# SCIENCE

**Papers 5124/01, 5125/01 and 5126/01**

**Multiple Choice**

***Paper 5124/01 Physics/Chemistry***

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

***Paper 5125/01 Physics/Biology***

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

***Paper 5126/01 Chemistry/Biology***

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

Comments on Physics, Chemistry and Biology questions within the three formats are provided separately below.

***Physics, Papers 5124/01 and 5125/01 Questions 1 – 20***

**General comments**

A number of well prepared candidates produced a mean score of 23.3 with a standard deviation of 8.9. Most of the questions discriminated well and produced facilities within expected parameters. No question proved to be very difficult, with only **Questions 4**, **15** and **20** being classified as being very easy.

**Comments on specific questions**

**Question 1**

Candidates were split almost exclusively between options **B** and **D**, with slightly more choosing the correct option, **B**.

**Question 2**

Again, two options, **B** and **C**, attracted most of the candidates, with the less able choosing option **B** and the more able correctly choosing option **C**.

**Questions 3 and 6**

Both questions provided excellent discrimination. The less able candidates were almost equally split between options **A** and **C** in **Question 3**. In **Question 6**, it was between options **C** and **D**, with more candidates opting for **C**.

**Questions 5, 7 and 17**

These questions expected candidates to remember and use equations. In all three, the majority were able to do this successfully, with the remainder choosing that option illustrating the most common mathematical error.

**Question 8**

This question discriminated well, with the less able candidates choosing either option **A** or **C**, the latter proving more popular.

**Question 9**

The mechanism of convection was not well known, with almost one third of candidates choosing the diffusion option, **C**, with a similar number choosing, correctly, option **A**. The remaining third were equally divided between options **B** and **D**.

**Question 10**

Amplitude and wavelength were well known.

**Question 11**

This was another question which discriminated well, with the less able candidates almost equally spread across each of the incorrect options **A**, **B** and **C**.

**Question 12**

The majority of candidates correctly chose option **A**. Of the remainder, most chose option **C**, suggesting that they may not have read the question carefully enough.

**Question 13**

Only 50% of candidates knew the correct answer, option **C**. The less able candidates chose either option **B** or **D**.

**Question 14**

Almost twice as many candidates chose option **B**, as chose the correct option, **C**. They were either immediately attracted to the S-pole and failed to read the remainder of the option carefully enough, or copper is still believed to be magnetic!

**Question 16, 18 and 19**

These questions were successfully answered by 70% or more of candidates.

***Chemistry, Papers 5124/01 Questions 21 – 40 and 5126/01 Questions 1 – 20***

**<u>Comments on specific questions</u>**

**Question 21**

This proved to be an easy question for the better candidates. A number of candidates chose option **A**, which had substance 1 as a gas, whereas the information given stated that substance 1 was brittle.

**Question 22**

The better candidates chose option **B**, which showed the vapour entering the condenser at a temperature of 100ºC. A significant number of candidates thought that the temperature of the liquid in the flask was at 100ºC and chose option **A**.

**Question 23**

This question proved difficult for many candidates. A large number of candidates chose option **A**, which gave the number of atomic particles for a calcium atom and not a calcium ion. Only the best candidates recognised that, in option **D**, the number of electrons was higher than the number of protons, which is necessary for the atomic structure to represent a positive ion.

**Question 24**

The better candidates chose option **C**, which was a compound formed from a metal and a non-metal. A significant number of candidates thought that carbon and oxygen formed an ionic compound.

**Question 25**

There was evidence of widespread guesswork in this question, particularly amongst the weaker candidates. Candidates should be aware that the $M_r$ of a substance is the product of the $A_r$ and the number of atoms present in the molecule.

**Question 26**

This question was well done by the better candidates but again, there was evidence of guesswork amongst the weaker candidates. Candidates should be able to calculate the masses of substances produced in a chemical reaction using the $M_r$ of the substances involved.

**Question 27**

This question proved difficult for many candidates. Candidates should know that the rate of a chemical reaction slows down as the reaction proceeds because the concentration of the reactants decreases, therefore all reactions are quickest at the beginning, when the concentration of the reactants is highest.

**Question 28**

The better candidates knew that an amphoteric oxide reacts with both an acid and an alkali, hydrochloric acid and sodium hydroxide. A number of the candidates, however, chose option **A** or option **D**, where the oxide reacted with only the hydrochloric acid or the sodium hydroxide.

**Question 29**

Almost half of the candidates deduced that substance **X** was copper(II) carbonate. Those candidates, who chose option **B**, copper(II) sulphate, recognised that a blue precipitate was produced when sodium hydroxide was added to a copper compound in aqueous solution, but did not appreciate that carbonates produce carbon dioxide when treated with dilute hydrochloric acid.

**Question 30**

This question was well done by the majority of candidates, although there was evidence of guesswork amongst the weaker candidates.

**Question 31**

The majority of candidates recognised that caesium is more reactive than lithium, but the most popular option for the weaker candidates was **A**, which stated that caesium lost an electron when it forms an ion.

**Question 32**

There was evidence of guesswork even amongst the better candidates. A significant number of candidates thought that limestone was the reducing agent in the production of iron and chose option **D**.

**Question 33**

This was an easy question for many of the candidates, but option **D** was a popular option for a number of candidates.

**Question 34**

This was another easy question. A number of candidates thought that the rusting of iron caused the carbon dioxide content of the atmosphere to increase and chose option **D**.

**Question 35**

This question was well done by the majority of the candidates but again, there was evidence of some guesswork.

**Question 36**

This question was well done by the many of the candidates. The significant number of candidates chose option **B**, which contained all three elements but not equal numbers of atoms.

**Question 37**

This question was poorly answered. A large number of candidates chose option **C** or option **D**. Graphite is a macromolecule, but it is not a carbon compound, as it contains only carbon atoms and it is therefore an element.

**Question 38**

The majority of candidates were able to add up the number of atoms in each structure.

**Question 39**

There was evidence of guesswork, particularly amongst the weaker candidates. Many candidates did not recognise the reaction as an addition reaction with an alkene; consequently the reaction of propane with steam to produce propan-1-ol was a popular distractor.

**Question 40**

There was evidence of guesswork, particularly amongst the weaker candidates, in this question. The structure of nylon, option **D**, was chosen by a significant number of candidates.

***Biology, Papers 5125/01 and 5126/01 Questions 21 – 40***

**Comments on specific questions**

**Question 21**

This was a straightforward question on cell structure, although it proved slightly more difficult than similar questions in past papers where a diagram has been given.

**Question 22**

This question was on a similar theme, but in a particular context. Some of the better candidates were confused.

**Question 23**

This question worked well. The better candidates realised that increasing the sucrose concentrations would cause the potato pieces to lose more water and more mass.

**Question 24**

This question, which required the interpretation of simple information in a table, discriminated well between candidates.

**Question 25**

Many candidates, even the better ones, chose **D**, showing that they did not really understand the meaning of the term *transpiration*.

**Question 26**

Weaker candidates were inclined to think that cold conditions would increase the dietary requirement for protein, rather than energy.

**Question 27**

This question discriminated well between candidates.

**Question 28**

Many candidates chose **A**, indicating a misunderstanding (or a misreading) of 'high humidity'.

**Question 29**

As with **Question 24**, it was pleasing to see that most candidates could interpret the information given to them accurately.

**Question 30**

This question required candidates to deal with an unfamiliar context, and it caused much confusion. To arrive at the correct answer, candidates only had to realise that all parts of a germinating seed will be undergoing active respiration.

**Question 31**

Over one third of candidates chose option **D** on this question, evidently believing that light rays cross over within the eye for normal focusing.

**Question 32**

This question was easy, but discriminated satisfactorily. Some candidates thought that alcohol speeds up reactions, but it only seems that way.

**Question 33**

There was some evidence of guessing here, but the better candidates were able to interpret the diagram accurately.

**Question 34**

Again, most candidates were able to make sensible use of the table of information.

**Question 35**

This question proved to be very easy.

**Question 36**

This question worked well, but a common error was to think that asexual reproduction is a way of developing new varieties of plants.

**Question 37**

This straightforward question exposed a gap in many candidates' knowledge, on fruit and seed structure.

**Question 38**

Better candidates could interpret the information here, on the menstrual cycle, but the weaker candidates were guessing.

**Question 39**

Again, the weaker candidates were guessing here, indicating a poor understanding of such terms as *fertilisation* and *implantation*.

**Question 40**

A surprisingly small number of candidates were able to recognise the definition of a chromosome.

**Papers 5124/02 and 5125/02**
**Theory (Physics)**

## General comments

There was the usual wide range of ability shown by the candidates, with some not being prepared to answer basic factual questions involving definitions. Generally candidates scored better in Section **A**, and worse on questions requiring understanding as well as recall. The standard of presentation of the answers was usually satisfactory, and few candidates showed problems with the use of English. There were some indications that parts of the syllabus had not been covered by certain candidates: this will almost certainly hamper them, as the examination aims to test the full range of the syllabus.

## Comments on specific questions

***Section A***

**Question 1**

This question was very well done. The occasional mathematical slip in subtracting 40 from 65 still gave candidates 3 marks out of 4.

*Answer*: 5 g/cm$^3$.

**Question 2**

**(a)** This part was generally well tackled. The formula ½mv$^2$ was usually known, but some candidates could not carry out the subsequent numerical work.

**(b)** Only about 50% of candidates realised that the principle of conservation of energy is used here. The formula mgh is of no value in this question.

**(c)** This part was well done by a majority of candidates, though units were sometimes incorrect.

*Answers*: **(a)** 7.2 J; **(b)** 7.2 J; **(c)** 3, (or –3), m/s$^2$.

**Question 3**

Only part **(c)** caused problems. The correct response is increase, not decrease.

**Question 4**

**(a)** A significant number of candidates did not use the distance 2x 180 m (or a time 0.25/2 s), thus arriving at the incorrect value 720 m/s. Some tried to use the inappropriate formula $v = f\lambda$.

**(b)** There were several incomplete answers to this question. Two points were needed:

1. A medium is needed for the transmission of sound waves.
2. Between the Earth and the Moon is a region where there is no medium.

*Answer*: **(a)** 1440 m/s.

**Question 5**

**(a)(b)** This was well tackled. Weaker candidates struggled with the arithmetical problem of re-arranging the formula V = IR.

**(c)** Only a few candidates realised that in any series circuit the current is the same in all components. Therefore no new calculation was needed to answer this question.

**(d)** The formula, Q = It, was generally known, and the units were usually correct.

*Answers*: **(a)** 8 Ω; **(b)** 0.5 A; **(c)** 0.5 A; **(d)** 5 C.

**Question 6**

**(a)** A disappointing number of candidates could not recall the formula P = VI.

**(b)** This part was usually well answered, with the most frequent error being to give the current as zero in the neutral wire.

*Answers*: **(a)** 1920 W; **(b)(i)** 8.0A, **(ii)** 8.0 A, **(iii)** 0 A.

**Question 7**

This was not a particularly easy question, and the standard of answers was pleasing.

*Answers*: **(a)** 36; **(b)** 6; **(c)** 18.

**Question 8**

**(a)** Almost all candidates used the turns-ratio formula correctly.

**(b)** There were many incorrect answers to this question, even where candidates started with the correct formula $V_1I_1 = V_2I_2$. Arithmetical problems once again.

**(c)** Few candidates recognised the need for a low resistance in order to reduce energy loss due to heating effects of the current in the secondary.

*Answers*: **(a)** 300; **(b)** 0.15 A.

**Question 9**

**(a)** Most candidates knew the definition of half-life.

**(b)(i)** The majority of candidates correctly selected the Tl sample, the lowest half-life producing the highest initial activity.

**(ii)** The first step in answering this question was to calculate that three half-lives had elapsed, but there was confusion among several candidates who had made this first step. Some reduced the proton and mass numbers by factors of 3 or 8, whilst others could not produce the correct answer to ½ x ½ x ½.

*Answer*: **(b)(ii)** 1/8.

***Section B***

**Question 10**

**(a)** Not all candidates gave a clear description of the method of suspending the spring or of placing a ruler correctly in order to be able to measure the extension. The idea of limit of proportionality is well understood.

**(b)** Many candidates failed to see that the extension-load graph is a fixed property of a spring. Where or how the spring is stretched does not affect this property.

**Question 11**

**(a)** This part was quite well answered. Common errors were angles being measured relative to the boundary rather than to the normal, and incorrect changes of direction as the ray went from one medium to another.

**(b)** This part was well answered.

**Question 12**

**(a)** Generally the question was well answered, though some candidates used non-electrical methods. Several answers did not make clear whether a.c or d.c. was being used, and there are still those who describe the current flowing through the bar instead of through the coil.

**(b)** The crucial factor in answering this question is the decision about the type of magnet needed – temporary or permanent.

## Papers 5124/03 and 5126/03
## Theory (Chemistry)

**Comments on specific questions**

***Section A***

**Question 1**

*Identifying elements, compounds and mixtures by their atomic/molecular structures*

The diagram that best represented a particular substance was required. Those candidates giving two possibilities for any one substance failed to earn the mark available. Many candidates identified correctly the structure of water. Some, but not many, candidates failed to identify the diagram with the widest separation of particles to be a gas, and that gas to be the only diagram that could possibly have been hydrogen at room temperature and pressure.

**Question 2**

*Organic compounds – production and identification in the laboratory*

**(a)** Some candidates failed to give a named example of a saturated hydrocarbon: they did not earn a mark for the response 'alkane'. Besides the fairly standard decolourisation of aqueous bromine, several candidates used other and somewhat more uncommon tests to distinguish between saturated and unsaturated organic compounds, such as the changes to bromine gas, bromine liquid and alkaline and acidified manganate(VII).

**(b)** There are many ways to distinguish between alcohols and esters. Adding sodium to liberate hydrogen is not one. Adding a metal, without specifying its nature, was not accepted as a distinguishing test. A simple indicator test, with the indicator specified, was accepted for full marks.

**Question 3**

*Isotopes and their atomic structure*

**(a)** Markers looked to see whether candidates realised that isotopes are atoms of the same element with the same numbers of protons but different numbers of neutrons, or the same atomic/proton numbers but different mass/nucleon numbers. 'Elements with the same number of protons and different numbers of neutrons' was accepted, at this level, as being sufficient for full marks.

Completing a table that required an understanding of the structure of nuclei was extremely well done.

**(b)** Some candidates did not know how the number of protons in the nucleus of a neutral atom can be used to determine the number of electrons in orbit about that nucleus.

The difficult concept of relative atomic mass not always being a whole number, the basis of this question, was mastered by only the very best candidates. Answering this question well indicated these top quality candidates. Markers were looking for some indication of 'an average taken' or 'a mixture of isotopes'. 'Because of isotopes' failed to earn the mark.

**Question 4**

*The oxides of Period 3 of the Periodic Table.*

**(a)** When a question specifies name, e.g. 'name a basic oxide', then a formula is not accepted. When a question asks 'suggest the identity of the compounds', formulae are accepted for these compounds, but the formulae must be completely correct.

Several explanations were accepted for Group 0 elements not forming oxides. 'Full outer shell of electrons, duplet or octet in the outer shell, noble gas, unreactive gas, no valency electrons and inert gas' were all considered sufficient, at this level, for a candidate to earn full marks.

**(b)** Chlorine(I) oxide is not a solid at 19 $^0$C and knowing its boiling point will tell whether it is a gas or a liquid at this temperature.

**(c)** Very many candidates gained full marks for writing correctly the electronic structure of $Cl_2O$. There is a way of drawing a structure between two chlorine atoms and an oxygen atom with the two chlorine atoms sharing together a pair of electrons and one of these providing a dative covalent bond, of two electrons, to the oxygen atom. This was the structure, though not the correct one for chlorine(I) oxide, determined by a small number of candidates. The marks available were for devising a possible structure and so for this rather weird but structurally acceptable response they gained full marks.

Many candidates incorrectly believed that the low melting point of some covalently bonded molecules results from the bonds between, in this case oxygen and chlorine atoms, being weak. Many candidates correctly related the low boiling point to weak intermolecular forces or even to weak van der Waals forces.

**Question 5**

*Catalytic decomposition of hydrogen peroxide*

**(a)** Candidates found this section of the paper relatively easy. Most knew a correct definition of catalyst and could give a suitable test for oxygen.

**(b)** Many candidates believed that the loss in mass was the result of reactants being used up, rather than oxygen gas being liberated.

Graphs were plotted well and curves of 'best fit' added. The rate of reaction at 300 seconds was zero. If a candidate wrote 'reaction had stopped', this earned full marks.

**(c)** Few candidates realised that to find the weight of copper(II) oxide accurately, the weight of a filter paper, if used in the separation, first must be found. Most realised that the copper(II) oxide should be dried before weighing.

The mass of the copper(II) oxide left after this catalytic decomposition is exactly 1.0g.

***Section B***

**Question 6**

*Relative atomic mass, calculations and relative reactivity.*

**(a)** This difficult definition, especially when carbon-12 is used as a standard, was well recalled. Hydrogen, as a standard, was also accepted.

**(b)** Several methods were used to solve this problem. When working is shown, and a wrong answer results, markers can look through the working to find where marks can be awarded. If no working is shown and a wrong answer results, the mark awarded must be zero. So, candidates should always show their working.

**(c)** If this chemical reaction takes place, as it does, carbon must be more chemically reactive than tungsten in reactions with oxygen.

**Question 7**

*An identification involving ammonia*

**(a)** Surprisingly few candidates could give more than one use for ammonia.

**(b)** Many candidates gained full marks for this section. 'Ammonia sulphate' was unacceptable. Incorrectly identifying A as hydrochloric acid resulted in no marks being given for B as 'barium chloride' (soluble in water and so not a white precipitate) but marks being given for C as 'ammonium chloride', (a white salt).

**(c)** Correctly balanced chemical equations with state symbols were often given

**Question 8**

*Halogens, their similarity and trends in properties*

**(a)** Chlorine, bromine and iodine have many similar physical and chemical properties. 'Relatively low melting and boiling points' were accepted for these three halogens. 'A valency of one' was also accepted, as was 'seven electrons in outermost shells'.

(**b)** The trends in physical properties were not so well known. Several candidates just gave additional common properties, ignoring the request for trends. These answers gained zero marks. 'A darkening in colour from chlorine through to iodine' was sufficient to earn a single trend mark. 'Becomes heavier' did not earn a mark.

That, for this Group, elements will replace those below them from their compounds was often stated. Correctly balanced equations were commonplace.

**Papers 5125/04 and 5126/04**

**Theory (Biology)**

**General comments**

Some candidates were able to show good overall knowledge and understanding of the key points involved in the questions, although a large number showed many areas of weakness. In ***Section A***, the responses to be given by candidates were structured by the nature of the questions. For most candidates, this resulted in a far better performance in ***Section A*** than in ***Section B***, where candidates were allowed more freedom to frame their answers. Experimental design and the drawing of relevant diagrams were particularly weak areas. The standard of written English was generally good, although the ability of candidates to understand what was expected in the questions did vary. The inclusion of irrelevant detail, often at great length, was common in ***Section B***. All candidates had adequate time to complete the paper, and most attempted all of the questions. A few of the weaker candidates did not answer two of the questions from ***Section B***.

**Comments on specific questions**

***Section A***

**Question 1**

**(a)** This part was answered well by more able candidates, although many others made several errors. A significant number of candidates placed all ticks in a reverse of the correct positions.

**(b)** Many candidates quoted examples that were not included in Fig. 1.1, and so did not gain this mark.

**Question 2**

**(a)** Few errors were seen in this part. Some of the weaker candidates lost one or two marks, often by reversing A and E.

**(b)** Nearly all candidates gave two correct observations. Common errors amongst the weaker candidates were cell membrane and references to shape.

**Question 3**

**(a)(i)** Almost all candidates chose the correct box.

**(ii)** Few candidates scored well in this part, where many answers vaguely referred to blocked arteries but did not specify which, or what effect the blockage has on heart muscle.

**(b)** Most candidates gave sensible suggestions related to reduction of smoking, increased exercise or reduced fat intake.

**(c)** This part was less well answered. More able candidates scored one or both marks, with common correct answers relating to dehydration and temperature regulation. Less able candidates often gave vague references to transport of blood. Some candidates confused respiration and perspiration.

**Question 4**

**(a)** Most candidates plotted points accurately, but very few could draw a line of best fit. Most drew a curved line through the anomalous point at 0.4, −0.09. The most able candidates ignored this point, and drew a straight line through the other four points.

**(b)** Most candidates knew that the change in mass was caused by osmosis in part **(i)**, but only the more able could explain fully the movement of water into or out of the potato pieces in response to water potential gradients. Many answers gave vague references to high or low sucrose concentration. Some less able candidates incorrectly thought that sucrose entered or left the potato.

**(c)** More able candidates could read off their graph to gain this mark, but errors were common.

**Question 5**

A lack of precision lost most candidates some of the marks in this question. The sources of the pollutants were often too vague to score the mark, for example, in part **(a)** 'smoke', instead of 'burning fossil fuels'. The effects of the pollutants were better understood, although some candidates incorrectly thought that some or all of the pollutants had an effect on the ozone layer. Most candidates scored half of the marks available.

**Question 6**

**(a)(i)** Only the more able candidates could name all the parts of the seed. Many less able candidates scored no marks in this part.

**(ii)** The function of the test was usually given as 'protection' without the qualification needed to gain this mark.

**(b)** Most candidates appreciated that the hooks of fruit L would catch in animal fur and that the 'parachute' of fruit M would catch the wind. Some less able candidates thought that fruit L would be eaten.

**(c)** The majority of candidates gained marks in this part, although a number incorrectly thought that the fruits of X would be distributed by animals. Some of the weaker candidates referred back to fruits L and M.

**(d)** This part showed a lack of understanding of the processes for many candidates.

**(i)** Even the more able candidates often omitted to mention a zygote in the definition and so lost the mark.

**(ii)** Many less able candidates confused self pollination with asexual reproduction. Some candidates gave answers that were the reverse of the correct response.

***Section B***

**Question 7**

Many candidates gave lengthy answers but did not sequence their ideas well and consequently missed key points. It was common to find ideas about breathing in part **(a)** and about pulse rate in part **(b)**, where they did not score marks. A number of candidates included irrelevant details, for example about the structure and function of the heart. The essential link to exercise in each part was often not established, with candidates commonly referring to the speed of the machine rather than the speed of the man running. Many candidates incorrectly thought that increased oxygen supply during running was to remove lactic acid or repay oxygen debt. Some gave long and irrelevant descriptions of anaerobic respiration. A number of candidates thought that although breathing was faster, it would also be shallower.

**Question 8**

**(a)** This part was answered well by many candidates.

**(i)** Few candidates mentioned the significance of food being broken into small pieces to the role of enzymes.

**(ii)** The part played by bacteria in the production of acids was rarely mentioned.

**(b)** Excretion was often not understood, and frequently confused with egestion. More candidates successfully described the excretion of some or all of the metabolic products in the question although less able candidates often showed confusion in which organ excreted which product.

**Question 9**

**(a)** Drawing the carbon cycle proved to be a problem for many candidates. A common error was the failure to include carbon dioxide in the cycle, and many candidates did not include all of the stated processes.

**(b)(i)** Most candidates realised the role of photosynthesis in the removal, and respiration in the addition, of carbon dioxide to the atmosphere, although few could express these ideas logically to explain the balance of carbon dioxide.

**(ii)** Answers to this part usually included ideas of deforestation and sometimes of combustion, but the connection to an increase in carbon dioxide was seldom clear. Many candidates seemed to have sensible ideas but be unable to use them to answer the question.