COMBINED SCIENCE

Paper 0653/01
Multiple Choice

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

General comments on whole paper

The mean score on this paper was 63%, which is a considerable improvement on the last two papers. The mean of the Physics items was 65%, which is even better. The items do not appear to be significantly easier this time, so this group of candidates seem to have been well prepared.

Comments on specific questions

Questions 1 to 13

Question 6

This was a very easy question The solution to this particular question depended ultimately on whether the candidate realised that hormonal responses are slow whereas nervous ones are fast. Perhaps, irrespective of any knowledge possessed on the endocrine system, candidates just know that a reflex action involves the nervous system since only 0.1% thought that hormones were involved.

Question 10

Confusion over the functions of the various reproductive parts of a flower is common and accounted here for over a third of the candidates believing that the stigma produces pollen.

Question 11

It was a little surprising to find that 41% of the candidates failed to link the idea of asexual reproduction with offspring produced in this way being genetically identical. Reassuringly, most of the more able candidates appreciated that the environment would therefore be the cause of the variation.

Questions 14 to 27

Question 14

For the lower-scoring candidates, response **D** was twice as popular as the key, **A**. In the former, the dye would simply dissolve and no chromatogram would be obtained.

Question 18

Response **D** was, for the lower-scoring candidates, nearly as popular as the key, **B**. Was this a case of misreading or misunderstanding of the difference between "diatomic" and "divalent"?

Question 19 and 20

In both of these questions, the lower-scoring candidates appear to have been guessing.

Question 21

Amongst the lower-scoring candidates, response **D** was the most popular, with the key being **B**. In galvanising, the zinc is, of course, merely a coating and not an alloy.

Question 23

The lower-scoring candidates seemed to have largely discounted response **A** but then guessed between the other three responses. A possible explanation is that these candidates did not realise that marble and chalk are both forms of calcium carbonate.

Question 24

A degree of guessing seems to have occurred amongst the lower-scoring candidates with response **D** being the least popular but response **C** the most popular. This should have been a test of simple recall.

Question 27 was found disappointingly hard across the ability range. As many as 40% of the lower-scoring candidates chose response **B** and a third of the higher-scoring candidates chose response **D**, the key being **C**. For the former candidates, they should have realised that a hydrocabon contains only carbon and hydrogen (and not oxygen) and the latter should have known that carbon dioxide is acidic.

Questions 28 to 40

There were several items which large numbers of candidates answered correctly (facility greater than 70%). These were **Questions 28**, **29**, **33**, **35**, **37** and **40**. The only item which had a low facility (i.e. a low proportion of candidates answering correctly) was **Question 34**. The following comments about individual items might prove to be instructive.

Question 28 was answered correctly by the vast majority of candidates, but it is interesting to note that 12% answered **C**, the direction in which the bird would appear to be flying. This is probably a case of weak candidates not reading the question properly. **Question 30** was only answered correctly by just over half of the candidates; almost as many answered **D**, the solid with the biggest volume. A similar proportion answered **Question 31** correctly, with 27% thinking that hot air can go downwards by convection and a further 14% thinking that air conducts enough to cook with. A similar lack of understanding about convection applied in **Question 32**, where over 90% knew that the cooled air moved downwards but only ⅔ of these knew why. It would seem that perhaps the transfer of thermal energy is not well understood.

Light items often cause candidates difficulty, so it was pleasing to see that **Question 34** was well done. However, only half the candidates could identify the angle of incidence in the diagram. Lots of candidates failed to think and chose the angle labelled 30°.

Most of the electrical items were well done. It is worth noting, though, that many candidates automatically choose “electric shock” when there is a question about electrical safety.

Question 40 was well done. 85% of candidates realised that gamma-rays are the most penetrating, but only 75% realised also that alpha-particles are the least penetrating.

COMBINED SCIENCE

Paper 0653/02

Core Theory

General comments

The entry for this component was almost 250 candidates. As usual for this core paper, the candidature generally found the content to be challenging. The full mark range was seen but very few candidates scored very high marks. In this paper overall, the three Sciences seemed to provide challenge in equal measure although the balance varies between Centres. Many potentially very good candidates tended to lose marks through poor examination technique. It may be beneficial to remind candidates that consecutive parts of questions are often strongly connected, for example **Question 6** parts **(iii)** and **(iv)**. There was no evidence that candidates had difficulty in completing the paper in the available time.

Comments on specific questions

Question 1

(a) The majority of candidates scored marks in this recall question. The least well known part of the heart was **B**, the septum.

(b) (i) It was important that candidates shaded all areas on the diagram corresponding to the left hand chambers. Weaker candidates shaded heart muscle.

(ii) The majority of candidates correctly referred to the lungs. Common incorrect answers referred to the major blood vessels associated with the heart.

(c) This question was answered well by about one third of candidates. There was no particular pattern to incorrect responses, and several candidates failed to draw any arrows.

(d) In order to gain both marks, candidates needed to specify that any blockage would prevent oxygen from reaching heart muscle. The most common incorrect answer which failed through poor technique was to refer to the blockage preventing blood reaching the heart.

Question 2

(a) (i) Most candidates were well drilled in sub-atomic particles and scored all three marks.

(ii) Once again, poor technique caused even good candidates to miss a mark by failing to provide the symbol, Li. There were a number of ways in which candidates could score the second mark and in general the question was well answered. One answer which was not accepted was that the atom contained three electrons, although if candidates stated that these were arranged 2,1 showing Period 2 and Group 1 then this was, of course, accepted.

(b) (i) This was well known by most candidates and there was no particular pattern to incorrect responses.

(ii) This was more challenging and only a minority of candidates recognised that calcium reacts, producing an alkaline solution. For both marks a sensible reference to the formation of an alkaline product and a correct colour change were required. References to the mixture turning blue or purple were accepted as a colour change.

(c) This question proved accessible to the majority of candidates who used their knowledge very well to score both marks. There were a large number of sensible answers which were accepted, including references to reaction rate, colour of product, gas evolution. Credit was not given for references to changes in Universal Indicator colour in Fig. 2.3 since there was no reference to indicator in the iron reaction.

Question 3

(a) (i) The majority of candidates correctly recalled the formula for work done. There was no particular pattern to the incorrect responses.

(ii) Expected answers included change of direction, speed or shape and in general candidates had learned this well.

(b) (i) Although many candidates recognised that the required section on the speed/time graph was **B**, they failed to explain the answer properly. The most common mistake was to state that the graph was straight during ***section B***. It is important to specify that the graph is horizontal or a description which means the same thing.

(ii) In order to gain both marks, the candidates working needed to specify that change in speed ÷ time has to be calculated. Better candidates showed this clearly and the majority of candidates obtained the mark for the answer of **1.4 m/s^2**.

(c) (i) The reasons for the expansion gaps had been learned fairly well in some Centres but there was a tendency for candidates to think that these were measures taken to reduce car speed.

(ii) Even if candidates scored the mark for part **(i)**, it proved harder to obtain this mark. Some reference to the ability of rubber to be compressed was required. Many candidates, unfamiliar with this part of the syllabus suggested that the rubber was required for safety reasons so that people did not fall through the gaps.

Question 4

This question proved to be the most challenging on the paper.

(a) Candidates needed to refer to the undisturbed rainforest possessing the greater number of species. The mark, as always in a one mark question like this, is for the explanation only.

(b) Very few candidates scored this mark. Candidates tended to ignore the instruction to *use the data in the table* and instead wrote lengthy answers based on ecology they had learned. Using the data simply meant that they had to make the point that there are a large number of species (14) found only in the rainforest.

(c) (i) Candidates needed to make the connection between the larger numbers of bats in the cacao plantation and the flowers/nectar which would be present to a greater degree in the plantation. This proved to be too challenging for all but the very best candidates.

(ii) In this question candidates should have been discussing the role of bats in helping pollination. Instead, most discussed seed dispersal.

(d) This was generally very well answered and very many candidates across the ability range and all Centres scored 2 or 3 marks. There was no pattern to incorrect responses.

(e) Most candidates scored at least one mark here, showing that causes and cures for soil erosion are generally well known. A number of correct answers were possible, including the role of roots in binding the soil and coverage by leaves preventing direct rain impact. These were the most commonly given correct responses.

Question 5

(a) (i) Most candidates scored this mark.

(ii) This was also well answered and a good number of candidates gave the correct answer *bromine* as opposed to *bromide*, which was not accepted.

(iii) This was also answered well. Candidates could discuss flow of ions or the simpler idea that no current flows if the salt is solid.

(iv) The majority of candidates were able to identify the anode and correctly stated that this is the answer since **A** is the positive electrode.

(b) (i) This fundamental idea proved to be mare challenging than part **(a)**. Better candidates did discuss that the formula shows two chlorine atoms (one mark) bonded (one mark) together. Some candidates misinterpreted the symbol for chlorine thinking it showed two different elements.

(ii) Most candidates were very familiar with the role of chlorine in sterilising drinking water, and some good answers were given.

(iii) The responses to this question varied with Centre. Even the weakest candidates from certain Centres were able to balance the equation. The responses from other candidates showed that they had no idea what this question involved.

Question 6

(a) Most candidates correctly stated that the reading on both ammeters would be 1.5 A.

(b) (i) Most candidates could give two fossil fuels. Crude oil was not accepted since this requires processing before useful fuel is obtained. The most common incorrect answer given was wood.

(ii) This is commonly asked and was very well answered by most candidates. The award of three marks for the correct answers of *chemical, kinetic (movement)* and *electrical (electric)* was common.

(iii) Many candidates obtained the correct numerical answer but did not score all three marks. A sensible statement of the formula they propose to use, followed by correct working are also required. The formula must be in the form of a proper equation and make use of words or generally accepted symbols. The correct answer is **320 000** turns.

(iv) This proved too challenging for most candidates, and the mark was hardly ever awarded. Candidates needed to refer to the fact that the output has to be a.c. because transformers work only with a.c. It had been hoped that they would have been keyed into this idea from part **(iii)**.

Question 7

(a) (i) A surprising number of candidates had not learned the composition of air. A wide range of incorrect suggestions were seen for this question including carbon dioxide and oxygen.

(ii) This question, in one form or another, is frequently asked and candidates continue to struggle to answer it properly. Acceptable answers refer to gases in a mixture retaining their properties and being able to be present in any proportions. They could also discuss the absence of bonding between different gas atoms in the mixture. The idea that gases in a mixture can easily be separated was not accepted, although reference to a method such as fractional distillation is fine.

(b)(i) This was not well answered. Candidates needed to refer to the fuel reacting with or bonding with oxygen. Many candidates stated that this was because the fuel burned but this was not enough to explain the meaning of oxidation.

(ii) This was answered with much greater success by many candidates. They were familiar with the product of hydrogen combustion being non-polluting water and many could also discuss the formation of carbon monoxide when hydrocarbons burn.

(iii) It had been expected that most candidates would score both marks for this commonly asked recall question. This was not the case and only about half the candidates could recall the limewater test. Many candidates suggested the inability of carbon dioxide to support combustion would be a good enough test but this was not accepted.

(c) (i) Few candidates could recall the formula of sulphuric acid.

(ii) About half the candidates identified sodium carbonate.

Question 8

(a) Candidates needed to show that they understood that sound travels by the vibration of particles. This concept was too challenging for the majority of candidates.

(b) Most candidates scored one mark here. They correctly wrote down the formula they intended to use but missed the fact that the distance travelled by the sound would be 600 m and not 300 m. If therefore they gave the answer 150 m/s they scored one mark. The correct answer was **300 m/s**.

(c) (i) Candidates needed to be clear that frequency is the number of oscillations per second. Many candidates gave incorrect, non-numerical answers.

(ii) Very few candidates gave the acceptable range of 20 to 20 000 Hz. Many gave, correctly, just one limit of the range but this could not be accepted.

(d) Poor examination technique cost many candidates these marks. The question requires candidates to describe the sounds corresponding to the waveforms in the diagrams, but large numbers simply described the diagrams, often correctly using correct terms. They needed to state that **P** would be of lower pitch and lower volume than **Q**.

Question 9

(a) (i) The required answer, plasma, was rarely given. Candidates tended to go for red or white cells.

(ii) Most candidates could make the link with the energy provided by glucose. The second mark was for reference to respiration as the process releasing the energy. This was rarely scored.

(b) (i) Candidates were, in general, unable to state the role of cellulose in plant cell walls.

(ii) Candidates either discussed the biuret test and scored most or all of the marks or Benedict's test and scored nothing. About one third of candidates scored some marks for their answers to this question.

(c) (i) This question is often asked and candidates are still tempted to state that denatured enzymes have been killed. This does not score the mark, and candidates should state that the enzyme is destroyed. Some candidates referred to enzyme molecules going out of shape, which is obviously an acceptable response.

(ii) Candidates needed to discuss that fact that plants normally have to exist at lower temperatures than humans. This was not well answered.

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Paper 0653/03
Extended Theory

General comments

This Paper was accessible to most candidates, and no one question proved particularly difficult. However, numerous candidates were clearly very ill-prepared, demonstrating no familiarity at all with a considerable proportion of the material tested. It is apparent that many candidates who would perform better on Paper 2 have been inappropriately entered for this Paper.

Comments on specific questions

Question 1

(a) This question was expected to be a friendly introduction, but a surprisingly large proportion of candidates could locate only one of these areas of the heart. Many labelled the bicuspid valve on the wrong side, and the pulmonary vein was frequently labelled as pulmonary artery. Many others got no marks at all, with labels seemingly randomly placed; it was not unusual to see the space inside the ventricle, for example, labelled as any of these three structures.

(b) Most candidates appreciated that the left ventricle pumps blood all around the body. Better candidates also explained that the wall of the ventricle is made of muscle, and that the thicker muscle can produce more force or a higher pressure when it contracts. However, there were many answers suggesting that because the left ventricle contains 'oxygenated blood' it needs to be able to 'resist a higher pressure', which demonstrates a fundamental lack of understanding.

(c) A wide range of answers was seen here. There were some excellent comparisons, generally in terms of the thickness of the wall and the presence of valves. Once again, there was confusion about the relevance of whether blood is oxygenated or deoxygenated.

(d) Weaker candidates frequently did no more than rewrite the question. Better answers recognised that the lack of a blood supply to the heart muscle would mean that it could not respire (or, at least, respire aerobically) which would prevent it from contracting. References to the 'heart' not receiving blood were not credited.

Question 2

(a) Better candidates generally got all four readings correct. The most common errors were to state that the two voltmeters would read 6V.

(b) (i) This was often well done, although a few lost marks by not stating the formula.

(ii) This proved very difficult, with only a few of the better candidates able to give a relevant answer. Many answered the question they would have preferred to have seen, explaining *why* voltage is stepped up.

Question 3

(a) Most candidates appeared to have at least some idea about the difference between a mixture and a compound, but frequently had difficulty in expressing it in a form of words that could earn credit. It would clearly be valuable for them to learn a definition, which they could quote without having to worry about putting nebulous ideas into words.

(b)(i) This was answered well by many, but more got 0 or 1 mark here than got 2. A number of candidates appeared not to notice the term 'incomplete' in the question, and named carbon dioxide rather than carbon monoxide. Several struggled with the 'solid' substance, often naming another gas.

(ii) There were many correct answers describing a test for carbon dioxide, but fewer thought of water or – if then did – knew how to test for it.

(c)(i) This was a challenge for all but the best candidates. Many did not understand what was required, and tried to write an equation, or wrote a name.

(ii) This equation needs to be known and learned by candidates. Unfortunately, it was not generally familiar to them, and relatively few earned a mark here.

Question 4

This question contained a novel context and novel data, requiring candidates to read words and interpret data in a table and on a graph. It proved challenging for many, although almost all got at least some marks in more than one part of the question.

(a) This was generally well answered. Most candidates clearly understood the meaning of 'species diversity' and were able to quote figures from the table relating to the numbers of plant species and bat species in the two habitats.

(b) This proved more difficult, and only a relatively small proportion of candidates recognised the implication of the data in the table concerning the number of bat species found *only* in the rainforest.

(c) Many candidates tried to answer this in terms of biological control or the dispersal of fruits or seeds. The expected answer was the potential role of bats in pollination, to which there were several clues in the stem of the question.

(d) The role of vegetation cover in preventing soil erosion was generally appreciated, although only the better candidates were able to explain this, mentioning the role of roots in holding soil together and preventing run-off, and/or the effect of leaves in preventing rain from hitting the soil directly. Some also mentioned the uptake of water from the soil by roots, again preventing excessive run-off.

(e)(i) This question required a simple description of the data shown in the graph. Very few candidates looked at *both* lines, simply describing what was happening in the line labelled 'biological control' and not recognising that the graph showed that the biological control reduced the number of pods infected *compared with no treatment*.

(ii) This proved to be a very difficult question. Better candidates suggested that the biological control fungus took time to reproduce, or to grow, or to spread, and related this to particular regions of the graph.

Question 5

(a) This part of the question involved a series of calculations. Most candidates do now remember to write down the formula used when asked to do so, and give units with their answers.

(i) This was generally well answered, although many candidates erroneously think that 'straight' means 'horizontal'.

(ii) This was generally calculated correctly (there was no need to give a formula here), but the units were frequently incorrect.

(iii) Those candidates who remembered the formula *force* = *mass* × *acceleration* generally calculated this value correctly, and most of these included the correct unit with their answer.

(iv) Most candidates knew how to do this calculation, but there were quite a few errors in arithmetic and some gave incorrect units – m^2 or m/s were not uncommon.

(b) (i) This was generally well answered.

(ii) Again, this was generally well done.

(c) Answers to this question suggested that many candidates were not familiar with the method of calculating resistance in parallel circuits. Some candidates actually did the calculation, which was not necessary but was good to see.

Question 6

(a) Most candidates recognised the gas produced as being hydrogen, and many also suggested a suitable metal. Teachers are asked not to encourage candidates to consider francium as an element that actually occurs in 'normal' situations.

(b) (i) This was generally well answered.

(ii) Very few candidates correctly stated what 'rust' is, and it was surprisingly rare to see answers explaining that the extra mass was due to oxygen that had combined with iron (or steel).

Question 7

(a) Most candidates drew a curve with a peak to the left of the one given, but weaker candidates often drew a curve with the peak at the same temperature but 'lower' in terms of enzyme activity.

(b) The great majority of answers simply described the shape of the curve rather than attempting to explain it. Very few candidates scored more than one mark, for mentioning that the enzyme was denatured at high temperatures. The better candidates did, however, explain the rise in activity between 0 and 40ºC in terms of collision rate and energy of collisions, and explained what is meant by the term 'denatured'.

(c) There were many good answers here, generally along the lines that plant do not control their body temperatures and are therefore often at a lower temperature than a human's body.

Question 8

(a) (i) Microwaves were the most common answer here.

(ii) This was not generally well known. Even those who gave an appropriate number often failed to state units.

(iii) It was surprising to see numerous answers suggesting that the waves travel at different speeds, considering the wording of the previous question.

(b)(i) Candidates who had learned a definition had no difficulties here. The answer needed to refer to the breakdown of the *nucleus*.

(ii) This was generally well known.

(iii) Many candidates did not appear to know anything about the behaviour of alpha, beta and gamma in an electric field, and gave their answers in terms of whether the radiation would be able to penetrate the metal plates.

(iv) This was generally well answered.

Question 9

(a)(i) Better candidates correctly named bromine. There were, however, many incorrect answers, including a number giving inexplicable answers such as sulphur or sodium.

(ii) Surprisingly few candidates were able to state that the lead bromide was heated to melt it. The second mark was only rarely given; answers needed to explain that this allowed the ions to move, or that it allowed an electric current to flow through it. Many candidates think that the current is carried through the electrolyte as a flow of electrons.

(b)(i) There were numerous correct answers to this question, and better candidates were able to explain their deduction in terms of the balance of charge between the two particles.

(ii) A significant number of candidates appeared not to have noticed that the question asked for the number of electrons in an *ion* and not in an atom.

(c)(i) This was well answered. A few candidates made life more difficult for themselves by showing *all* the electrons, not just those in the outer shell as asked.

(ii) There were many incorrect answers to this, frequently failing to use the fact that chlorine exists as diatomic molecules – as had just been shown in the answer to **(c)(i)**.

COMBINED SCIENCE

Paper 0653/04
Coursework

General comments

(a) Nature of tasks set by Centres.

Three Centres submitted coursework for the June examination. Two had provided coursework in previous years.

In all cases the tasks set were appropriate to the requirements of the syllabus and the competence of the candidates. The standard of candidates' work was comparable with previous years.

(b) Teachers' application of assessment criteria.

In all Centres the assessment criteria were understood and applied well to all of their activities. No Centre tried to assess both skills C1 and C4 in the same investigation. The new Centre had benefited from the Distance Learning Programme.

(c) Recording of marks and teachers' annotation.

There was little evidence of annotation on the scripts at the point where the marks were awarded. There were frequent examples of writing comprehensive supporting comments at the end of each skill area.

(d) Good practice.

Some Centres made very useful comments about individual candidate's performance on a summary sheet.

COMBINED SCIENCE

Paper 0653/05

Practical Test

General comments

All three questions were readily accessible and there were many good answers. Despite the misgivings of one or two Centres, most candidates were able to construct a key in **Question 1** and the majority scored well. Supervisors were generally helpful in their comments. Most showed initiative in handling any local difficulties and acted sensitively towards candidates who may have suffered a set back due to faulty apparatus. Not for the first time some Supervisors reported that the instructions did not include a small measuring cylinder. As reported on previous occasions, measuring cylinders are not required, indeed should not be given, when volumes to be used are approximate.

Specific Comments:

Question 1

The observation required to gain a mark was 'bubbles from the lower side of the leaf'. Many made this observation and went on to explain in terms of the escape of air through the stomata, scoring the second mark. Drawings were generally good and correctly named. The majority of candidates scored both marks. Despite the concern of some, the construction of a key was not a problem. An example was provided, therefore candidates were not required to have previous knowledge and this part of the question was meant to test handling observations and presenting results in a particular manner. There was no set answer and many candidates scored full marks. The complete range of marks 0-6 was used.

Question 2

There were some local difficulties but Supervisors acted sensibly and enabled candidates to perform the experiment. If candidates results were to be believed, some lamps were far from similar. In the majority of cases this did not result in more than a loss of one mark. Parts **(a)** and **(b)** were not as straightforward as they should have been. Too many candidates could not correctly read a meter, recording currents in excess of 2 amperes and a substantial number used incorrect units or no units at all. A minority recorded an increase in current when the second lamp was included. Recorded voltages varied greatly but were acceptable provided they were in keeping with the Supervisor's result. The mark most commonly lost was due to a failure to read a meter consistently. The most frequent error in part **(d)** was using the current from part **(a)** in calculating one or both resistances. Some either did not know the symbol for resistance or just failed to use it. Providing a suitable comment was made on each value of voltage and resistance, one mark was scored. The second mark was reserved for appreciating that, within experimental error, the lamps were similar. Few scored this last mark either because mistakes were made earlier or they missed the point of the question.

Question 3

Reference has already been made to the use of measuring cylinders but it is worth emphasising that candidates are expected to know what 2 cm^3 looks like and when the words 'about 2 cm^3 ' are used, no measuring cylinder is required. In such circumstances the Supervisor should not provide one. To gain both marks in **(a)** it was necessary to state 'black' or 'dark grey' or 'dark brown' and an observation noting a difference in the state of the solid, e.g. one more finely divided than the other. A small number scored zero for this part. Part **(b)** was well answered in contrast to part **(c)**. Are candidates encouraged to refer to the notes on page 8? The test for chlorine is clearly stated and litmus turning red does not indicate chlorine. The filtrate colour could be green or blue depending upon the concentrations of the chloride and copper ions. Both colours were accepted. Again one wonders if the notes on page 8 are used. The observations when using sodium hydroxide are stated and one expects candidates to be familiar with the words used. A large number have no idea as to the meaning of 'insoluble in excess' and some are reluctant to use the word

‘precipitate’. The answer required in order to score both marks, needed the words ‘blue precipitate’ and the phrase ‘insoluble in excess’.

COMBINED SCIENCE

Paper 0653/06
Alternative to Practical

General comments

It is emphasised every year that this paper contains questions that require knowledge of laboratory procedures appropriate to the syllabus. It is expected that candidates will have such knowledge through carrying out, or at the very least, seeing experiments demonstrated. It is clear from the answers they give that this is not always the case.

Another problem is the clear evidence that candidates are not reading the questions properly and sometimes appear to be answering a completely different question. This is not a matter of failing to reproduce scientific knowledge, but simply poor examination practice.

Having said this, it is good to see an increasing number of high quality scripts and there is evidence that a number of Centres clearly take notice of these reports and act on them.

Comments on specific questions

Question 1

(a) (i) As is usual, one of the questions on the paper asks for candidates to draw something from a photograph. This year the photograph was of a leaf. It was expected that candidates would draw a similar sized diagram showing faint lines to correspond to the veins in the original. Many candidates were unable to draw a similar sized diagram and drew very thick lines to represent veins.

(b) Most were able to name the stomata as being the “holes” from which the trapped air escaped.

(c) This part required candidates to use the information they were given and adapt it to make a new key. Most managed very well and it was interesting to see the many different ways they came up with.

Correct biological terms were neither expected nor required. So long as the terms used were clear and not well-known terms for something else (e.g. petals), most were accepted; leaflets, separate sections, leaves and, indeed, leafs were all given credit.

A small minority failed to adapt the given key and used the terms given in the example.

Question 2

Many candidates lost marks by not reading the question.

(a) The candidates were told to take measurements from the mid-point of the rays. Any errors here were taken into account when calculating the distance from the centre.

(b) Most candidates knew the law of reflection and a pleasing number of candidates noted the experimental error built into the question, although this was not required.

(c) and (d) The pathways were not well known.

Question 3

In general this question was answered very poorly. Only basic chemistry, was required.

(a) (i) Many interesting safety aspects were mentioned, overalls, gloves, goggles, etc. but it was surprising that many missed the important fact that the magnesium ribbon should have been held with tongs. Extra precautions were not penalised, but only tongs (or similar) and viewing through blue glass gained credit. Few, if any, mentioned blue glass.

(ii) The addition of water to magnesium oxide to produce an insoluble (or sparingly soluble) mixture was not well known.

(iii) Many thought that Universal Indicator turning blue signifies acid.

(b) (i) The number of candidates who realised that the magnesium oxide reacts with (or neutralises) the acid was unfortunately very few, some even saying that the magnesium oxide is too strong or too reactive to react with acid. At this point it is worth reminding candidates that the full name for chemicals is required. Magnesium should not be given when referring to magnesium oxide or magnesium sulphate.

(iii) A simple drawing to represent filtration was required. A number gave a series of diagrams of the whole process; others just drew a diagram of the crystallisation in part **(c)**. Although a labelled diagram was not specified, labels should always be given as the filter paper had to be obvious from the diagram to score, a simple label would have given candidates more chance of attaining this mark.

(c) The reasons for evaporation of a small amount of water or to concentrate the solution was not well known.

Question 4

Most candidates realised the theory behind this question and scored well.

(a) Some candidates failed to read the question and instead of trying to explain the colours of the bicarbonate indicator, tried to use Universal Indicator colours.

(b) Candidates should be encouraged to use the correct term. In this case “control” as “wordy” answers, as given by many candidates, usually failed to score.

(c) All that was expected were very similar diagrams to those given in the question, with the leaf removed and some sort of ledge for the woodlice to live on. Many candidates did not use the bicarbonate indicator and/or the control. Some woodlice were left to hang in mid-air or drown in the indicator.

Question 5

(a) Candidates still need practice in reading scales.

(b) The test for oxygen is that a glowing splint relights. Candidates should question themselves when they write “a lighted splint relights”.

(c) The behaviour of enzymes seemed well-known, but not the name given to inorganic examples, “catalysts”.

(d) (i) This was answered reasonably well although a few candidates gave chloride instead of chlorine.

(ii) Many candidates realised that the ion was copper.

(iii) The question asks how the presence of the metal ion in the blue solution could be confirmed using aqueous ammonia. A number of candidates started by saying that the solution would “turn blue” – again a failure to read the question.

Question 6

(a)-(c) Answered very well by most candidates

(d) (i) Again some candidates failed to read the question. Although told to omit the voltmeter from the diagram, many kept it in.

(ii) Vague answers were not credited. More energy, electricity, etc. were not accepted. Current, voltage and/or resistance were required in their correct usage.