

Science B J640

Gateway Science Suite

General Certificate of Secondary Education

Report on the Units

January 2009

J640/MS/R/09J

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Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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B621/01 Unit 1: Modules B1, C1 and P1

Foundation Tier

General Comments

The paper allowed candidates to show satisfactory levels of knowledge and understanding in the vast majority of the questions. Candidates showed a sound grasp of many scientific ideas along with an acceptable level of factual recall. The poor level of scientific language and incorrect spelling of scientific words and terms weakened many answers thereby hindering the awarding of marks. Very few candidates used a ruler in question 2 and often made poor attempts to draw the bars in the chart correctly. Although candidates were never penalised for not using a ruler their work would have been much clearer and therefore easier to assess accurately if a ruler had been used. Overall the candidates appear to have been well prepared for the examination.

Candidates struggled with the early questions in the Biology and Physics sections and this may well have lowered their overall attainment. This in part may be due to assessing some topics in the specification not previously tested, or at least not in such depth.

The areas that candidates failed to display consistent understanding were

- White blood cells; genes / chromosomes / inheritance and liver damage in Biology
- The terms 'exothermic', 'property' and '(fuel) burner' in Chemistry
- Reflection of microwaves and microwaves passing through glass; air as an insulator and dark skin and the absorption of UV in Physics.

Comments on Individual Questions

SECTION A - MODULE B1

Question 1

- (a) A small majority of candidates gained this first mark but a surprising number could not recall normal body temperature, some even gave 1000 °C as their answer.
- (b) The table format appeared to throw some of candidates. Sometimes 'more blood near skin surface' was written in both columns, the other most common error was to put shivering or sweating in the wrong column. One or zero was awarded more often than two marks.
- (c) The success rate was very poor in both parts of the question. Less than 30% gave 'cholera' as the correct response in (i), whilst 80% scored zero in the second part. Common wrong answers were:
- (i) Flu or to a lesser extent athlete's foot
 - (ii) Vague answers constructed around protection and 'fighting', 'attacking', 'digesting' or 'breaking down' antibodies.

Question 2

- (a) Although poorly drawn this was often the first mark for many candidates, however the 0.5 value for the tinned peaches bar was often wrongly drawn. This value was plotted as 1 or 5.
- (b) Most candidates performed the calculation correctly. Those who failed to score converted, or tried to convert, the 80kg to grams. The term 'amino acids' was very poorly known in the second part, with a mere 5% gaining the mark.
- (c) There were much better answers in the last part of the question, probably due to the strong prompt in the form of the names of the gases being listed in the stem of the question.

Question 3

- (a) There were good responses in this question even though, like 2(b), it required unprompted recall. Sometimes amino acids appeared here or chromosomes / molecules. Sadly about 1/5 of the entry failed to write anything.
- (b)
 - (i) A reasonably high success rate in this part of the question the usual incorrect answer given was 76, when candidates doubled the number of chromosomes rather than halving it.
 - (ii) The concepts of dominant / recessive genes together with inheritance were poorly understood, or at least explained. The main problems in answers were references to 'the fur being passed on' or 'dad had stronger genes'. Although many candidates gained a mark, two marks were rarely awarded.
 - (iii) Well answered on the whole, a common error was referring back to parents in the previous response.

Question 4

- (a) The candidates were well aware of the short term effects of alcohol on the nervous system and the complete range of answers accepted in the Mark Scheme were offered. References to affecting the brain or 'causes him to be sick' were unacceptable answers given by some candidates.
- (b) Very few candidates (<5%) gave 'cirrhosis' as the answer, those that did rarely had the correct spelling. Liver cancer and liver failure were the most common mistakes.

SECTION B - MODULE C1

Question 5

- (a) and (b) The vast majority of candidates were off to a good start in the Chemistry section gaining both marks in the first part.
- (c) A significant number of correct answers for colour change rather than difficult to reverse. Incorrect answers were to do with 'because it has been cooked' or 'because the bacteria, or microbes, have been killed'. Change in texture was also often given.

Question 6

- (a) A reasonable amount of successful answers; poor responses were about perfumes not sinking into the skin.
- (b) Usually one mark for the idea that perfumes need to have a (nice) smell, two mark responses went on to talk about not irritating the skin. Smaller numbers mentioned insoluble or non-toxic. Poor answers focused on ingredients in the perfume or the need to be washed off easily. The term **property** was not well understood by candidates.
- (c) Too many answers that failed to score only stated 'cause reaction' and did not specify the type (bad reaction / could irritate the skin / could cause side effects) of reaction.

Question 7

- (a) The gaining of the first mark for the correct answer was often spoiled by candidates listing more than one reason, including incorrect ones alongside the expected response. Indeed, some answers had all of the properties (from the list in the question) written in the answer space, again highlighting the poor grasp of the term properties.
- (b) This question was understood better than the previous one and the mark was generally awarded.
- (c) Candidates very rarely offered a method and a problem caused; both marks were often gained through giving two acceptable methods. Poorer responses often gave the same problem worded differently or merely stated 'bin it'.

Question 8

- (a) Similar to question 2(c) in Section A; the candidates benefited from the listed prompts and scored well in both (a) and (b).
- (b) The term 'exothermic' was very poorly recalled by the candidates, less than one in ten gaining the mark. Errors were offerings such as: repeating 'combustion' or 'burning' from the stem of the question; writing 'heat' or 'electricity' from the list in the previous part of the question.
- (c) In view of the very poor success rate in this question it has to be assumed that centres do not use spirit burners in practical work. On the surface a simple enough question but just over 10% of the entry gained the mark. Bunsen burner was the most common mistake, followed by candle and glass beaker or jar.
- (d) The answers in this question were much more encouraging. Whether it was the structure of the question or Centres preparation of the candidates, they scored much better than in previous examinations with a displayed formula question.
- (e) Unprompted but reasonably well answered. Carbon dioxide was the gas given most frequently in a wrong answer, although carbon monoxide and nitrogen were also seen in answers.

SECTION C - MODULE P1

Question 9

- (a) This question caused the candidates a lot of problems and ensured a poor start to the Physics section for all but a few. The percentages of candidates gaining marks in each part were; 18%, 4% and 15%. Errors were varied but illustrated a very poor grasp of microwave cooking. There appears to be confusion between a microwave, i.e. a microwave cooker as used in everyday language, and a microwave as used in scientific terminology. Incorrect answers given in each part were:

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- (i) Metal being a conductor or waves 'bouncing', the mark, when awarded, was often for reflection of heat.
 - (ii) Too many references to not melting or to cook the food properly.
 - (iii) Most answers were constructed around; 'to stop the food (or rice) drying out' or 'to stop the food burning or sticking'.
- b) A much better set of answers with over 80% of candidates securing one or two marks. Wavelength was a term more widely known than amplitude.

Question 10

(a)(i) and (ii) In both parts there was almost an exact 50 / 50 split between correct and incorrect answers whilst one in ten failed to offer any answer in either (i) or (ii). Errors were: $200 \times 2 = £400$ in (i) or adding £100 to the £250 already in the table, £350 being the wrong answer in this instance; answers of 2 or 200 in

- (a) (iii) Few two mark answers, the one mark answers usually gained the mark for 'trapped air'; the idea of air being an insulator was not well known or thought not to be relevant in this question. Answers involving trapped heat or needing air (or oxygen) to breathe or circulate in the house were common and resulted in zero scores all too often. The idea of reduced convection was hardly ever given as an answer.
 - (iv) A very surprising number of candidates failed to achieve this mark, often just repeating the examples in the stem (double glazing or loft insulation) or answering in terms of reflective material.
- (b) A well answered question generally with 80% of candidates scoring one or two marks. However, the spelling of fairly basic scientific words such as Celsius and Joules was extremely poor. The unit of temperature was known much better than the energy unit where the unit of power, or to a lesser degree, the unit of force was often incorrectly given.

Question 11

- (a) A high level of success in this part of the question, approaching 90% gained the mark.
- (b) A much lower success rate in the second part of this question, this time nine out of ten candidates failed to register any mark at all. Answers were poor; the absorption of UV by dark skin thereby providing protection for underlying tissue was not understood at all. Many candidates thought that dark skin 'had a good tan already' or 'dark skin absorbs (or reflects) the heat better'. One mark answers were invariably for the idea of melanin or pigment in the dark skin.
- (c) Better quality responses were seen in this part of the question, with the majority of answers scoring one or two marks. However, many candidates simply re-worded the idea of better protection in their answer thus only gaining a single mark. The idea of less UV getting through (the sun cream) was almost never given as a response.

Question 12

A satisfying end to the paper for the vast majority of candidates, most (70%) gaining two or maximum marks. The failure to secure all three marks was usually due to giving 'refraction' for the final part instead of 'reflection', Repeating 'digital' in the first response and giving 'calculators' in the second typified poorer answers..

B621/02 Unit 1: Modules B1, C1 and P1 Higher Tier

General Comments:

The paper produced a mean mark of 28.3 and gave candidates the opportunity to show what they know understand and can do. The paper produced the full range of marks and the standard deviation was 9.5. About 2000 candidates scored less than 15 marks and would have been better served by entry to the foundation tier. Assistant examiners and team leaders felt that the paper was at an appropriate level of difficulty. Most candidates could access the paper with only a small proportion of questions omitted. There was no evidence of lack of time.

There were a number of questions requiring understanding of concepts at a molecular level e.g. evaporation, conduction and passage of impulses across synapses. These questions were less well answered by a majority of candidates.

The physics section of the paper was more demanding than the biology and chemistry sections. The paper differentiated adequately with 34 marks required for grade A and 17 for grade C.

Comments on Individual Questions:

SECTION A - MODULE B1

Question 1

- (a) (i) This question was well answered by most candidates who could correctly identify 'dehydration'. All the distractors were seen.
- (ii) A significant number of weaker candidates omitted this question. Better candidates correctly stated 'homeostasis'. Incorrect answers included 'vasodilation'.
- (b) (i) This question was generally well answered with a variety of acceptable responses including 'take malaria tablets', 'use insect repellent' or 'use a mosquito net'. The most common incorrect answers were 'vaccination' or 'injections'.
- (ii) This was correctly answered by the vast majority of candidates.

Question 2

- (a) (i) The majority of candidates were able to calculate the RDA of protein to be 60g.
- (ii) Only the best candidates were able to name amino acids. Many stated 'protease' or 'protozoa' and failed to score.
- (b) This was very poorly answered. Few candidates knew that first class proteins contained all the essential amino acids or contained amino acids that the body can't make.
- (c) Most candidates correctly stated that high blood pressure can cause strokes, heart disease or damage to the kidneys or eyes.

Question 3

- (a) Approximately half of candidates could correctly identify the four bases. Other candidates included incorrect letters and failed to score.

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- (b) (i) This question was well answered with most stating that the sperm cell of a cat contains 19 chromosomes. '23' was a common incorrect answer.
- (b) (ii) A significant proportion of candidates scored one mark, usually for stating that black is dominant. Very few then went on to score the second mark for stating that the black gene is inherited from the father.
- (c) Punnet squares were generally completed correctly but frequently started from incorrect parental genotypes e.g. Bb and Bb or BB and Bb. In this case they could score 2 marks.

Question 4

- (a) Most candidates recognised that alcohol was a depressant. 'Stimulants' and 'hallucinogens' were the most common incorrect answers.
- (b) (i) Only the better candidates could identify the gap between neurones as synapses. A number of weaker candidates omitted this question.
- (b) (ii) Very few candidates scored both marks on this question. A small number referred to neurotransmitters for 1 mark, but even fewer went on to mention diffusion or receptors for the second mark. This area of biology continues to be poorly understood by a significantly large proportion of candidates.
- (c) A surprisingly small number of candidates were aware of cirrhosis as the damage caused to liver cells by prolonged alcohol usage. Incorrect spellings were not penalised. Most stated 'liver damage' or 'cancer' and failed to score.

SECTION B - MODULE C1

Question 5

- (a) Both parts were well answered by the vast majority of candidates. They could correctly identify eggs in part (i) and potatoes in part (ii). A minority of candidates thought that butter or margarine contained a lot of carbohydrate.
- (b) Again this question had a high facility and was well answered. The most common correct answer was 'to kill bacteria' with a smaller number referring to improved taste or texture.
- (c) This question discriminated well for more able candidates who usually scored two marks. Candidates needed to refer to the break down of proteins (1), the irreversibility of the process (1) or that the protein was denatured (1). Middle ability candidates often scored the mark for the break down of protein. Weak candidates stated that the name of the process was 'cooking' and failed to score.

Question 6

- (a) The majority of candidates gave the correct response to this question. The idea of particles needing to reach the nose was well understood.
- (b) Only the best candidates scored both marks on this question. Weaker candidates often scored 1 mark for the idea of particles escaping from the liquid. The other mark was for the idea of the forces between the particles being weakened or overcome
- (c) This was well answered by most candidates. Answers varied from the idea of cruelty, animals having no control over what happened to them to the idea that animals and humans are different.

Question 7

- (a) Most candidates correctly identified 'fizzy pop bottles' scoring 1 mark. A much smaller number correctly related the properties to the use for the second mark. The mark scheme required the identification of the **essential** properties necessary in a polymer used to make fizzy pop bottles, i.e. won't shatter when dropped or resists attack by water and acids. References to low melting point or flexibility lost the second mark.
- (b) Part (i) was better answered than part (ii). Approximately half the candidates scored the mark in part (i) for realising that the forces between the polymer chains were weak. Answers were frequently characterised by vagueness or references to the distance between polymer chains. Part (ii) was correctly answered by only a fifth of candidates. Very few candidates referred to **bonds** between polymer chains or cross linking.

Question 8

- (a) This question differentiated well. Better candidates scored both marks; correctly identifying paraffin and giving the correct explanation in terms of least fuel used for the same temperature rise. Weaker candidates either correctly identified paraffin but could not justify their choice or chose petrol. Petrol was a common choice with candidates mistakenly thinking that because most fuel was used, it must give out most energy.
- (b) Just under half of candidates correctly identified an exothermic reaction. Common unacceptable answers were 'burning' or 'combustion'.
- (c) Only one third of candidates scored both marks for 8400J. Many candidates used the mass of the fuel rather than the mass of water (67.2J) and were restricted to 1 mark. A significant number of candidates used the mass of fuel **and** the mass of water (336J) and failed to score.
- (d) This question was well answered by the majority of candidates showing a clear understanding of the requirements for word equations. A very small minority added '+ energy' and lost the mark.
- (e) Only the better candidates correctly answered this question. The use of displayed formulae was not familiar to a number of candidates. Almost all candidates answered with a conventional equation which was acceptable. Those who attempted to use displayed formulae frequently 'invented' formulae which were clearly incorrect.

SECTION C - MODULE P1

Question 9

- (a) Just under half of all candidates gained the mark on part (i) for correctly realising that the microwaves were reflected. A number of candidates stated that metals were good conductors of heat and failed to score. Fewer still scored the mark in part (ii) for the idea that microwaves will pass through glass. Many stated that glass has a high melting point or can withstand heat which was insufficient to score.
- (b) Approximately a quarter of all candidates correctly answered part (i) by stating that the water molecules vibrate more or gain kinetic energy. Unacceptable answers, including 'they get hotter' and 'they evaporate', were common. About a third of candidates correctly stated conduction or convection in part (ii). The myth that microwaves cook the food from the centre outwards still persists with a significant number of candidates.
- (c) This was well answered by the majority of candidates who identified that cooking oil has a lower specific heat capacity.

Question 10

- (a) Very few candidates gained 3 marks on this question. The mechanism of conduction is a difficult concept to explain. The mark scheme required any three from: idea of transfer of energy from warm air to glass (1), idea of increased vibration of glass particles (1), idea of collisions or transfer of energy between glass particles (1), and idea of collisions or transfer of energy from glass to cool air particles (1). A number of candidates talked about 'heat particles' and failed to score. Some talked about the lack of double glazing and missed the point of the question. Others talked about 'warm air particles moving through the glass and warming the cold air outside'.
- (b) The calculations were well done in both parts (i) and (ii) with the majority of candidates getting both marks.
- (c) About a third of candidates gained both marks on this question. Many were unable to rearrange the equation to get the correct answer. The question discriminated well at grade A. Candidates who were unsure of what to do opted to multiply and obtained an answer of 225000J or 2250J. Others calculated 0.25×3000 and added it to 3000 to get 3750J.

Question 11

- (a) Most candidates were able to calculate that factor 12 would be required. Factor 8 was a common incorrect answer.
- (b) This question discriminated well at grade A. Many candidates mentioned that dark skin contained more pigment and scored 1 mark. Explanations of absorption of uv were rarer and explanations that less uv reached the lower tissues were very rare. There were a number of answers involving the reflection of uv by darker skin which failed to score.

Question 12

- (a) The majority of candidates scored 1 mark on part (i) either by mentioning reflection or drawing a correct reflection on the diagram. Only more able candidates scored the second mark for the mention of 'total internal reflection'. About half of all candidates could state a correct difference between analogue and digital signals usually by stating that a digital signal is either on or off or 0 and 1. Weaker candidates offered information from part (b) as an answer (i.e. digital signals carry more information or there is less interference on digital signals) which was unacceptable.
- (b) Both parts of this question were poorly answered except by the best candidates. The idea of multiplexing was not well known in part (i). The reasons for digital signals being less susceptible to noise were poorly understood.

B622/01 Unit 2: Modules B2, C2 and P2 Foundation Tier

General Comments

This examination paper differentiated very well and allowed Foundation Tier candidates to demonstrate their knowledge and understanding. Only a very small proportion of the candidates would have been better suited taking the Higher Tier. Only a very small proportion of the candidates gave no response to a significant number of questions.

The mean mark for the paper was 32 and the range was from 0 to 57 marks out of 60. Section A was the most accessible and Section C the least accessible.

There was no evidence that candidates did not have sufficient time to finish.

Comments on Individual Questions

SECTION A - MODULE B2

Question 1

This question was about collecting beetles and was the most accessible in Section A.

In part (a) most candidates were able to identify that a net was used to collect butterflies, but a lower proportion of candidates realised that ants could be collected by a pooter or beetles by a pit-fall trap.

In part (b) a small proportion of the candidates described similarities e.g. they all had six legs rather than differences. The most common differences described were the number of spots, the shapes and the sizes. In part (ii) a large proportion of candidates were able to identify B and E as the same species. Candidates had to refer to the same number of spots or the same size or shape and not just that they were ladybirds.

Good answers referred to fossil evidence in part (c) but a significant proportion of the candidates left this blank or referred to evidence from books or the internet.

Question 2

This question was about ospreys.

In part (a) many candidates described ospreys as birds and predators. Only a small proportion of candidates stated that ospreys were prey.

Part (b) differentiated well. Good answers described two adaptations and clearly linked these to how they help ospreys hunt and catch fish. The most common adaptations described were large or sharp claws and sharp beaks. A common error was to refer to eyesight without referring to either good eyesight or that it could see fish from long distance. It was not sufficient to mention claws, wings or beaks these adaptations had to be qualified e.g. large wings.

Most candidates could recall the meaning of endangered in part (c).

Question 3

This question was about photosynthesis in trees and was the least accessible in Section A.

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Although many candidates could complete the word equation for photosynthesis in part (a), a significant proportion of candidates inverted the answers giving oxygen as a reactant and water as a product.

In part (b) candidates who did not refer to carbon dioxide being absorbed by trees during photosynthesis were not awarded a mark. It was not sufficient to mention that more oxygen would be produced.

In part (c) candidates had to refer to the tall trees absorbing most of the light but not that the tall trees absorb all of the light.

Cellulose being made from glucose was not well known in part (d). Carbon dioxide and water or starch were also allowed.

In part (e) the definition of a parasite was not well known by candidates. It was not sufficient to state that a parasite lives on or in an organism the answer also had to state that the host will be harmed.

SECTION B - MODULE C2

Question 4

This question was about igneous rocks and volcanoes.

In part (a) many answers were imprecise and did not refer to molten or liquid rock being cooled down. Lava cooling down was given credit.

Many candidates in part (b) gave very good descriptions of lava without mentioning the key idea that it was liquid rock that erupts from a volcano. It was not sufficient to mention just liquid coming out of a volcano.

In part (c) many candidates were awarded two marks. Almost all candidates stated that the first reason was to predict the next volcano. Any sensible statement about studying volcanoes or igneous rocks was given credit for the second mark.

Question 5

This question was about metals, alloys and purifying copper. It was the most accessible question in section B.

In part (a) (i) many candidates could identify the metals in one alloy but less could identify the metals in all three alloys. In part (ii) it was well known that steel was used to make car bodies but much less well known that amalgam was used to fill teeth.

Many candidates could use the diagram to recognise electrolysis on part (b). Only a very small proportion of candidates referred to decomposition.

Question 6

This question was about the properties and recycling of iron and aluminium.

In part (a) it was well known that aluminium had a low density and that iron corrodes however the majority of the candidates stated that aluminium was a poor conductor of electricity.

The advantages of recycling was well known in part (b) with the most common answers stating it either was cheaper, saves energy or saves resources.

Question 7

This question about the rate of reaction between zinc and hydrochloric acid was the least accessible question in Section B.

In part (a) a significant proportion of candidates could not recognise the reactants.

In part (b) (i) most candidates could read off 6 minutes from the graph, but only a small proportion of candidates could explain why the reaction stopped in part (ii). Since the stem stated zinc was left behind at the end of the reaction, candidates had to refer to the lack of acid. In part (iii) many candidates referred to increasing the temperature or heating the acid but less referred to increasing the concentration of the acid. Most candidates only gave one way of increasing the rate of reaction.

Only an extremely small proportion of the candidates could balance the equation in part (c), other candidates wrote an unbalanced equation and were awarded one mark. A significant proportion of the candidates did not attempt this question.

SECTION C - MODULE P2

Question 8

This question was about solar power and photocells.

Most candidates were awarded one or two marks for part (a) but seldom did candidates get maximum marks. The most common misconception was to have the wrong energy transfer including heat energy. Other candidates referred to alternating current rather than a direct current.

In part (b) many candidates stated it was cheaper but this was not given credit. The most popular correct answer was that it was a renewable resource. Reference to pollution had to be qualified in order to be awarded a mark.

In part (c) water and wind were the most common correct renewable energy source given by candidates but a significant proportion of candidates gave examples of fossil fuels.

Question 9

This question was about Near Earth Objects and was the least accessible of the questions in Section C.

Although the use of telescopes was well known in part (a) some candidates gave microscopes instead.

The materials that comets were made from were not well known in part (b). Candidates often gave one correct answer but one incorrect. Candidates tended to recall that comets were made from rock but could not recall ice.

Only a small proportion of candidates recalled that the shape was an ellipse or an oval in part (c), others stated it was circular and even a rectangle.

In part (d) many candidates gained credit for reference to death or destruction and the formation of a crater. Qualified reference to climate change was also given credit.

Candidates found part (e) difficult and a significant proportion of candidates did not attempt it. The answers needed to be precise. In particular it was not sufficient to refer to the fossil record, it had to be qualified by reference to a change in the fossil record. Candidates were more likely to be awarded credit by reference to craters or to rocks from the asteroid being discovered.

Question 10

This question was about nuclear radiation and was the most accessible question in Section C.

In part (a) many candidates could recognise both alpha and gamma radiation. Ultraviolet was the most likely incorrect answer given by candidates.

It was well known in part (b) that the amount of beta radiation decreases.

Many candidates referred to the use of protective clothing in part (c) but often candidates listed two examples of protective clothing so were only awarded one mark. The use of tongs, and keeping class way from source was also well known.

Question 11

This question was about the cost of using kitchen appliances.

Candidates in part (a) often appreciated that the fridge was on all the time but the kettle was not. A few candidates showed by calculation that the number of kilowatt hours was the same.

In part (b) only a very small proportion of candidates could calculate that it would cost 104 pence. Typically candidates used the numbers in the table without explaining why or left the question blank.

Watts or kilowatts were well known in part (c) but a small proportion of candidates gave the symbol instead.

B622/02 Unit 2: Modules B2, C2 and P2 Higher Tier

General Comments

The paper produced a full range of marks with the highest being 58 and the lowest 0. Generally candidates were entered for the correct tier with only 1% of the candidates scoring below 15 marks, who would have been better entering the Foundation Tier. The mean was 34.4 and the standard deviation 9.0. The questions seemed to be targeted at the correct level and produced good discrimination.

Comments on Individual Questions

SECTION A - MODULE B2

Question 1

The majority of candidates correctly completed the word equation for photosynthesis in part (a).

The explanation in part (b) was generally correct. Examiners were looking for a reduction in carbon dioxide (due to photosynthesis) several candidates mentioned trees producing oxygen but not removing carbon dioxide and so failed to score. There was a (too large) minority of pupils who explained that trees 'breathe in' carbon dioxide and 'breathe out' oxygen. This scored zero.

Part (c) scored lower than expected, too many candidates thought that the tall trees stopped *all* the light. At this level Examiners expected candidates to realise that some light got through but not enough for successful growth.

Candidates knew that cellulose was made from glucose/sugar/starch in part (d).

Part (e) was the lowest scoring question on the paper. Had this been a two mark question most candidates would have scored 1 by giving an incomplete answer. An important fact that identifies a parasite is that it harms the organism, which was missing from most answers. Just to say it lives on the organism was insufficient as it could be a symbiotic relationship.

Question 2

There were many incomplete answers to part (a). Being a 2 mark question Examiners were looking for two statements. The question asked how the lynx population affected the hare population so answers stating high lynx numbers = low hare numbers and low lynx numbers = high hare numbers were expected. Candidates who described the time lag were also credited, for example: the number of lynx went down after the number of hares went down because there was less food and similarly the opposite argument. Part (a) (ii) produced strange answers. Examiners were looking for the idea that there were other factors involved such as foxes having other prey and foxes and rabbits being hunted.

Part (b) was looking for an understanding of sustainability such as the idea of quotas or limiting the hunting season.

Part (c) was answered correctly by the majority of candidates. Whilst spreading the weight over a larger area or reducing the pressure was correct Examiners also allowed 'spreading the pressure' and to stop them sinking in the snow.

In part (d), a large number of candidates mistakenly thought that dandelions were pollinated by wind and described the seed 'parachutes' floating through the air. Only 50% of the top quartile managed to answer the question correctly.

Question 3

In (a) (i) candidates were able to give reasons why some fossils were missing. In (ii) the question provided good differentiation with weaker candidates describing survival of the fittest and better candidates showing knowledge of adaptation and the new characteristic being passed on.

The most common answers in (b) (i) were that mammals have fur or gave birth to live young. Part (ii) proved more difficult, Examiners were looking for the idea that they lived in the same type of environment however many candidates tried to explain it in terms of dolphins trying to look like sharks so that they did not get attacked.

Ecosystem was the most common answer in (c).

SECTION B - MODULE C2

Question 4

In part (a), most candidates gave 'to predict future eruptions' as a reason for studying volcanoes, but only the better candidates were able to give a correct second reason.

In (b) candidates knew that the rate of cooling affected crystal size. There were some excellent answers in term of intrusive and extrusive formation of rocks.

Subduction proved difficult in part (c) for all but the best candidates.

Question 5

In general candidates were able to answer 5(a) correctly.

In (b) however, a significant number of candidates did not copy the labels correctly and changed them to impure copper cathode and pure copper anode making two of the labels incorrect. As the + and – were on the diagram anode and cathode needed to be correct as well as pure and impure copper.

Question 6

Section (a) gave at least 1 mark for the majority of candidates with transparent being the most popular answer. The second mark proved more difficult with most candidates choosing the description strong which was not accepted. The mark scheme provided a vast choice of properties with shatterproof and waterproof being high in the popularity stakes.

In section (b)(i) it was clear that several candidates did not understand density and gave answers totally unrelated to the question. In part (ii) many candidates thought rusting and corrosion were interchangeable words. Examiners were lenient and allowed 'does not rust' instead of 'does not corrode' for aluminium with an explanation that a protective oxide layer was formed on the surface. This leniency, however, cannot be guaranteed for future papers and centres are advised to make sure their candidates understand that rusting only applies to iron and steel.

Question 7

Apart from (a) where most candidates correctly identified the time that the reaction stopped the question proved difficult for weaker candidates.

There was good discrimination throughout the remaining four parts. About 60% of candidates were able to explain what a catalyst does. Candidates were able to explain that there was a

larger surface area in powdered zinc, but only the best candidates went on to explain why this increases the rate of a reaction.

In part (d) candidates often stated that the particles moved faster or had more energy [1] but failed to explain that there were more *frequent* collisions or an increased *rate of* collision. Just more collisions is not a correct answer as there will be the same number of collisions – they will just take longer to happen. Examiners gave a compensatory mark for more collisions if no other mark had been scored in this section. The writing of a balanced equation was better than in previous years with approximately 2/3 of the candidates scoring at least 1 mark. The most common error (which gave zero for the section) was to use a capital letter L in $HC\ell$.

SECTION C - MODULE P2

Question 8

Part (a) scored worse than expected because candidates tended to use vague expressions such as environmentally friendly, does not harm the environment, renewable, free etc. which failed to score. Candidates needed to expand the environment answers by saying 'no carbon dioxide produced' or 'no waste products produced' and for renewable needed to say that the energy source or the sun light was renewable energy. Free again needed to be linked to the energy source.

The majority of candidates correctly answered part (b); of those failing to score the most common error was to say no light reached the photocells which is not compatible with a *reduced* power.

Part (c) was targeted at the most able pupils and proved to be a difficult question with only 6% of candidates scoring full marks and 55% failing to score.

Question 9

This question was about Near Earth Objects. Most candidates identified rock or dust as being part of a comet but only 1/3 stated that ice was the other component. Both were needed to score.

In part (b) the majority of candidates knew that the orbit of a comet is elliptical although spelling was a problem with this word. Examiners were told to be lenient but to mark incorrect any word with a c as second letter as it was thought candidates were confusing ellipse and eclipse. Drawings of the orbit were common and perfectly acceptable.

In part (c) most candidates stated that craters have been found [1] but often struggled to give a second piece of evidence. There seemed to be confusion over fossils with candidates thinking that fossils in the asteroid had been found.

Question 10

Many candidates scored full marks in part (a) but a significant number gave at least one wrong answer. 'Video recorders' was a popular wrong answer for some reason.

Candidates did not take the hint in the question in part (b) Examiners were looking for the simple answer of adding electrons.

In (c) the majority of candidates correctly stated that the radiation decreased, some thought that it stopped it completely.

The majority of candidates stated that waste was buried or dumped at sea in answer to part (d). There appeared to be some misunderstanding about encapsulating waste in glass, a significant number of candidates described the process as putting it in a large glass box and burying it rather than the idea of melting it into glass.

Question 11

Part (a) proved difficult; the question requiring re-arrangement of the expression at the front of the paper and the conversion of kW into W. The answer was 1200W but for those who forgot to convert from kilowatts a mark of 1 was awarded for an answer of 1.2.

Candidates often multiplied the wrong number by 12 in part (b). There could be no error carried forward in this part as both the cost (12p per unit) and the energy in kWh (0.6) were given in the question. It seemed clear that candidates had not realised that 'units' and 'kWh' were the same thing.

More able candidates gave correct answers for both advantages and disadvantages of off-peak electricity. Weaker candidates usually managed to give an advantage – the most common answer was cheaper. Examiners did not allow a risk of fire as a disadvantage as this is not specific to off peak and could apply to appliances left unattended during the daytime.

Grade Thresholds

General Certificate of Secondary Education
Science B (Specification Code J640)
January 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B621/01	Raw	60	-	-	-	33	27	21	16	11	0
	UMS	69	-	-	-	60	50	40	30	20	0
B621/02	Raw	60	43	34	25	17	12	9	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B622/01	Raw	60	-	-	-	37	30	23	17	11	0
	UMS	69	-	-	-	60	50	40	30	20	0
B622/02	Raw	60	47	39	31	23	16	12	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J640	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J640	0.7	7.8	29.9	62.1	86.5	93.8	97.9	99.4	100.0	676

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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