candidates. A large proportion thought that iron is the most reactive of the four metals and chose option **D**.

Question 23

Another question where there was evidence of guesswork even amongst the better candidates.

Question 24

The uses of aluminium are well known by a majority of the candidates.

Question 25

The majority of the candidates recognised that process W is fractional distillation, but many of these thought that the product of fractional distillation is an alkene and chose option **D**.

Question 26

The use of aqueous bromine to identify compounds containing a carbon to carbon double bond is well known by the majority of the candidates.

Question 27

The structural formula of an alcohol was very well known, particularly by better candidates.

Comments on specific questions (Biology)

Question 28

Some candidates did not read the question here, and chose a plant/animal cell difference without relating this to the shapes of the cells.

Question 29

This question (on osmosis) proved difficult, with many candidates choosing the reverse of the correct answer.

Question 30

Many candidates found this question challenging.

Question 31

Candidates need to be aware of how the structure of a leaf is related to the different functions needed for photosynthesis.

Question 32

This was a straightforward question, and was answered well by most candidates.

Question 33

About half of the candidates confused ion uptake and water uptake.

Question 34

Many candidates appeared to be confused about the names of the different valves in the heart.

Question 35

A common error was the belief that anaerobic respiration in muscles produces carbon dioxide.

Question 36

Even some of the better candidates were confused about the mechanism of accommodation.

Question 37

It was pleasing to see that, compared to previous years, a higher proportion of candidates understand that alcohol is a depressant.

Question 38

This question proved difficult. Candidates did not take into account that it was a question about food chains, not food webs.

Question 39

This question about deforestation caused problems for many.

Question 40

Candidates need to be made aware of the classification of the different methods of birth control by the mechanism involved in that birth control.

COMBINED SCIENCE

Paper 5129/02

Theory

Key Message

Candidates should be reminded to read the stems of questions very carefully in order to elicit the type and depth of answer that is required. Candidates must also be reminded to put all of their working down when answering numerical questions or questions requiring calculations.

General Comments

Candidates should be reminded that a question that begins with 'explain' requires an explanation rather than a statement of facts. Candidates should be encouraged to state the equations used in Physics calculations. These equations should use the correct symbols for the quantities involved, for example, force should be represented by the symbol F , and the current should be represented by the symbol I . Candidates are expected to be able to quote the correct units for the answer in these calculations. Other areas of difficulty in the Physics section of the syllabus included the concept of half-life and the operation of a basic transformer. The process of digestion and the functions of the parts of the alimentary canal were less well understood by many of the candidates. Many of the candidates demonstrated that they were challenged by concepts relating to food webs and also by Organic Chemistry and alloys questions in the Chemistry section of the paper.

Comments on Specific Questions

Question 1

- (a) (i) The function of red blood cells was well known by the majority of the candidates.
- (ii) The better candidates were able to identify the two features of a red blood cell which make them efficient in the transport of oxygen.
- (iii) Candidates were expected to match the adaptation of the red blood cell to the features stated in (a)(ii).
- (b) The better candidates were able to identify the liquid part of the blood as plasma.

Question 2

- (a) This calculation was well done by many of the candidates; however the units often created difficulty for some. Those candidates who correctly stated the equation for the calculation ($F = ma$) were awarded credit.
- (b) Candidates needed to extract the mass from the stem and multiply it by the given value of g to obtain the weight. Many candidates found this difficult. Some candidates used the answer to (a), an acceleration, rather than the mass quoted in the question.

Question 3

- (a) The better candidates were able to calculate the relative molecular masses of chlorine and sodium chloride and take into account the stoichiometry of the equation given in the question. Candidates who calculated the relative molecular masses incorrectly were awarded credit if the correct procedure was followed for the rest of the calculation. Many candidates were able to divide the initial masses by ten for the second step of the calculation but found the third step of the calculation more challenging. Candidates needed to determine by what number 4.6 must be divided to give 1.15, and then divide their answer to the second part by the same number.
- (b) Many candidates identified the type of bonding in sodium chloride as ionic.
- (c) The use of chlorine to kill bacteria in the purification of water supplies was well known by the majority of the candidates. Imprecisely worded answers that could be interpreted as repeating the question, such as 'chlorine is used to clean the water' were not awarded credit.

Question 4

- (a) Candidates need to know the units for commonly used quantities; many candidates were unable to quote the correct units for the moment of a force here.
- (b) Candidates who gained credit here were able to refer to the idea of the moment of a force about a pivot to explain the statement made in the stem. Many candidates who did not gain credit restated the stem in their answer, or stated imprecisely that a larger force can be exerted by a spanner with a longer handle. Candidates were required to state that the force is applied at a greater distance from the pivot and hence a smaller force produces the same moment.

Question 5

- (a) A large proportion of the candidates knew that the relative charge of an electron was -1 but the relative charge of a neutron and the relative mass of a proton were less well known.
- (b)(i) The difference between two isotopes of the same element was well known by the majority of the candidates. Candidates should be aware that the nucleon/mass number of an atom is not the same as the relative atomic mass.
- (ii) Candidates need to be able to demonstrate that they understand that the chemical properties of an element are determined by the number of electrons in the outermost shell of the atom. Many candidates simply stated that the isotopes are in the same group of the periodic table with no reference to the electronic structure of the isotopes.

Question 6

- (a)(i) The majority of the candidates were able to identify where glucose is absorbed.
- (ii) The part of the alimentary canal where most of the water is absorbed was less well known by candidates.
- (b) Candidates needed to read the question carefully to realise that the question asked for another function of the stomach other than digestion. Many candidates answered this question in terms of digestion which was stated in the question. Candidates were expected to state that hydrochloric acid is produced in the stomach in order to kill any bacteria or that food is stored in the stomach so that it does not have to be eaten constantly.
- (c) Candidates need to know the main functions of the gall bladder. That bile is produced by the gall bladder was known only by the best candidates. Very few candidates were awarded further credit for describing the emulsification of fats or the neutralisation of the stomach acid by the bile. Many candidates mistakenly thought that the blockage in the tube between the gall bladder and the duodenum would prevent the passage of the food through the alimentary canal.

Question 7

- (a) The fact that aerobic respiration produces more energy and uses oxygen was well known by many of the candidates. Some candidates were aware of the differences in the products of each of the types of respiration. A number of the candidates stated that respiration uses energy rather than producing energy and were not awarded credit.
- (b) This question was concerned with the visual differences in breathing before and during exercise. Many candidates stated that during exercise breathing is faster but only a small number went on to state that the breathing is also deeper or heavier. A number of candidates included references to the heart beat or to the amount of oxygen breathed in during exercise in their answers, which are not visible differences, and therefore do not answer the question.
- (c) (i) The majority of the candidates performed well in this question.
- (ii) Many candidates were able to identify that the longer the race, the more aerobic respiration occurs. However, a significant number of candidates thought that the information given in the question related to one race and answered the question in terms of the beginning and the end of the race.

Question 8

- (a) A large number of candidates were able to draw a wave with the correct amplitude. A few candidates were able to draw a wave with the correct wavelength.
- (b) The calculation was generally well done by candidates. A number of the candidates who showed their working were able to gain credit for stating the correct equation, despite then using it incorrectly to calculate the speed of the wave. Candidates generally need to ensure that they present working in order to gain some credit in the case where their calculations may be incorrect.

Question 9

- (a) The reactivity series was well known by a large number of candidates.
- (b) The test for hydrogen was quite well known although a significant number of candidates confused the test with the test for oxygen and specified a glowing splint rather than a lighted splint.

Question 10

This question proved straightforward for the majority of the candidates. 'Root hair cell' was the most common correct answer, closely followed by 'transpiration' and 'osmosis'.

Question 11

- (a) The majority of the candidates identified that the ball was positively charged. The best answers then explained that like-charged objects repel one another. There was some confusion between magnetic poles and electrical charges amongst a number of the candidates.
- (b) A small number of candidates correctly identified the rate of flow of charge as current.

Question 12

- (a)(i) Candidates needed to use equation $P = VI$, rearranging the equation to obtain the current ($I = \frac{P}{V}$). A large number of candidates obtained an answer without any reference to an equation.
- (ii) Candidates needed to use the energy and power equation ($E = Pt$) and also be sure to change the time given in minutes into seconds before substituting it into the equation.
- (b) Many candidates were able to identify the parts of the electromagnetic spectrum longer than infrared radiation and shorter than ultraviolet radiation.

Question 13

- (a) A small number of candidates were able to identify the main constituent of natural gas as methane.
- (b) Candidates need to be able to present a definition of a hydrocarbon. Candidates are expected to state that a hydrocarbon is a compound containing carbon and hydrogen only.
- (c) The better candidates were able to balance the equation.
- (d)(i) Good candidates were able to identify the gas produced when sulfur containing fossil fuels are burned as sulfur dioxide.
- (ii) The production of acid rain was less well known than the environmental problem associated with acid rain.

Question 14

- (a)(i) Candidates need to know that the source of energy for food webs is the Sun.
- (ii) Candidates need to be able to identify the main type of energy given out by the sun.
- (b)(i) Many candidates were able to state how many species were herbivores and how many were carnivores.
- (ii) The best answers showed that those candidates understood what was meant by 'the longest food chain'. This question proved difficult for the majority of the candidates.
- (iii) Many candidates were aware that the longer the food chain, the less energy is passed on; the best answers explained why this is the case. Candidates should know that energy is lost at each trophic level (by heat, movement, digestion, etc.) and therefore less energy passes to the next organism in the food chain.
- (c) A large number of candidates recognised that the only source of food for the spiders was the moths; in addition, candidates needed to state what would happen to the spider population as a result of the deaths of the moths.

Question 15

- (a) The equation $\text{speed} = \frac{\text{distance}}{\text{time}}$ was quite well known by the candidates and many candidates scored full credit on this question.
- (b) The fact that the athlete was running on a circular track was insufficient as an explanation as to why the velocity was not constant. Candidates were expected to explain that the direction of the athlete changed because he was running on a circular track.

Question 16

- (a) The composition of brass was not well known by many candidates.
- (b)(i) The uses of stainless steel were well known by the majority of the candidates.
- (ii) Candidates were expected to know that alloys are made by mixing two or more metals together in order to change or improve the properties of the metal. Candidates who stated a specific example of an alloy were given credit for their answer.

Question 17

- (a) The principle of energy conservation was not well known by the candidates. Candidates were expected to state that energy can be neither created nor destroyed.
- (b) This proved to be a straightforward question for many candidates, although the fact that the turbine has kinetic energy was the least well known response.

Question 18

- (a) Candidates need to know how calcium carbonate is used in the extraction of iron.
- (b) The amphoteric nature of aluminium oxide was known only by the best candidates.
- (c) Many candidates correctly identified potassium nitrate as the substance that provides two essential elements for plant growth.
- (d) The better candidates knew that calcium carbonate reacts with dilute sulfuric acid to produce the gas carbon dioxide.

Question 19

- (a) The parts of the basic transformer were identified by the better candidates. The iron core was correctly identified more frequently than the primary and secondary coils.
- (b) The best answers stated that when the input to the transformer is direct current, the magnetic field in the iron core does not change and therefore there is no induced emf/voltage/ current in the secondary coil and the bulb does not light. Many candidates found this question challenging.

Question 20

Candidates need to know that the half-life of a radioactive source is the time taken for the count rate/activity (of the radioactive source) to halve.