

COMBINED SCIENCE

Paper 5129/11
Multiple Choice

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

General Comments

Candidates found no question to be very easy but only **Question 6** to be very difficult. Candidates are reminded to use their knowledge to eliminate impossible options when answering questions for which the correct option is not immediately apparent.

Comments on Specific Questions

Question 1

There was some guessing among the more able candidates with a number choosing option **D** rather than the key, option **C**. Weaker candidates were mainly divided between options **A** and **B**.

Question 2

This was well answered, with option **A** favoured by some weaker candidates.

Question 3

This was also well answered with most candidates divided between option **D**, the key, and option **B**.

Question 4

This question discriminated well with weaker candidates favouring option **D** over option **C**.

Question 5

With only 40 % of candidates choosing correctly, option **B**, each distractor attracted a significant response with some stronger candidates choosing option **D**.

Question 6

Candidates found this question very challenging, with over 50 % thinking that 'containing mercury' was the property essential to a clinical thermometer.

Question 7

There was excellent discrimination here with weaker candidates equally divided between options **B** and **D**.

Question 8

There was uncertainty among the more able candidates with option **B** attracting a greater response than the key, option **A**.

Question 9

This question discriminated well with option **A** proving popular with weaker candidates.

Question 10

This was well answered and showed good discrimination with option **C** the most popular incorrect option.

Question 11

Here, there was evidence that the more able candidates chose between the key, option **B**, and the 'positive distractor' in option **D** which also attracted a greater response from candidates. Candidates are reminded that they must consider each option carefully when choosing their answer.

Question 12

Nearly all the candidates were divided, almost equally, between options **A** and **B**, and **C** (the key), with option **A** attracting the weaker candidates and option **B**, a 'positive distractor', a significant number of the stronger candidates.

Question 13

This was not well known with only 35 % of candidates choosing the key, option **A**, and almost as many choosing option **B**.

Question 14

Less than a third of the candidates correctly identified the burette as the piece of apparatus. A large proportion of the candidates chose option **B**, the pipette, which is the piece of apparatus used to measure the 25.0 cm³ of alkali.

Question 15

This was correctly answered by the majority of the candidates.

Question 16

Atomic structure is well understood by the more able candidates. Many of the weaker candidates simply added the mass number and the proton number together and chose option **D**.

Question 17

The majority of the candidates recognised that X is an inert gas and does not bond with other atoms. Over 50 % of the candidates chose option **D**, the formation of an ionic compound rather than option **A** where a covalent bond is formed between atoms of the same element.

Question 18

There was evidence of guesswork amongst all the candidates.

Question 19

This was answered correctly by the majority of the candidates.

Question 20

Over 75 % of the candidates knew that bromine displaces iodine from potassium iodide but less than half of these candidates knew that bromine is a liquid.

Question 21

Two thirds of the candidates chose option **C**, an ionic compound, which shows a regular pattern of the two different atoms. Candidates should be able to recognise that an alloy is a regular arrangement of atoms with a random pattern of a second atom.

Question 22

The determination of a reactivity series from experimental data proved challenging for even the more able candidates and there was evidence of guesswork by the weaker candidates. Over 50 % of the candidates thought that X is the most reactive element and chose either option **B** or option **C**.

Question 23

The presence of a protective oxide layer on the surface of aluminium is well known by the stronger candidates. There was evidence of guesswork amongst the weaker candidates.

Question 24

Candidates are expected to know of the production of ammonia by the reaction between an ammonium salt and an alkali, sodium hydroxide. Option **C**, hydrochloric acid was the most popular choice even amongst the more able candidates.

Question 25

This proved to be an easy question for many of the candidates but the relationship between boiling point and size of molecule is not understood by a significant proportion of the candidates.

Question 26

There was evidence of guesswork amongst the weaker candidates but the more able candidates correctly used the general formula of an alkane to determine the molecular formula.

Question 27

The stronger candidates recognised that ethanoic acid contains two carbon atoms and is formed by the oxidation of an alcohol that contains the same number of carbon atoms.

Question 28

This was a straightforward question.

Question 29

While many candidates got this question correct (on water absorption by plants), significant numbers had the water concentrations reversed.

Question 30

This was quite a difficult question, but it worked well in discriminating between candidates.

Question 31

Candidates are expected to know that osmosis always refers to the movement of *water*.

Question 32

This question required careful reading. The majority of candidates who got it wrong had the answers exactly reversed.

Question 33

This question discriminated well.

Question 34 and 35

These were relatively simple questions.

Question 36

This question (on accommodation) caused problems. Candidates are expected to know that most of the refraction occurs at the eye surface.

Question 37

Candidates were not able to recognise the description of a producer given in this question.

Question 38

This was a relatively easy question.

Question 39

Some candidates were evidently guessing here.

Question 40

The more able candidates understood the importance of screening blood transfusions for control of HIV.

COMBINED SCIENCE

Paper 5129/12
Multiple Choice

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

General Comments

Candidates found all questions accessible, meaning that the paper provided good discrimination. Candidates are reminded to use their knowledge to eliminate impossible options when answering questions for which the correct option is not immediately apparent.

Comments on Specific Questions

Question 1

This question showed good discrimination with the weaker candidates choosing option **A** and the stronger candidates, option **C**, the key.

Question 2

The distractors accounted for 50 % of the responses with option **D** attracting almost half of them, which included a number of the more able candidates.

Question 3 and 4

Both questions showed good discrimination with weaker candidates favouring option **A** in **Question 3** and option **B** in **Question 4**.

Question 5 and 6

These questions also showed good discrimination with option **D**, in both questions, attracting a slighter greater response from the weaker candidates as their choice of distractor.

Question 7

Just over 50 % of candidates considered that 'containing mercury' was the property essential to a clinical thermometer. This was almost twice the number choosing the key, option **B**, and suggested guessing by the more able candidates who contributed to both options **C** and **D**.

Question 8 and 10

These were both well answered with option **A** in **Question 8** and option **C** in **Question 10** attracting most of the incorrect responses.

Question 9

There seemed to be guessing among the more able candidates with many choosing option **D**. Many more candidates also chose option **B** than did the key, option **A**.

Question 11

The electrical hazard was reasonably well known with a 53 % correct response which included many of the weaker candidates. Some of the more the more able candidates were distracted by option **B**.

Question 12

Both options **C** and **D** were 'positive distractors', indicating that they were chosen by more able candidates in significant numbers. More candidates also chose option **D** than did the key, option **B**. Candidates are reminded to consider all options carefully.

Question 13

Here, some more able candidates incorrectly chose option **C**; option **B** was popular with weaker candidates.

Question 14

Less than a quarter of the candidates correctly identified the burette as the piece of apparatus. A large proportion of the candidates chose option **B**, the pipette, which is the piece of apparatus used to measure the 25.0 cm³ of alkali.

Question 15

Candidates are expected to understand simple atomic. Almost 60 % of the candidates simply added the mass number and the proton number together and chose option **D**.

Question 16

Almost 50 % of the candidates chose option **D**, the formation of an ionic compound rather than option **A** where a covalent bond is formed between atoms of the same element. Candidates should know that covalent bonds are formed between two non-metal atoms.

Question 17

Candidates are expected to be aware of the energy and speed of particles of the three states of matter.

Question 18

There was evidence of guesswork amongst all the candidates.

Question 19

Over half of the candidates chose option **C**, an ionic compound, which shows a regular pattern of the two different atoms. Candidates should be able to recognise that an alloy is a regular arrangement of atoms with a random pattern of a second atom.

Question 20

A large proportion of the candidates knew that bromine displaces iodine from potassium iodide but less than half of these candidates knew that bromine is a liquid.

Question 21

The properties of acids are well known by the majority of the candidates.

Question 22

The production of ammonia by the reaction between an ammonium salt and an alkali, sodium hydroxide, is not known by the majority of the candidates. Option **C**, hydrochloric acid was the most popular choice even amongst the stronger candidates.

Question 23

The determination of a reactivity series from experimental data proved difficult for even the more able candidates and there was evidence of guesswork by the weaker candidates. Over 50 % of the candidates thought that X is the most reactive element and chose either option **B** or option **C**.

Question 24

The presence of a protective oxide layer on the surface of aluminium is well known by the more able candidates. There was evidence of guesswork amongst the weaker candidates.

Question 25

The stronger candidates recognised that ethanoic acid contains two carbon atoms and is formed by the oxidation of an alcohol that contains the same number of carbon atoms.

Question 26

This proved to be an easy question for the more able candidates but the relationship between boiling point and size of molecule is not understood by a significant proportion of the candidates.

Question 27

There was evidence of guesswork amongst the weaker candidates but the more able candidates correctly used the general formula of an alkane to determine the molecular formula.

Question 28

While many candidates got this question correct (on water absorption by plants), significant numbers had the water concentrations exactly reversed.

Question 29

This was a straightforward question.

Question 30

Candidates need to know that osmosis always refers to the movement of *water*.

Question 31

This was quite a difficult question, but it worked well in discriminating between candidates.

Question 32

This question required careful reading. The majority of candidates who got it wrong had the answers exactly reversed.

Question 33 and 34

These were relatively simple questions.

Question 35

This question discriminated well.

Question 36

This question (on accommodation) caused problems. Candidates are expected to know that most of the refraction occurs at the eye surface.

Question 37

This was correctly answered by the majority of candidates.

Question 38

Candidates were not able to recognise the description of a producer given in this question.

Question 39

Candidates needed to read all the options carefully before selecting the right answer.

Question 40

The more able candidates understood the importance of screening blood transfusions for control of HIV.

COMBINED SCIENCE

Paper 5129/21

Theory

Key Message

When doing calculations, candidates should ensure that they write down the equation they are using and then show each step in the calculation to make sure that they can gain part credit for correct working in the event that they give a wrong answer.

General Comments

The quality of the candidates' responses was broadly in line with previous examination sessions. In the Biology section of the paper the majority of candidates were conversant with the methods of birth control and their use in the prevention of the spread of HIV infection. Questions relating to the function of the heart and lungs are less well understood.

In the Physics questions the calculations were quite well done by many of the candidates. Some candidates have difficulty rearranging equations and are unable to quote the correct units. In calculations candidates should be encouraged to write down the equation they are using and then show each step in the calculation. Candidates also show some confusion in their understanding of magnetism.

In the Chemistry questions, candidates demonstrated a good knowledge of atomic structure. Calculations from chemical equations proved difficult for quite a number of the candidates.

Comments on Specific Questions

Question 1

- (a) A large proportion of the candidates correctly identified the type of blood cell present in samples **A** and **B**.
- (b)
- (i) The vast majority of the candidates incorrectly identified sample **C** as the one with the most concentrated salt solution rather than sample **A**.
 - (ii) The explanation of the observation for blood sample **C** was not well understood. This was caused by the misunderstanding that sample **C** contained the most concentrated salt solution. Many candidates thought that the blood cells dissolved in the salt solution. Only the more able candidates recognised that sample **C** contained the most dilute salt solution and that the concentration of the solution in the blood cell was more concentrated than the salt solution, therefore water entered the cell by osmosis and caused the cell to burst.

Question 2

- (a) The more able candidates knew that the difference between speed and velocity is that velocity has direction. Candidates should also be aware that velocity is a vector quantity whilst speed is a scalar quantity.
- (b)
- (i) A significant proportion of the candidates had difficulty in reading the graph accurately. The time when the acceleration becomes zero is 5.8 seconds rather than 6 seconds. Most candidates recognised that the acceleration is zero when the speed is constant.
- (ii) The calculation of the distance the cyclist travels between 9 seconds and 13 seconds was well done by many of the candidates. Some candidates correctly stated the equation (speed equals distance divided by time), but then were unable to manipulate the equation correctly.
- (c) A large proportion of the candidates were able to state correctly that the cyclist has kinetic energy but the majority thought that it was converted to potential energy rather than thermal energy or sound.

Question 3

- (a) The name of the homologous series was known by many of the candidates.
- (b) A small proportion of the candidates were able to calculate the mass of oxygen. Candidates had more success with the relative molecular mass of carbon dioxide, which suggests that there is some confusion amongst candidates about the meaning of the stoichiometry in a chemical equation.
- (c) The test for oxygen was well known by quite a number of candidates. Some candidates confused the test for oxygen with the test for hydrogen and stated that the result of the test is a 'pop' sound, rather than the glowing splint re-igniting.

Question 4

The charge on a proton was well known by many of the candidates. The charge on a neutron was less well known by the candidates. A significant proportion of the candidates confused the mass of a neutron with the mass of an electron.

Question 5

- (a) The type of tissue from which the heart is composed was not well known. Many candidates simply stated that the heart is made up of cardiac tissue without identifying that this is mainly muscle.
- (b)
- (i) The majority of candidates knew that valve **W** opens when chamber **Y** contracts.
- (ii) A large proportion of the candidates knew that valve **X** closes when chamber **Y** contracts but this was less well known than valve **W**.
- (c) Many candidates knew that when chamber **Z** contracts the blood is forced from the chamber. The more able candidates were also able to identify that the blood pressure is increased.

- (d) Some of the weaker candidates answered this question in terms of the heart rather than the composition of the blood in chamber **Z**. The fact that chamber **Z** contains deoxygenated blood was well known by many candidates. The difference in the concentration of carbon dioxide in chambers **Z** and **Y** was rarely seen.

Question 6

- (a)
- (i) The more able candidates could draw the normal at 90° to the mirror. Candidates should be aware that when drawing ray diagrams the rays and the normal should be drawn using a ruler and should approach the correct angle.
 - (ii) The responses to this question were disappointing. A large number of candidates drew the reflected ray behind the mirror rather than in front of the mirror. Quite a number of the candidates would have gained credit if they had continued the line from the pin through the mirror.
- (b) A significant number of candidates correctly stated that the image of the pin moved left towards the mirror.
- (c) Many candidates were able to name sound as an example of a longitudinal wave.

Question 7

- (a) The diagram showing the outer electrons in a molecule of chlorine was well done by many candidates.
- (b) The trend in boiling points of the halogens was well known by many candidates.
- (c) The use of chlorine in the purification of water supplies was well known by many candidates.
- (d) A large number of candidates correctly identified potassium chloride as one of the products of the reaction between potassium iodide and chlorine. The more able candidates correctly identified iodine as the other product.

Question 8

- (a)
- (i) This question proved to be easy for the vast majority of the candidates. The methods of birth control are very well known.
 - (ii) Only a small proportion of the candidates were able to identify that the contraceptive pill depends on the use of hormones.
 - (iii) The use of a condom to prevent the spread of HIV infection was well known by a great many candidates and they were able to explain how the condom prevents the spread of the infection.
- (b) This was another question which was well done by the majority of the candidates.

Question 9

- (a) The vast majority of candidates were able to draw a series circuit. The symbols for the apparatus in the circuit were less well known; in particular, the variable resistor. Candidates should know that the symbol for a cell consists of a long and short line perpendicular to the wire in the circuit, the symbol for a bulb is a circle with a cross inside it, the symbol for an ammeter is a circle with an A inside it and the symbol for a variable resistor is a rectangle with a diagonal arrow.
- (b)
- (i) The equation $V = IR$ is well known by most candidates. A large proportion of the candidates were able to calculate the resistance of the lamp and state the units correctly.
 - (ii) The equation for the power of the lamp ($P = VI$) was less well known and a number of the candidates had difficulty with mathematics involved in the calculation, producing an answer of 3.6 rather than 0.36.

Question 10

- (a)
- (i) The catalyst involved in the manufacture of ammonia was well known by the more able candidates.
 - (ii) More able candidates had no difficulty in balancing the equation.
 - (iii) The pH of a solution of ammonia was not well known. A disappointingly large number of candidates thought that ammonia solution is acidic.
- (b) The use of nitric acid to make ammonium nitrate from ammonia was quite well known but only the most able candidates could identify the reaction as neutralisation.

Question 11

- (a) The vast majority of the candidates were aware that an enzyme is a biological catalyst and speeds up chemical reactions but only the more able candidates identified that enzymes are proteins.
- (b)
- (i) A large number of the candidates did not use the data provided in the question and simply stated that enzymes were denatured by high temperatures. The data in the question can only demonstrate that increasing the temperature increases the enzyme activity.
 - (ii) The data given in the question indicates that optimum enzyme activity occurs at pH 7. Many candidates simply stated that enzyme activity is reduced by either low or high pH. These candidates would have gained credit if they had made both statements.
- (c) Many candidates drew the line on the graph above the line for 40 °C, even those who had stated that high temperatures denature the enzyme in part (b)(i). Any line which is below the 15 °C line over the whole pH range was the expected response.

Question 12

- (a) The more able candidates knew that heat is transferred through copper by conduction.
- (b) This question proved easy for the more able candidates with many gaining full credit.
- (c)
- (i) A disappointingly large number of candidates did not recognise that plastic is an insulator or a poor conductor.
 - (ii) The candidates' responses indicated some confusion. Many of the candidates answered the question in terms of absorption of heat. The question did not relate to the container becoming hot from the outside but related to heat being lost from the container with a white surface, therefore the correct reason is that a white surface is a poor emitter of heat.

Question 13

- (a)
- (i) This question proved easy for many of the candidates.
 - (ii) The vast majority of the candidates found this question easy.
 - (iii) This was another easy question for the majority of the candidates.
- (b) This question proved to be difficult for many of the candidates. Only the more able candidates knew that a pipette is used to measure the alkali solution into a conical flask. A greater proportion of the candidates were able to identify a burette as the piece of apparatus used to add the acid to the alkali.

Question 14

- (a) The process of gaseous exchange in the lungs is not well understood by many of the candidates. The thin walls of the alveolus and its large surface area were only rarely stated as the reasons for the efficient gas exchange in the lungs.
- (b) Many candidates identified carbon dioxide as the gas excreted through the alveoli.
- (c) The fact that smoke and soot block the alveoli and prevent diffusion of oxygen and carbon dioxide was known only by the more able candidates. A large number of candidates thought that the smoke and soot caused poisonous carbon monoxide to be produced in the alveoli.

Question 15

- (a) The process **A** was correctly identified as fermentation by many of the candidates. Fewer candidates were able to identify water as the substance that is added to ethane in order to make ethanol. The oxidation of ethanol to ethanoic acid by oxygen in the air was known only by the more able candidates.
- (b) The presence of enzymes in the yeast was not well known by the candidates.
- (c) The polymerisation of ethene is not well understood by the majority of the candidates. Ethene monomers are added together in a process known as addition polymerisation.

Question 16

- (a) There is some confusion amongst the candidates about the difference between magnetic and non-magnetic materials. Candidates are expected to know that magnetic materials are attracted towards a magnet whilst non-magnetic materials are not.
- (b) Many candidates answered this question in terms of the strength of iron and steel magnets rather than in terms of the magnetic properties of iron and steel. Candidates were expected to state that steel retains its magnetism or that iron is easily demagnetised.

Question 17

- (a) The calculation was well done by many of the candidates. A large proportion of the candidates were able to quote the correct equation ($F = ma$) but some of the candidates were unable to manipulate the equation correctly to calculate the acceleration.
- (b) The vast majority of the candidates thought that the acceleration of the spacecraft increased due to the exhaust gases being emitted from the spacecraft rather than the mass of the spacecraft decreasing due to the use of the fuel.

Question 18

- (a) Many of the candidates correctly stated that the energy in the cheetahs was less than in the grass.
- (b) The concept of energy flow in food chains is not well understood by the majority of the candidates. Candidates were expected to state that energy is lost at each stage of the chain and then indicate that energy is lost either by respiration or egestion or excretion or movement.
- (c) The more able candidates could identify that the type of organisms not shown in the food chain are decomposers.

Question 19

- (a) This question was well done by the majority of the candidates.
- (b) A large number of candidates gave their answer as atom **R** which demonstrated some confusion between nucleon number and number of electrons. The nucleon number of the element is 16 and has 8 neutrons which means that there are 8 protons in the nucleus, therefore there are 8 electrons in the atom, which is atom **T**.
- (c) The fact that atoms **R** and **T** have the same number of electrons in their outer shell and are therefore in the same group of the Periodic Table was recognised by a majority of the candidates.
- (d) Candidates were awarded credit for either atom **W** (a metal) or **U** (an inert gas) both of which do not produce an acidic oxide. This was an easy question for many of the candidates.

COMBINED SCIENCE

Paper 5129/22

Theory

Key Message

Candidates must develop greater precision when answering questions, making sure that their answers address the question asked. Candidates must ensure that they have a good grounding in knowledge of chemistry as well as of biology and physics.

General Comments

The candidates found this paper more difficult than in previous years. Candidates' answers to questions involving an explanation frequently lacked the precision required. Candidates' found many of the chemistry questions challenging, even those questions that required simple recall of knowledge. The differences between an element, compound and alloy are not understood by the majority of the candidates.

In contrast the recall questions in the biology section were quite well done by many of the candidates. Ideas about the germination of seeds were understood by a large number of candidates.

In the physics section the candidates' understanding of calculations was better than in previous examinations. Electromagnetic induction is poorly understood by the vast majority of the candidates.

Comments on Specific Questions

Question 1

- (a) Many candidates were able to identify gas **A** as hydrogen. The acid **B** was less well known. Only the most able candidates recognised that when a base (calcium hydroxide) reacts with an ammonium salt, ammonia is produced.
- (b) Many candidates did not recognise that the use of limewater is the test for carbon dioxide. Candidates who stated the incorrect gas but the correct observation were given credit for the result.

Question 2

- (a) A large number of candidates did not use the graph to count the number of waves between zero and one minute.
- (b)
- (i) Many of the candidates answered this question in by referring to the volume of the lungs rather than the breathing rate. Candidates were expected to state that the breathing rate and the depth of breathing both increase.
- (ii) A large proportion of the candidates recognised that the change in breathing rate after one minute was caused by vigorous exercise.

Question 3

- (a) A small number of the candidates gave the full description of the principle of moments. Many of the candidates stated that the sum of the clockwise moments equals the sum of the anticlockwise moments but omitted to mention that this is necessary 'for balance to be achieved'.
- (b)
- (i) The equation to calculate the moment of the 8.0 N weight about the pivot was well known by many candidates; the units were less well known.
 - (ii) Candidates needed to take the answer from part (b)(i) and the relevant distance from the diagram to calculate this answer.
- (c) Candidates found this question difficult due to the fact that they were unaware of the need to calculate the extension of the spring.

Question 4

- (a) The components of the electromagnetic spectrum are well known by a majority of the candidates.
- (b) Many candidates knew the equation to calculate the frequency of the radio-wave; unfortunately, difficulties with scientific notation were encountered by some candidates. The units of frequency are quite well known.

Question 5

- (a) The approximate percentage of nitrogen in the air was not known by the majority of the candidates.
- (b) Candidates need to know the fact that oxides of nitrogen cause acid rain which has a corrosive effect on buildings
- (c) The more able candidates could balance the equation for the reaction. Candidates are expected to be able to work out the stoichiometry of a given equation.
- (d)
- (i) Candidates need to be able to work out the formulae of ions from the formula of a compound.
 - (ii) The vast majority of the candidates did not recognise that lithium nitride is an ionic compound. Ionic compounds have a high melting and boiling point, are soluble in water, and conduct electricity when molten and when dissolved in water.

Question 6

- (a) The majority of the candidates were able to identify some of the structures in the alimentary canal. Candidates were given credit for naming structure **D** and **E** as the small and large intestines although the expected answers were ileum and colon. **B** (gall bladder) and **C** (pancreas) were the least well known of the structures.

- (b) Many candidates assumed that the structures given in (a) had to be used in answering this question. The candidates' responses indicated a misunderstanding of the words ingestion and egestion.
- (c) A good proportion of the candidates knew that amylase is secreted from either the salivary gland or the pancreas.

Question 7

- (a) This question was well done by a vast majority of the candidates.
- (b) The equation ($E = P \times t$) was well known by many candidates. Some candidates were unable to manipulate the equation correctly and obtained the answer 3 W rather than 12 W.
- (c) Ideas about the weaker gravity on the moon are not well understood by the majority of the candidates.

Question 8

- (a) The concept of chemical reduction is poorly understood by a large majority of the candidates.
- (b) Candidates' responses to the calculation indicated that many of them found this challenging. A small proportion of the candidates were able to calculate the mass of water produced in the reaction; a greater number had more success with the relative molecular mass of carbon dioxide, which suggests that there is some confusion amongst the candidates about the meaning of the stoichiometry in a chemical equation.
- (c) A small number of the candidates linked the fact that copper(II) oxide is a metal oxide and is therefore basic.

Question 9

- (a) A majority of the candidates recognised that the seeds in dish P germinated due to the presence of water whilst the seeds in dish Q did not germinate.
- (b) A small proportion of the candidates understood that 20 seeds are used in the experiment to improve the reliability of the experiment or to make the experiment a fair test.
- (c) A large number of candidates answered the question in terms of the conditions required for germination and included water in the answer. The question asked for conditions that are kept constant, which are: the temperature, the light intensity, the oxygen concentration and the type of cotton wool.

Question 10

- (a) The equation to calculate the current in the heater was less well known than other equations on the paper. The units of current were well known by many of the candidates.
- (b) The responses to this question demonstrated a lack of understanding by the candidates as to how the fuse protects against electrical shock. Candidates are expected to know that when a large current flows through the live wire the fuse will melt and cause the circuit to be broken.

Question 11

- (a)
- (i) The more able candidates recognised that the process is called fractional distillation.
 - (ii) The use of bitumen to make roads was well known by many of the candidates; the use of kerosene as an aircraft fuel was less well known.
- (b)
- (i) The name of the homologous series was known by the more able candidates. A number of candidates gave specific names of alkanes rather than the name of the series.
 - (ii) Candidates were expected to use the general formula of the alkanes, C_nH_{2n+2} , to calculate the number of hydrogen atoms in a molecule of octane.
 - (iii) The type of bonding present in an octane molecule was quite well known.

Question 12

- (a) The majority of candidates were aware of one of the symptoms of gonorrhoea but many of the answers were poorly expressed and lacked precision. Candidates were expected to state that the symptoms are burning sensation during urination, discharge from the urethra, inflammation of the vagina, cervix, testes or prostate and swollen or painful joints.
- (b) There is some confusion amongst the candidates about sexually transmitted bacterial diseases. Quite a number of candidates gave the answer AIDS, a disease caused by a virus, rather than syphilis.
- (c) The treatment of sexually transmitted bacterial diseases with antibiotics (penicillin) was well known by the more able candidates.
- (d) This question was well answered by a majority of the candidates.

Question 13

- (a) Almost half the candidates were able to identify the measuring cylinder as the piece of apparatus used to measure the volume of a liquid.
- (b) This question was quite well answered by many of the candidates. The volume of the stone can be determined by two possible methods, by using a displacement can or using the measuring cylinder alone. A significant proportion of the candidates did not give sufficient detail in the description. For example, in the displacement can method it is important that the can is filled to the spout before the stone is added. The water that comes out of the spout is collected in a measuring cylinder and the volume of water is measured. In the measuring cylinder method, the volume of water in the cylinder must be measured before and after the stone is added and the difference in the two volumes calculated.

Question 14

- (a) The fact that an element consists of one type of atom was known only by a small number of candidates. Similarly most candidates were not aware that a compound consists of two types of atom chemically combined together. Many candidates did not gain credit because they thought that a compound is a mixture of elements. Quite a number of

candidates correctly stated that an alloy is a mixture but many of these candidates did not gain further credit because they did not state that it is a mixture of two different elements.

- (b) The fact that all metals conduct electricity was not known by the vast majority of the candidates.

Question 15

- (a) The answers to this question were disappointing. Candidates were expected to identify that a famine occurs when there is a lack of food.
- (b) A large number of candidates correctly stated that famine occurs on the island because the agricultural land is damaged by frequent flooding but only a small number of candidates recognised that there is insufficient agricultural land or there are large areas of non-agricultural land on the island.
- (c) In both parts of this question, the majority of the candidates did not state whether the probability of famine increased or decreased in their answer and therefore did not gain credit. Many candidates were able to state the reasons for the changes in the probability but without the statement about the probability of famine the answers were ambiguous. For example, 'a decrease in the annual rainfall means that there is less flooding' is a correct explanation but should be accompanied by 'there will be less chance of a famine'.

Question 16

- (a) The name of the electrical effect was known only by a small proportion of the candidates.
- (b) A large proportion of the candidates were able to state that changing the number of turns on the coil will affect the size of the induced current. The other factors, the strength of the magnet, the speed of the magnet and the cross-sectional area were only known by the more able candidates.
- (c) A large proportion of the candidates incorrectly thought that the magnet is attracted by the magnetic field rather than repelled.

Question 17

- (a) The use of oxygen in the production of steel was known by only a small proportion of the candidates.
- (b) In contrast, large numbers of candidates knew that helium is used to fill balloons.
- (c) A number of candidates confused ethane and ethane. Ethene is polymerised to make poly(ethene).
- (d) The test for oxygen was quite well known, particularly by the more able candidates, although there was some confusion with the test for hydrogen.

Question 18

- (a) Candidates needed to take care to answer the question asked, here. Many candidates focused on the negative aspects of drug taking rather than on what a drug is. Candidates were expected to state that a drug is a substance that is injected, swallowed or externally administered in order to modify the chemical reactions or metabolism in the body.
- (b) Most candidates were able to gain some credit. Candidates who focused on the social aspects of excessive drinking such as crime and family breakdown did not gain credit as the question required the candidates to state the harmful physical effects of drinking excessive alcohol.

