COMBINED SCIENCE

Paper 5129/11
Multiple Choice

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

General Comments: Physics Section

Candidates found **Question 10** to be very easy and **Questions 5** and **12** to be very difficult.

A number of questions showed uncertainty and guessing among candidates.

Comments on specific questions

Question 1

The choice for most candidates was the key option **A**. However, a significant number incorrectly chose option **B** or option **D**.

Question 3

How the density of a material is described was generally well known.

Question 5

Candidates have difficulty in choosing the correct unit to use for 'time' in an equation. The ma
candidates incorrectly chose option **C**, with only a very small number choosing the key, option **A**.

Question 6

There was uncertainty shown by candidates with options **C** and **D** being chosen as often as key, option **B**.

Question 7

This question showed evidence of guessing.

Question 10

Almost all candidates chose the key, option **A**.

Question 12

This question on electrical energy showed evidence of widespread guessing.

Question 13

The charge on the nucleus and on the atom as a whole was not well known by the candidates.

General Comments: Chemistry Section

Questions 20 and **25** were found to be easy by the majority of candidates.

Candidates found **Questions 14**, **18**, **21**, **23** to be difficult.

Comments on specific questions

Question 14

Almost half the candidates incorrectly chose option **D**, indicating that they are unaware that the water enters the condenser at the lowest point so that the condenser completely fills with water.

Question 15

The definition of the nucleon number is well known by the better candidates.

Question 17

Many candidates are aware of the general properties of a covalent compounds but a significant proportion of candidates incorrectly chose option **C**, in which the liquid substance conducted electricity.

Question 18

This question proved difficult for most candidates and there was evidence of widespread guesswork.

Question 19

A significant proportion of candidates incorrectly chose option **D**, not realising that zinc oxide, a metallic oxide, is a basic oxide and reacts with acids.

Question 20

An easy question for the majority of the candidates.

Question 21

Almost half the candidates chose option **A**, which is a general property of **all** metals, and not a property indicative of an alkali metal.

Question 22

Candidates should be aware that it is the oxides of the least reactive metals are reduced by carbon.

Question 23

The use of limestone to remove sand in the extraction of iron from its ore is not well known. There was evidence of guesswork.

Question 24

Many candidates were confused by the negative values of the boiling points and incorrectly chose option **A**.

Question 25

The fact that nitrogen is essential for plant growth is well known by the majority of the candidates.

Question 26

Almost half of the candidates incorrectly chose option **C**, which shows the addition polymerisation of ethene to form poly(ethene), although the question asked for the equation which was **not** an addition reaction.

Question 27

Almost half the candidates recognised that bromine adds across the double bond in propene and chose the key, option **C**.

General Comments: Biology Section

Candidates found **Question 38** very easy.

Candidates found **Questions 32, 33** and **35** difficult.

Comments on specific questions

Question 32

Almost half of the candidates chose the key, option **B**. The commonest mistake was to exactly reverse the opening/closing of the valves.

Question 33

There was evidence of candidates guessing in this question.

Question 34

Candidates should be reminded to read the question carefully. A significant number of candidates incorrectly chose option **A**, indicating that **both** oxygen and carbon dioxide are removed by the lungs.

Question 35

Many candidates knew the ciliary muscles contract when the focuses on a near object, but not that the suspensory ligaments are 'loose'. .

Question 36

Many candidates did not realise that drugs are broken down in the liver.

COMBINED SCIENCE

Paper 5129/12
Multiple Choice

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

General Comments: Physics Section

Candidates found **Questions 4**, **8**, **10** and **12** to be very difficult.

Questions 6 and **13** showed uncertainty and guessing among candidates.

Comments on specific questions

Question 1

This question was generally well answered.

Question 2

Most candidates knew that the answer would be calculated by either dividing or multiplying using the values of mass and speed given in the question. The best candidates correctly chose to 'multiply' and thus chose the key, option, **B**. Those who incorrectly chose option **A**, had 'divided' the given values.

Question 3

How the density of a material is described was generally well known.

Question 4

Candidates have difficulty in choosing the correct unit to use for 'time' in an equation. The majority of candidates incorrectly chose option **C**, with only a very small number choosing the key, option **A**.

Question 5

Candidates need to know the different properties of liquid-in-glass thermometers.

Question 6

There was evidence of widespread guessing among candidates as all options had approximately equal number choosing them.

Question 8

A small number of candidates chose the key, option **C**. Most candidates incorrectly chose option **A**.

Question 10

This proved to be a difficult question for many candidates, and showed evidence of guessing.

Question 12

The correct input/output requirements for a transformer were not well known. A majority of candidates incorrectly chose option **B** or **C**.

Question 13

The charge on the nucleus and on the atom as a whole was not well known by the candidates

General Comments: Chemistry Section

Candidates found **Questions 15**, **19**, and **26** to be very difficult.

Questions 14 and **17**, **18** and **24** showed uncertainty and guessing among candidates.

Comments on specific questions

Question 14

The arrangement and movement of particles in the three states of matter is not well understood by the candidates and showed evidence of guesswork.

Question 15

A large number of the candidates thought that the numbers on the symbol represented the numbers of protons and neutrons in an atom of helium and incorrectly chose option **B**.

Question 16

A significant number of candidates thought that a catalyst slows down the rate of a chemical reaction and incorrectly chose option **A**.

Question 17

The general properties of covalent compounds are not well known by the candidates and there was evidence of widespread guesswork.

Question 19

This question on calculating mass proved difficult for even the better candidates.

Question 20

The general properties of acids are not well known by the majority of the candidates. A large proportion of the candidates incorrectly chose option **A** which is a general property of an alkali.

Question 21

The reactivity series of the halogens is quite well known by the most able candidates.

Question 22

A significant number of candidates are unaware of the lack of reactivity of copper with dilute acids.

Question 23

Many candidates were confused by the negative values of the boiling points and incorrectly chose option **A**.

Question 24

The reactions involved in the extraction of iron from iron ore are not well understood by the majority of the candidates. Again there was evidence of guesswork.

Question 25

The fact that nitrogen is essential for plant growth is well known by the majority of the candidates.

Question 26

The reaction of an alkene with steam to produce an alcohol and its oxidation to a carboxylic acid is not well known or understood by the candidates. The responses indicated that the candidates did not associate the prefix propan with a compound containing three carbon atoms.

Question 27

Almost half the candidates recognised that bromine adds across the double bond in propene and chose the key, option **C**.

General Comments: Biology Section

Candidates found **Questions 31, 33** and **35** difficult. **Questions 34** and **35** showed uncertainty and evidence of guessing among candidates.

Comments on specific questions

Question 31

Candidates found the interpretation of this bar chart difficult.

Question 33

There was confusion over the production / removal of urea in the liver / kidneys.

Question 36

Many candidates did not realise that drugs are broken down in the liver.

Question 37

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

COMBINED SCIENCE

Paper 5129/21

Theory

Key Messages

In questions involving calculations candidates should be encouraged to show all their working.
In questions involving ray diagrams the rays should be drawn using a ruler.
In questions which ask the candidate to explain their answer the explanation should be specific to the context of the question asked and not simply general statements of knowledge.

General Comments

The calculations in the Physics part of the paper were quite well done by many of the candidates; however candidates should be encouraged to show the full working for their answer, including the formula used in the calculation. Marks are awarded for the correct equations in these calculations. Questions in the Biology section of the syllabus which involved recall were frequently well answered by many of the candidates; candidates now need to improve their interpretation of experimental results.

Comments on Specific Questions

Section A

Question 1

This question was well answered by many of the candidates. Some candidates gave the conversion of fibrinogen to fibrin during clotting the wrong way round.

Question 2

(a) A large number of the candidates were aware that if ink is used to draw the base line then this interferes with the chromatogram due to the fact that colours of the dyes in ink separate.

(b) The vast majority of the candidates were able to identify yellow and blue as the colours present in dye **W**.

(c) Many candidates correctly identified X as the pure substance; fewer were able to offer the correct explanation.

Question 3

(a) (i) The better candidates found this question easy.

(ii) The question asks for a relationship between two quantities; to gain credit, candidates needed to refer to both quantities and how one quantity changes given a specified change in the other quantity.

(b) (i) Many candidates identified position B as the point at which the pendulum has the most kinetic energy.

(ii) A significant number of the candidates were unable to identify that at position A the pendulum has potential energy.

Answer: **(a)(i)** 1.79s

Question 4

(a) The majority of the candidates were able to demonstrate that they could correctly interpret thi of graph.

(b) (i) Again, the vast majority of the candidates were able to demonstrate that they could extract and interpret information from this table.

(ii) Most candidates were aware of the ways in which a person may reduce their body mass.

(c) (i) Candidates need to be aware that fibre is food that cannot be digested.

(ii) The importance of including fibre in the diet in order to prevent constipation is well known; fewer candidates were able to explain that fibre prevents constipation because it makes peristalsis more efficient due to the fact that the muscles of the alimentary canal are able to grip the fibre left in the intestines as the food passes through the body.

Question 5

(a) Many candidates correctly stated the proton number of the atom of carbon; fewer candidates were able to state the nucleon number.

(b) The majority of the candidates were able to complete the electronic structure of the carbon atom.

(c) The type of bonding present in methane was well known but only the better candidates were able to clearly explain that the bonds are formed by sharing pairs of electrons so that each atom has an inert gas structure/ full outer shell.

Question 6

(a) The better candidates were able to recognise that both switches **A** and **C** need to be closed in order to light only lamp **Y**.

(b) (i) Many candidates correctly subtracted the lamp current from the cell current; a number of the weaker candidates added the two currents together.

(ii) The equation V=IR was quite well known by the majority of the candidates but some of those who knew the equation had difficulty in rearranging it. Candidates should be encouraged to show their working in these calculations in addition to writing down an answer. The unit of resistance was well known.

Answer: **(b)(i)** 0.3
(b)(ii) 7.5Ω

Question 7

A number of candidates failed to gain full credit as they thought that only three lines were required. Most candidates were able to score on this question although it is a common misconception that urea is formed in the kidney and excreted by the liver.

Question 8

(a) The ion responsible for acidity is better known than the ion responsible for alkalinity.

(b) (i) The majority of the candidates correctly identified the pH of a neutral solution as 7.

(ii) The colour of Universal Indicator in a neutral solution was less well known by the candidates.

(iii) Many candidates were able to balance the equation.

(iv) The ionic equation for the neutralisation of an acid by an alkali was known only by the best candidates. The responses indicate that candidates do not understand the distinction between a symbol equation and an ionic equation.

Question 9

(a) (i) Candidates should be aware that ray of light on a ray diagram should be drawn with a ruler. Of those candidates who drew the reflected ray, many did not draw the ray so that the angle of reflection was equal to the angle of incidence.

(ii) A significant proportion of the candidates successfully calculated the angle of reflection. The most common incorrect answer was 42^{o}.

(iii) Many of the candidates were able to draw the refracted ray correctly.

Answer: **(a)(ii)** 48^{o}

Question 10

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

(ii) Many of the candidates' responses were spoilt by the fact that they referred to the excretory function of the urethra; the question asks for the **reproductive** functions. The function of the prostate gland and the testis were well known by many of the candidates.

(iii) A large number of the candidates stated what the scrotum is rather than explaining its importance in the production of healthy sperm. Candidates should know that sperm develop most effectively below body temperature and that the scrotum holds the testis outside the body in order to keep the sperm cool.

(b) The vast majority of the candidates correctly drew a cross on a sperm duct.

Question 11

(a) (i) The process of cracking is not well known by many of the candidates.

(ii) The majority of the candidates were unable to identify reagent **B** or compound **C**. Solid **D**, poly(ethene), was more often identified than either of the other substances.

(b) (i) Many candidates knew that unsaturated compounds contain a carbon to carbon double bond.

(ii) The effect of ethene on bromine water is not well known by the candidates.

Question 12

(a) A large number of candidates were able to draw a curve with the correct shape but many did not gain full credit as, in addition to the correct shape, the curve needed to have positive and negative elements with equal magnitude.

(b) Candidates need to be aware of all of the factors affecting the size of the maximum voltage output of the generator. The number of turns on the coil was the most frequently-given correct answer but the rate of rotation of the coil and strength of the magnetic field were only occasionally seen.

(c) The calculation was well done by many of the candidates. Some candidates were failed to gain the credit for converting the time into seconds.

Answer: **(c)** 60 000J

Question 13

(a) Many of the candidates knew that water is taken into the plant by osmosis but a significant number needed to state that this occurs through the root hair cells.

(b) (i) Many candidates recognised that the plant had wilted. Credit was not given to those candidates who stated that the plant had died.

(ii) A large proportion of the candidates described the loss of water from the plant but needed to **explain** how this happened in addition. Candidates were expected to state that the plant lost water though transpiration and that more water is lost than is taken up by the root hair cell, causing a loss in turgidity.

Question 14

(a) The definition of relative molecular mass is not well known by the candidates and candidates who did not use precise language did not gain full credit. Candidates were expected to state that the relative molecular mass is the mass of one **molecule** of a substance relative to the mass of one **atom** of carbon-12.

(b) The calculation was well done by the better candidates. The calculation of the relative molecular mass of sodium carbonate proved to be most challenging part of the calculation.

Answer: **(b)** 106 44
10.6 4.4
2.65

Question 15

(a) The majority of the candidates were able to calculate the volume of the stone.

(b) The calculation of the density of the stone was well done by many of the candidates even those who had not calculated the volume of the stone correctly.

Answer: **(a)** 14 cm^3
(**b)** 42 g/cm^3

Question 16

(a) (i) The majority of the candidates recognised that wood is an insulator/poor conductor.

(ii) A large proportion of the candidates answered this question in terms of reflection indicating t they thought the heat was coming from outside the metal can. A shiny white metal can loses hea from the inside of the can because a shiny white surface is a poor emitter.

(b) The idea that hot air is less dense than cold air is well known by many candidates.

(c) A significant number of the candidates misinterpreted the question and answered in terms of the different uses of the thermometers rather than the physical differences between the thermometers. Candidates should also be aware that thermometers of both types can be made using mercury or alcohol as the liquid inside them and this is not regarded as a difference between them.

Question 17

(a) Many candidates recognised that **B** is a liquid at room temperature.

(b) The better candidates identified **E** as the element in Group 3 of the periodic table because it has three electrons in the outer shell.

(c) This question proved more difficult for many of the candidates. The better candidates identified **D** as the solid non-metal at room temperature but many had difficulty explaining their answer. Candidates were expected to state that the element has a melting point above room temperature and that it is in Group 6 of the Periodic Table.

Question 18

(a) Many candidates stated that the charge on the nucleus of an atom is positive.

(b) The responses to this question were disappointing in that the candidates seemed unaware that the charge on an electron is opposite to the charge on the nucleus and that opposite charges attract one another.

(c) The speed of gamma rays in a vacuum was well known by the better candidates.

Question 19

(a) The names of the leads in a mains plug are well known by the majority of the candidates.

(b) There was a degree of confusion amongst many of the candidates about the term *fuse rating*. Candidates were expected to state that a fuse rating is the maximum amount of current that a fuse can carry before the fuse melts and breaks the circuit.

COMBINED SCIENCE

Paper 5129/22

Theory

Key Messages

In questions involving calculations candidates should be encouraged to show all their working.
In questions involving ray diagrams the rays should be drawn using a ruler.
In questions which ask the candidate to explain their answer the explanation should be specific to the context of the question asked and not simply general statements of knowledge.

General Comments

The calculations in the Physics part of the paper were quite well done by many of the candidates; however candidates should be encouraged to show the full working for their answer including the formula used in the calculation. Marks are awarded for the correct equations in these calculations. Questions in the Biology section of the syllabus which involved recall were frequently well answered by many of the candidates; candidates now need to improve their interpretation of experimental results. Candidates need concept reinforcement specifically in the following areas: the distinctions between chemical and physical properties, the explanation of oxidation, and dot and cross diagrams of covalent molecules.

Comments on Specific Questions

Question 1

Many candidates were aware that hormones are transported round the body the blood; other information relating to hormones was less well known.

Question 2

(a) The calculation was well done by many of the candidates but the unit for work done, J or Joules, was less well known.

(b) Many candidates knew that the magnitude of the induced e.m.f. is affected by the number of turns in the coil and the strength of the magnetic field. Some candidates were less specific in their responses, for example, they simply referred to the weight or the speed alone rather than the mass of the weight or the speed of rotation of the coil and were not awarded the marks.

Answer: **(a)** 6J

Question 3

(a) Many candidates thought that the force of gravity followed the path of the ball rather than vertically downwards; candidates need to be aware that the force of gravity acts in a vertical direction.

(b) Candidates were expected to indicate that the ball had maximum potential energy at the beginning of the path of the ball above the top of the building. The point at which the ball has maximum kinetic energy is when it hits the ground and the letter K should have been placed at this point.

(c) Many candidates gave a description of acceleration as an increase in speed or velocity but this is not sufficient to define what is meant by acceleration. Candidates were expected to state that acceleration is the rate of change of velocity.

Question 4

(a) The better candidates knew that magnesium loses two electrons from the outer shell when the magnesium ion.

(b) Most candidates were able to score some marks for the calculation although some had difficulty calculating the relative molecular mass of magnesium oxide. Candidates should know that a number in front of a formula in an equation means that the mass should be calculated by this number. A number of candidates gave the answer for magnesium oxide in the calculation as 64, which is (2 x 24) + 16 rather than 80 which is (2 x (24 + 16)).

(c) The nature of the bonding in magnesium oxide was well known by many of the candidates.

Answer: **(b)** 80 12
8.0 1.2
2.0

Question 5

(a) The idea that the concrete slabs expand during hot weather causing the gaps to come become smaller was understood by many of the candidates. A significant number of candidates thought that the size of the gap is directly affected by the temperature and made no reference to the concrete slabs.

(b) Those candidates who recognised that the slabs expand when they are heated realised that if the slabs are laid without gaps then the slabs buckle or crack.

Question 6

(a) The parts of an animal cell were well known by a large number of candidates.

(b) The function of the cell membrane was not well known. Candidates were expected to state that the cell membrane controls the movement of substances into or out of the cell. There exists a misconception amongst the candidates that the cell membrane protects the cell.

(c) Many candidates know that a red blood cell does not contain a nucleus and has a biconcave shape but many were unable to explain how the difference allows the red blood cell to carry out its function. Candidates were expected to explain that the biconcave shape increases the surface area of the cell and this allows more efficient uptake of oxygen into the cell and the lack of as nucleus means that he cell contains more haemoglobin and therefore more oxygen.

Question 7

(a) A significant number of candidates were able to identify correctly the two types of emission. More candidates were familiar with the most penetrating type of emission (gamma) than were familiar with the structure of the alpha particle.

(b) There was some confusion amongst the candidates about the word nucleus. Candidates need to be clear on the difference between the nucleus of an atom and the nucleus in a cell.

(c) Many candidates answered this question in terms of general laboratory safety rather than the specific safety precautions associated with handling radioactive materials. The most common correct response was to wear gloves when handling the source and less common was to store the radioactive source in a safe container. Many of the candidates' answers involved safety measures that were inappropriate for a school laboratory, such as wearing lead lined suits.

Question 8

(a) A large proportion of the candidates knew that magnetic materials are attracted towards a magnet, however a number of the candidates thought that magnetic materials are attracted towards a non-magnet. Those candidates who thought that non-magnetic materials are repelled from a magnet were also awarded the mark.

(b) (i) The temporary magnetic nature of iron compared with the permanent magnetic nature of steel was not appreciated by a large proportion of the candidates. Quite a number of candidates answered the question by stating that iron is a better conductor of electricity.

(ii) Many candidates did not appreciate that reversing the connections in the cell did not affect the operation of the lock.

(iii) The better candidates were able to state that the strength of the electromagnet is increased by increasing the number of turns on the coil or increasing the current or voltage. Candidates who referred to increasing the number of batteries/cells in the circuit were awarded the mark.

(c) A large proportion of the candidates were able to find the load from the graph. A number of candidates used the wrong axes and obtained the answer 3.2.

Answer: **(c)** 0.8N

Question 9

(a) Many candidates were able to correctly identify the substances. Candidates should be aware that the name of the acid is sulfuric acid not sulfate acid. Substance B (water) was the most commonly correct answer.

(b) Candidates were expected to describe how the copper(II) sulfate crystals are obtained from the copper(II) sulfate solution. No credit was given to those candidates who simply stated that the crystals are obtained by crystallisation. Full marks were obtained for stating that the solution is heated / evaporated to a smaller volume and then allowed to cool/crystallise.

(c) The difference between physical and chemical properties is not well understood by many of the candidates. The general physical properties of metals include high melting and boiling points, malleable, ductile, conduct heat and electricity etc.

Question 10

(a) Candidates need to develop a better understanding of the concept of a fair test. Candidates were given credit for stating that a single seed may be defective or might not work.

(b) (i) The majority of the candidates recognised that in order for germination to occur in tube B, water has to be added.

(ii) Many candidates recognised the significance of the oxygen absorber but only the best candidates were able to explain that the seeds were unable to respire if oxygen is not present in the tube. Many candidates simply stated the general conditions for the germination of seeds rather than offer an explanation.

(iii) As in **(b)(ii)** most candidates recognised that the temperature in tube D was too low. Answers that gained credit went on to explain that the reactions involved in germination are too slow at low temperature or that enzymes do not work efficiently at low temperature.

Question 11

(a) (i) The equation V=IR was quite well known by many of the candidates; many of these ca demonstrated a need to be more familiar with rearranging equations.

(ii) The better candidates correctly subtracted the two numbers. A significant number of candidates added the two voltages together.

(b) The candidates' responses suggested that there was a significant amount of guesswork particularly amongst the weaker candidates.

Answer: **(a)(i)** 0.5A
(**a)(ii)** 4V

Question 12

(a) This question proved easy for the better candidates. Many candidates knew that hydrogen was produced in the reaction but were unable to write the correct formula.

(b) Only the very best candidates were able to correctly state that zinc is oxidised because it gains oxygen and water is reduced because it loses oxygen during the reaction. A significant proportion of the candidates simply restated the question or described what they saw in the diagram.

(c) (i) The fact that rusting is caused by oxygen and water is not well known by many of the candidates, although many were able to name one of these substances.

(ii) Candidates generally need to be more familiar with the process of galvanising.

Question 13

(a) Most candidates needed to be more specific in their responses. Candidates should know that nitrogen containing ions are soluble in water and diffuse into the plant through the root hair cells. A number of candidates thought that the process involved is osmosis and frequently gave detailed descriptions/definitions of this process.

(b) (i) Many candidates were able to read the bar chart for field 1, although some had difficulty interpreting the scale on the y-axis.

(ii) Many candidates realised that the value for field 2 should be subtracted from the value for field 3 but those candidates who had difficulty reading the scale on the y-axis only gained credit for a correct subtraction of the misread values.

(iii) Many candidates simply restated the question and said that a nitrogen containing fertiliser increases the yield of maize. Candidates were expected to explain how the fertiliser increases the yield of maize. The required explanation was that nitrogen ions are essential to plant growth because they are needed for the synthesis of amino acids and proteins in the plant.

(iv) This question proved difficult for many candidates. The idea that the addition of more and more fertiliser brings increasingly less growth to the maize plants was not appreciated by the candidates.

(c) Many candidates realised that photosynthesis produces oxygen and food for other forms of life. A number of answers were spoiled by the candidates referring to the plant producing food for itself by photosynthesis.

Answers: **(b)(i)** 2200 kg/hectare
(b)(ii) 2300 kg/hectare
(b)(iv) 9100-9200 kg/hectare

Question 14

(a) Candidates need to be more familiar with the general formula for the alkenes.

(b) (i) Candidates should know that the reaction between ethene and hydrogen is an addition reacti The reaction can also be described as a reduction or a hydrogenation reaction.

(ii) A large proportion of the candidates understand that the structural difference between ethene and ethane is that ethene contains a carbon to carbon double bond.

(c) The structure of poly(ethene) is not known by the majority of the candidates. A significant number of candidates misread the question and drew the structure of ethene.

Question 15

(a) Candidates needed to be more précises in their responses. Coronary heart disease is caused by the blockage of the coronary arteries.

(b) The causes of coronary heart disease are well known by the majority of the candidates.

Question 16

A few candidates were able to read the micrometer scale successfully. A smaller number were familiar with the vernier scale.

Answers: **(a)** 1.8 mm
(b) 9.1 6 mm

Question 17

Most candidates were able to score at least one mark on this question. The last box in the table proved to be the most difficult where the candidates did not realise that the bar remained horizontal.

Question 18

(a) Candidates need to be familiar with dot-cross diagrams showing covalent bonding. The candidates were expected to draw a shared pair of electrons between the phosphorus and each of the three hydrogen atoms and a lone pair on the phosphorus atom.

(b) A significant number of the candidates recognised that the bonding in phosphine is covalent and linked the low melting point to covalent compounds. The fact that covalent compounds are formed when two non-metals combine together is not well known by the candidates. Many candidates misunderstood the question and wrote the names of the elements, phosphorus and hydrogen.

Question 19

(a) A large number of the candidates did not draw the normal. The normal should be drawn at 90^{o} to the mirror at the point where the ray is incident on the mirror.

(b) Many candidates drew a reflected ray but many needed to draw the ray with greater accuracy so that the angle of reflection equalled the angle of incidence.

(c) Many candidates did not realise that the image of the pin should be placed behind the mirror at an equal distance from the mirror as the pin and directly opposite the pin. This mark would have been gained by more candidates if they had drawn the reflected ray more carefully at the correct angle.

Question 20

(a) A large number of candidates though that carbon monoxide is produced by the **c** combustion of a hydrocarbon fuel. Candidates need to be aware that carbon monox produced by the **incomplete** combustion of a hydrocarbon.

(b) Candidates need to be familiar with the use of oxygen and acetylene in welding.

(c) A large number of candidates thought that oxygen is the most common gas present in the air, rather than nitrogen.

(d) Candidates need to be aware that sulfur dioxide has an acidic nature.