RECOGNISING ACHIEVEMENT

GCSE

Additional Science B

Gateway Science Suite

General Certificate of Secondary Education **J641**

OCR Report to Centres

June 2012

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

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

OCR will not enter into any discussion or correspondence in connection with this report.

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General Certificate of Secondary Education

Additional Science B (Gateway)(J641)

OCR REPORT TO CENTRES

Overview

The entries for B623/01, B623/02, B624/01 and B624/02 dropped slightly when compared to the corresponding session in June 2011. This may be due to increasing numbers of candidates being entered for the separate sciences.

The papers produced a full range of marks and mean marks were in the range 26.5 to 31.0. Centres entry policies were broadly correct, with only small numbers of candidates entered for the incorrect tier.

As stated last year, candidates have continued to perform well on questions involving extended writing. Good use was made of the bullet points which provide support in structuring an answer. Candidates perform well on questions requiring data analysis and interpretation and can successfully carry out single stage calculations involving selection of the appropriate formula, substitution and use of calculator to arrive at a final answer.

The writing of chemical formulae and chemical equations has benefitted from the additional care shown by candidates with the use of subscripts and upper and lower case.

In January 2013, there will be an opportunity for candidates to re-sit these units. June 2012 was the last full award for this specification.

B623/01 Foundation Tier

General Comments

The paper produced a mean mark of 31.0 with a standard deviation of 7.6. These figures are similar to performance in June 2011. The paper gave candidates the opportunity to show what they know, understand and can do. Marks ranged from 56 to zero. A small number of candidates would have been better served by entry to the Higher Tier but generally Centre entry policies were right. Assistant examiners and team leaders thought that the level of difficulty of the paper was appropriate. Most candidates could access the paper with very few questions omitted. There was no evidence of lack of time. Questions involving two or more marks were suitably differentiated for C grade candidates. The calculation questions on the paper were multi-stage which all but the better candidates struggled with.

Comments on Individual Questions

Section A – Module B3

Question 1

1(a) About two thirds of candidates correctly answered this question. Most gave 'arteries' but 'heart' was a common allowed answer. Some candidates wrote 'veins' and failed to score.

1(b)(i) Most candidates scored one mark for correctly calculating that 40% of 8.5 was 3.4(mmol). Only better candidates then correctly subtracted that from 8.5 to get 5.1 which scored two marks. Three marks were obtained by candidates who then found the difference between 5.1 and the average blood cholesterol level arriving at an answer of 0.6 mmol per litre of blood. Significant numbers of candidates subtracted 3.4 from 5.7 giving 2.3.

1(b)(ii) About three fifths of candidates correctly identified DNA in this question. The most common incorrect answer was 'chromosomes'.

1(c) Only better candidates could correctly describe diffusion in terms of particles moving from a high concentration to a low concentration. Weaker candidates talked about the particles 'spreading out' which was insufficient to score. Some thought that diffusion was the breaking down of substances again failing to score.

Question 2

2(a) This question was well answered by most candidates, who correctly matched each letter to the correct human growth phase.

2(b)(i) Cell differentiation was not well understood. The most common error was to confuse it with cell division. Answers were also characterised by a lack of precise language.

2(b)(ii) Again this question was not well answered. The mark scheme required a precise statement that larger animals have a longer gestation period or its reverse argument. Answers were often vague such as ' it depends on the size'. This was not enough to score.

2(c)(i) Only about one fifth of candidates could correctly name the placenta. Most stated 'umbilical cord' (with a myriad of incorrect spellings) and failed to score.

2(c)(i) Most candidates knew that red blood cells carry oxygen. Common incorrect answers were 'white blood cells', 'heart' or 'lungs'.

2(d) Only the best candidates realised that the foetus does not use the small intestine until after birth because it absorbs food from its mother or does not need to digest food. There were many vague answers given.

Question 3

3(a) Asexual reproduction was not well known. Common incorrect answers included 'cloning', 'photosynthesis' and 'seeds'. About 15% of candidates omitted the question.

3(b) Over half of candidates correctly stated that roots grow downwards in response to gravity. The most common distracter was 'food'.

3(c) A number of candidates gained one mark on this question usually for growth or to produce more cells. A few mentioned replacing worn out cells but very few scored all three marks. Large numbers talked about reproduction and failed to score.

3(d) This question was well answered with most scoring two marks. Where a mark was lost, it was usually for putting 'multiplication' instead of 'modification'.

Section B – Module C3

Question 4

4(a)(i) About a third of candidates scored both marks for identifying protons, neutrons and electrons and labelling them correctly. A number knew the particles but filled in the labels incorrectly often scoring one mark. A number merely wrote down the charges and failed to score.

4(a)(ii) Again about a third of candidates scored the mark for '12'. Common incorrect answers included '6' (the atomic number) or '18', presumably arrived at by adding 12 and 6.

4(b) Most candidates recognised that carbon dioxide was a gas at room temperature. A number of candidates wrote down temperatures and failed to score.

4(c) This question was well answered. Lead and tin were the most common correct answers. There was some confusion with periods by weaker candidates who often quoted 'nitrogen'.

Question 5

5(a) About a third of candidates correctly remembered the alkali metals. Common incorrect answers included 'reactive' or 'dangerous metals'. The question had a high omission rate, indicating a lack of knowledge.

5(b) Most candidates scored at least one mark, correctly noting that Group 1 metals are reactive or will react with air or water. Many scored both marks.

5(c) Many candidates scored both marks. Where one mark was scored, it was usually for linking sodium to yellow or potassium to lilac.

Question 6

6(a) Over half of candidates scored one mark on this question and better candidates scored both marks. Common incorrect responses included liquid as the state of chlorine at room temperature and a range of unacceptable colours for bromine including blue and purple.

6(b) This question was very poorly answered. The majority of candidates thought that chlorine was used to sterilise wounds. The next most common incorrect answer was as a preservative.

6(c) About a fifth of candidates gained this mark. There was much confusion concerning the endings of words. For example 'sodium bromine' and 'iodide' were common answers which failed to score.

Question 7

7(a) This question was well answered by almost all candidates.

7(b) Again the question was well answered with candidates correctly calculating £5400.

7(c) Around half of candidates correctly recognised that metals have high melting points because they have strong metallic bonds. 'Metals are superconductors' was a common incorrect answer.

7(d) About three quarters of candidates correctly identified 'electrolysis'. 'Thermal decomposition' was a common incorrect answer.

7(e)(i) Less than half of candidates stated that the formula for chalcopyrite contained 4 atoms. Some gave '3' presumably giving the number of elements. Many over-complicated the question and added together, either atomic numbers, relative atomic masses or a combination of both. '87' was a common answer arrived at by adding together the atomic numbers.

7(e)(ii) The majority of candidates stated iron, carbon and oxygen and scored the mark. 'Iron and cobalt' was a common incorrect answer.

Section C – Module P3

Question 8

8(a)(i) Almost all candidates correctly identified car **C**.

8(a)(ii) Just over half of candidates identified car **D** as being the fastest through the tunnel. Car **C** was a common incorrect answer.

8(b)(i) Most candidates recognised the need to measure the length of the tunnel or distance travelled. 'Speed' was the most common incorrect response.

8(b)(ii) About half of candidates used a tape measure or a trundle wheel to measure the distance and scored the mark. 'Metre rule' was a common unacceptable answer.

8(c) This question was not well answered. Most candidates multiplied 900 by 4 or 900 by 20 and failed to score. Candidates who wrote 'force = mass x acceleration but performed the calculation incorrectly scored one mark. Candidates who calculated the acceleration correctly scored two marks. Only the very best candidates then went on to correctly calculate the accelerating force scoring all three marks.

8(d) This was very poorly answered. The idea of calculating the area under the line was not understood. Most candidates suggested multiplying the speed by the time or suggested reading off the graph.

Question 9

9(a) This question was well answered. Candidates addressed the bullet points and most scored three marks.

9(b) Over half of candidates correctly stated 'kinetic energy'. 'Gravitational potential energy' was a common incorrect answer.

Question 10

10(a) The concept of braking distance is not well understood except by better candidates. Candidates were required to make it clear that they meant the **distance** travelled whilst braking. Many answers began with 'the time it takes.....' or 'how long....' and failed to score.

10(b) Again this was poorly answered. The use of the misconception with relation to time was repeated here with vague answers. Few realised that it was the thinking distance and braking distance added together.

10(c) This question was better answered, although a number of candidates ticked both boxes for a condition and lost marks. Over half of candidates scored both marks.

10(d) This question was well answered with 'seat belts' and 'crumple zones' being the most common correct answers.

Question 11

11(a) The majority of candidates correctly selected 'John' as the person doing the least work. 'Phil' and 'Mike' made occasional appearances.

11(b) Well over half of candidates recognised the need to measure the time in order to calculate the power. A number suggested 'pulse rate' and failed to score.

B623/02 Higher Tier

General Comments

The paper differentiated well allowing candidates to demonstrate their knowledge and understanding of science. Candidates performed slightly better on the Chemistry section than on the Biology and Physics sections. The average mark for this examination paper was 27, and the marks awarded covered almost all the mark range.

Candidates performed well on questions that involved analysis and interpretation. In some questions candidates needed to have a more secure knowledge of aspects of the specification.

Candidates used their knowledge and skills appropriately to respond to the questions on the circulatory system, diffusion in the human body, atomic structure and bonding, metals and speed and acceleration.

Candidates did not seem to have the knowledge required to respond to questions about cloning, genetic coding and forces & motion.

Comments on Individual Questions

Section A – Module B3

Question 1

This question tested ideas about growth.

(a) Most candidates made a good start to the paper, scoring at least one mark. Mitosis was the most common correct response. Centres should advise candidates that when a question asks them to indicate **two** correct responses, then each extra incorrect response results in the loss of a mark down to zero.

(b) Good responses were rare, but described the idea that humans tend to grow to a finite size whereas plants can grow continuously. When candidates did not gain credit it was usually because they referred to cell division or the idea that plants need sunlight to grow and humans do not.

(c) Good responses to this question identified that larger animals need a longer gestation period. Others needed to develop their answers beyond superficial references to the gestation period depending on the size.

(d) To gain the mark candidates needed to appreciate that undifferentiated cells are able to take on new roles / become specialised / develop into different kinds of cells.

(e) Less than 5% of candidates scored this mark. To gain credit candidates needed to appreciate that multi-cellular microorganisms have a large surface area to volume ratio. Unqualified references to surface area were frequently seen.

Question 2

This question was about the circulatory system and diffusion in the human body.

(a) Good responses to this question described how cholesterol can build up to form a plaque, which then restricts or blocks blood flow in arteries. Incorrect use of scientific terminology, such as references to veins or capillaries, was penalised.

(b) Many candidates scored three marks for the correct calculation of 0.6 mmol per litre of blood. One mark was scored for working out 40% of 8.5, and a second mark was available for subtracting this answer from 8.5. Error carried forward was allowed over the three calculation steps.

(c) The idea of diffusion was well understood by candidates.

(d) Many candidates were able to describe how the small intestine is adapted to absorb food efficiently. When candidates did not gain credit it was usually because they were inaccurate in their use of scientific terminology, e.g. referring to the small intestine having thin cell walls.

Question 3

This question was about genetics.

(a) Candidates were usually able to complete the sentences correctly in part (i). However, very few candidates gained credit in part (ii) for appreciating that plant cells retain the ability to differentiate whereas animal cells usually lose this ability at an early stage. Many answers discussed ethical issues about cloning.

(b) Good responses to this question identified that the base sequence or base code determines the amino acid sequence and that this sequence of amino acids makes up a protein. Candidates who failed to gain credit often made no reference to amino acids (e.g. the base code determines the protein) or were not precise enough in their answers, usually omitting the word 'sequence' (e.g. amino acids make up proteins). Precise and accurate use of terminology was essential to gain credit in this question.

Section B – Module C3

Question 4

This question was about atoms.

(a) Most candidates correctly labelled the diagram of the atom in part (i). The mass number of the carbon atom was usually correct in part (ii), although the atomic number of 6 was a common error.

(b) In part (i) D was a common incorrect response. Covalent bonding was usually correct in part (ii), although 'ionic' was a common error.

(c) Good responses to this question explained the low melting point of carbon dioxide in terms of weak intermolecular forces and the poor electrical conductivity in terms of an absence of free or delocalised electrons. When candidates did not gain credit it was usually because they confused intermolecular and intramolecular bonds or attributed the lack of electrical conductivity to full electron shells.

Question 5

This question focused on Group 1 metals.

(a) Many candidates appreciated that the Group 1 metals all have one electron in their outer shell.

(b) This question required candidates to write a balanced symbol equation for the reaction of sodium with water. One mark was awarded for the correct reactants and products and one mark for the correct balancing. The balancing mark was dependent on the correct formulae, but one mark was allowed for a balanced equation with a minor error in subscripts or formulae. When candidates did not gain marks it was often because they attempted to balance the equation by placing numbers within the formulae, e.g. 2Na2OH.

(c) Good responses to this question explained that potassium loses its outer electron more easily than sodium. Others needed to develop their answers beyond superficial references to potassium being further down Group 1.

Question 6

This question focused on Group 7. Some interpretation of data was required.

(a) Many candidates interpreted the data in the table correctly giving the state of chlorine, the colour of bromine and the atomic radius of astatine. Liquid was a common error for the state of chlorine, as was pale blue for the colour of bromine.

(b) Many candidates wrote the correct word equation for the reaction between bromine and sodium iodide in part (i). When candidates did not gain credit it was usually because they wrote sodium bromine or iodide. Candidates found the ionic equation in part (ii) very challenging.

Question 7

This question was about metals.

(a) Good responses to this question identified that the electrical conductivity of copper is similar to that of silver, but copper is cheaper.

(b) Many candidates suggested that copper is useful for the base of a saucepan because it is a good conductor of heat. Credit was also given for the idea that copper is malleable, does not corrode or is lustrous.

(c) Most candidates appreciated that metals have high melting points because they have strong metallic bonds.

Section C – Module P3

Question 8

This question was about speed and acceleration.

(a) Most candidates chose D, the car that **accelerates** most, rather than E, the car that **decelerates** most.

(b) Most candidates correctly calculated the length of the tunnel as 600m.

(c) Many candidates gained three marks for calculating the accelerating force as 4500N. One or two marks were available for correct steps in the calculation if the final answer was incorrect.

(d) To gain the mark candidates had to appreciate that the area under the graph represented the distance travelled. This was not well known.

Question 9

This question tested ideas about thinking, braking and stopping distances.

(a) Most candidates completed the table correctly.

(b) Good responses to this question appreciated that car B brakes after car A and that car B had not left enough braking distance. Credit was also given for appreciating that car B overtakes car A where the graphs cross. Many candidates thought the graph was a speed-time graph and gave explanations in terms of car A traveling faster than car B.

Question 10

This question focused on road safety.

(a) Good responses to this question used the data in the table to identify the concrete barrier as the safety feature that is likely to result in the most injury because the stopping distance is small and/or the stopping time is short, which will result in a large acceleration and large force. When candidates did not gain full marks it was usually because they simply quoted data from the table, rather than **using** the data to develop their explanation.

(b) This question required candidates to appreciate that the reduced frictional force, caused by slippery road conditions, will result in less deceleration hence the stopping distance increases. When candidates did not gain credit it was usually because they simply restated the information given in the question.

Question 11

This question was about the forces on falling objects.

(a) Many candidates correctly labelled the forces acting on the ball. Some candidates did not understand the difference between force and energy, with arrows showing kinetic energy and gravitational potential energy.

(b) In part (i) candidates were required to appreciate that at terminal velocity the forces on the ball are balanced. Good responses to part (ii) described that gravitational potential energy decreases as the ball falls and kinetic energy increases until terminal velocity or increases and then remains constant. Many candidates simply stated that the kinetic energy increases and did not gain credit.

B624/01 Foundation Tier

General Comments

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates, producing a good distribution of marks, covering almost the whole mark range available. All candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions.

There was however a few candidates that scored zero marks on the paper.

The quality of candidates' spelling, punctuation and grammar was poor in some cases and there were times when deciphering a candidate's writing posed a serious difficulty.

Comments on Individual Questions

Section A – Module B4

Question 1

(a) The majority of candidates were able to correctly identify the leaves in part (i). In part (ii) about half the candidates gave the correct answer, chlorophyll tended to be the most common incorrect answer. A common misconception in part (iii) was that water enters through pores.

(b) Few candidates understood that the beetles feed from phloem tubes and even less understood the concept of biomass. Many thought you could burn dead animals for fuel.

(c) The majority of candidates failed to interpret the graph correctly. In part (ii) they often thought the temperatures were decreasing. The concept of negative numbers proving too difficult at this level.

(d) Candidates tended to lose the mark because they referred to killing beetles instead of eating them.

Question 2

(a) Very few candidates answered part (i) correctly. They tended to say it was simply the organism at the start of the food chain and not that it was able to make its own food. About half the candidates gained both marks in part (ii). Some candidates were confused by the birds and incorrectly put four levels in their pyramids.

(b) Over half the candidates were able to identify hydroponics.

(c) Candidates tended to answer both parts correctly.

Question 3

(a) The majority of candidates correctly gave bacteria or fungi as an answer.

(b) Most candidates incorrectly answered in terms of air or even to keep the steam or heat in, failing to realise that the seal stops bacteria entering the bottle.

(c) The majority of candidates gained both marks. Those that scored only one tended to get the pickling idea correct.

Section B – Module C4

Question 4

(a) Most candidates were able to gain at least two marks out of three, mainly for the wash temperature and not ironing. Many incorrectly thought the shirt could not be tumble dried.

(b) Incorrect answers tended to be vague comments about being 'environmentally friendly' or it would take less time.

(c) Very few candidates understood the role of enzymes. Many simply said they removed dirt and did not refer specifically to food stains.

Question 5

(a) Over half the candidates correctly identified neutralisation. However catalysis was seen as a common error.

(b) About half the candidates could calculate the mass of water but very few could calculate the mass of potassium nitrate. Many candidates failed to answer part (iii) correctly. A common error was to divide 5.5 by 4.4 instead of the other way round. Some candidates scored one mark because they forgot to multiply by 100.

(c) Few candidates were able to identify phosphorus. A number of candidates gave elements already in potassium nitrate and many suggested compounds such as water.

(d) Most candidates gained at least one mark by answering in terms of increased crop yield. Fewer realised the crops would grow faster.

Question 6

(a) Many candidates struggled with this question often making multiple attempts with three or four scribbled out curved lines. The diamond response was usually correct but the other two were often reversed.

(b) Some candidates lost the mark with vague answers such as 'tools'.

(c) Candidates struggled to explain that graphite has layers that slide off to leave a black mark on the paper. Many gave answers linked to simple properties such as soft or conducts electricity.

Question 7

(a) The majority of candidates correctly identified energy production. Some however went for public water supply to households as this had the word 'water' in it.

(b) Most candidates were able to make the correct calculation.

Section C – Module P4

Question 8

(a) Many candidates gained both marks. Some however incorrectly gave the answer static.

(b) Candidates tended to correctly answer both parts (i) and (ii).

(c) Candidates found it more difficult to describe another use in part (c). Many incorrectly referred to balloons.

Question 9

(a) Only the more able candidates were able to calculate resistance. Many candidates used 12 volts as they added the voltage across the resistor to that of the cells.

(b) Few candidates showed an understanding of value in part (i) and simply said it would increase without stating it would be 10Ω. More candidates gave the correct answer in part (ii).

Question 10

(a) Only the more able candidates were able to gain all three marks. Many candidates confused X-rays with gamma rays. In some cases candidates lost out on marks by giving both correct and incorrect uses. Doctors or nurses were mentioned more than the correct answer of radiographer.

(b) Most candidates were able to describe the change in activity for part (i). However few could identify the nucleus in part (ii).

(c) Few candidates gained both marks. Most of the answers were simple guess work showing little understanding.

Question 11

(a) Many candidates scored at least one mark but many thought ultrasound is used to sterilise hospital equipment or that it was an electromagnetic wave.

(b) Candidates gave the incorrect answer of amplitudes more often than wavelength. The confusion over time and wavelength did not seem to affect any candidates.

B624/02 Higher Tier

General Comments

The paper produced a mean mark of 26.5 which was lower than the June 2011 performance. The paper gave candidates the opportunity to show what they know, understand and can do. Marks ranged from 58 to zero and a standard deviation of 10.8 was achieved. About 3000 candidates scored less than 15 marks and would have been better served by entry to the Foundation Tier. Assistant examiners and team leaders thought that the level of difficulty of the paper was appropriate. Most candidates could access the paper with very few questions omitted. There was no evidence of lack of time. Questions involving two or more marks were suitably differentiated for A grade candidates. Performance on calculation questions was generally good even by weaker candidates. The exception was question 8c which was a difficult reacting masses calculation.

Comments on Individual Questions

Section A – Module B4

Question 1

1(a)(i) About two thirds of candidates correctly identified phloem. A range of spellings was seen including pholem, phleom, plohem and phelem.

1(a)(ii) Candidates found it difficult to express their ideas about the xylem being blocked and many thought that the phloem carries the minerals.
A number of candidates wrote about insects feeding off the minerals or there being no minerals in the soil.

1(a)(iii) Candidates did not appreciate the need to explain the role of the (guard) cells in closing the stomata. Many mentioned that guard cells were involved but failed to explain that it was due to water leaving the guard cells by osmosis that caused the stomata to close. If any marks were awarded it was usually for recognising that guard cells became flaccid. Answers often included why it was important that the stomata should close rather than the mechanism of closure.

1(a)(iv) Very few candidates gained this mark. Most thought that the trees were burned as soon as possible to make sure they did not decay or that this was so the energy they produced did not decrease in some way or before nutrients were lost. Only the best candidates appreciated that burning the trees would kill the beetles and stop the infection spreading.

1(b)(i) Less than half of all candidates gave the correct answer of 2002 (2001 was also accepted). A significant number gave answers of 1985 or 1996 and failed to score.

1(b)(ii) Most candidates realised that the graph shows that temperatures are increasing but some thought that -6^0C was warmer than -3^0C. Those candidates that identified that the temperatures are increasing often explained that more beetles would survive scoring the second mark.

Question 2

2(a) About two thirds of candidates drew the pyramid of biomass correctly. Many placed hedgehogs on the bottom layer and some even drew the pyramid upside down. A smaller number had four levels and scored zero.

2(b)(i) This was not well answered with candidates writing many different answers including detritivores, detritus, anaerobic bacteria and algae.

2(b)(ii) For photosynthesis or to make chlorophyll were well known by more than half of candidates.

2(b)(iii) This was well answered. If one mark was awarded it was usually for 'respiration'. The answer 'concentration gradient' was usually the one that candidates gave incorrectly. They tended to write just concentration or did not attempt an answer.

Question 3

3(a)(i) Less than 10% of candidates gave the answer 'saprophytic'. Many wrote fungi or did not attempt an answer.

3(a)(ii) Many gave vague answers such as 'grows faster' and 'best conditions' or thought it was because there is less water when it is hot. The mark scheme required faster respiration or faster reproduction.

3(b) This was not well answered and many candidates clearly did not know how salt preserves food. Most wrote about the salt removing water from food and so making it too dry for the bacteria to feed on it. A few thought that salt altered the pH of the food. Those that did achieve one mark wrote about the salt killing the bacteria.

Section B – Module C4

Question 4

4(a) This was well answered with a variety of correct answers including saving energy, not damaging clothes and 'so dyes do not run'.

4(b) This was well answered compared to previous years. There were some excellent labelled diagrams and clear explanations about the hydrophobic and hydrophilic ends of the molecule. Some candidates even drew their diagrams in numbered stages to help explain the whole process.

4(c)(i) Many candidates just wrote about not using water but failed to mention that another solvent would then be required. A common misconception was using steam instead of water.

4(c)(ii) About half of candidates correctly answered this question. If this was answered correctly then candidates usually wrote about dry cleaning being used for materials that are damaged with normal washing using water.

Question 5

5(a) Less than half of candidates scored the mark for this question. A large number of candidates just added the two masses together and gave the answer of 35.7(g).

5(b) This question was very well answered but a few candidates tried lots of different combinations to try to get the value of 80% without actually thinking about the equation of actual mass divided by predicted mass.

5(c) Candidates found this calculation much more challenging. Those candidates who set their working out with the relevant numbers under the chemical names in the equation they had been given tended to gain some of the marks available. The most common error was in calculating the relative atomic mass of ammonia as 2 x 14 + 3 = 31 instead of 2 (14 +3) = 34.

5(d) Candidates tended to correctly link that nitrogen is required to make protein and that protein is needed for growth. Some thought that nitrogen contains protein or amino acids. Others thought that nitrogen is needed for photosynthesis or to make chlorophyll.

Question 6

6(a) Many candidates wrote about strong bonds or just wrote about strong forces between the structures and failed to score. The mark scheme required reference to 'strong covalent bonds' or 'many strong bonds'.

6(b) This was well answered by over half of candidates with many explaining that graphite is used in pencils because it has weak bonds between layers that makes the layers slide easily onto the paper. A few thought that graphite was used because it was cheap, strong, hard, non poisonous or was easy to make into pencil shapes. A few candidates wrote about lead rather than graphite.

6(c) 60 was the usual answer but 80 was the next most chosen number.

6(d) Many candidates did not know any uses of nanotubes. Some candidates only gave generalised answers including 'in computers', 'in medicine', 'for electrical conductors' and 'in tennis rackets' and so did not gain the marks.

Section C – Module P4

Question 7

7(a)(i) Many candidates just wrote about the picture of the hairs with the positive charges rather than why they repel each other. Some recognised that each hair has the same or like charges and that this is what was causing them to repel.

7(a)(ii) Less than half of candidates correctly answered this question. Many candidates did not refer to electrons and those that did often thought that the electrons had a positive charge. Some candidates had positive charges moving one way and negative charges moving the other way.

7(b) The candidates that approached this answer in terms of electrons usually gained both marks. Again a number of candidates thought that electrons have a positive charge.

Question 8

8(a) This question was not as well answered as calculations in Section C usually are on the Higher Tier paper. This was because candidates were given three different values for the voltage and so as well as using the correct equation they also needed to choose the correct value of V for resistor R.

8(b)(i) Many candidates failed to realise the link between doubling the supply voltage and that this would double the value of the voltage across resistor R. Many just wrote that the voltage would increase rather than write about what happens to the **value** of the voltage. A few candidates did work out that the voltage would increase from 5.0V to 10.0V.

8(b)(ii) Just over half of candidates realised that the current would decrease but a surprising number thought that the current would 'get slower'.

Question 9

9(a) This question was structured to enable candidates to write about the three different ideas. Many of the weaker candidates just repeated the ideas without explaining them, e.g 'the beam is rotated to minimise damage to healthy human tissue'. The idea that the centre of rotation is on the tumour was not often seen. Candidates that gained all three marks usually wrote about the beam being concentrated only on the tumour and not the healthy tissue and that it was rotated to make sure the beam gave a full dose to the tumour from all angles. Some candidates thought that healthy tissue was protected by using lead aprons or because the gamma rays pass through the body. A worrying number thought that gamma radiation is used because it is safe and no harm is caused to healthy tissue. Some answers appeared to be about the use of gamma radiation for diagnosis rather than therapy even though 'treat' was in the question.

9(b) Candidates found it difficult to explain half-life. Many were not precise enough with their explanations and just wrote about the time it takes for atoms to half or for nucleus to half. The second explanation about which isotope is the most suitable was not well answered either. Many thought it was isotope X because the curve on the graph was flatter or thought it was isotope Y because it had a longer half-life.

9(c)(i) As candidates had a list to choose from, this was generally well answered but a surprising number of candidates mentioned X-rays and gamma rays.

9(c)(ii) This question was one of the most common to be left as no response, even when the rest of the paper was completed. The most common mistake was writing 52 instead of 54.

Question 10

10(a) Candidates found the task of completing the sentences quite difficult without a list of words to choose from. Many did know that, in an ultrasound scan, waves are reflected to the detector and that they are used to break up the stones. Fewer knew that the stones are vibrating at very high frequency.

10(b) Over 90% of candidates knew that ultrasound waves are above the range of human hearing.

10(c) Candidates answers varied considerably when describing what is meant by the frequency of a wave. Either there was a really clear description of the number of waves in a certain amount of time, often with the units of Hz quoted, or candidates simply did not know and wrote about peaks and troughs or wavelength.

B626 (Incorporating separate Biology B636, Chemistry B646 and Physics B656)

General Comments

This is the final Principal Moderator's report for this specification.

Over the last five years the performance of candidates has steadily improved as Centres came to realise what was required and developed strategies to develop their candidates' performance. It has been a successful mode of assessment some aspects of which are retained in the new Controlled Assessment tasks.

Skills and strategies developed for the Data Task and Research Study still have some validity in the new form of assessment as exemplified below.

Research from identified sources in response to given topics is clearly common to both assessments.

Planning an investigation is also common though significantly more detail is required in the plan for the new Controlled Assessment than was required in the answer to Q5 in the Data Task.

'Interpreting the data' and 'Processing data' have much in common though more is required in the latter in terms of treatment of uncertainty.

'Analysis of the data' and 'Analysing and interpreting' are also similar though again the latter is complicated by the requirement to consider secondary data. This consideration makes assessment of validity easier in the Evaluation section.

Evaluation is common to the two assessment schemes. Though the criteria are not identical, they are very similar.

The sections on conclusions also have their similarities with the addition of a link back to the research in the Controlled Assessment version.

Centres intending to undertake Gateway Controlled Assessment for the first time next year are encouraged to read the Principal Moderator's report for B713.

Data Task

A: Candidates usually showed ability in this quality. Graphs were correctly plotted on axes which were appropriate though sometimes units and titles were missing. The main problem found was graphs which were rather too small either because axes were inappropriately scaled or because the area of the grid covered was too limited.

B: Marks of four in this quality were common reflecting the ability of candidates to undertake simple processing such as averaging and to describe the basic pattern observed. Justified marks of more than four were rare as few candidates undertook significant further processing. Where Centres had provided hints as to what might be attempted, this was not often successful as candidates did not appreciate the reason for the processing and, thus, failed to reveal any additional information.

C: Candidates still find difficulty in addressing both data and method in this quality. Answers which examined the method in detail without considering the data were not worth much credit. The best way to cope with this quality is to start with the data and proceed to explain how the method affected the data described. There was some improvement in the performance of candidates in this quality.

D: Poor conclusions did not link with the data produced during the task and did not adequately use scientific explanations to explain the patterns found. There was also a problem with candidates miss-remembering explanations which they had been given in advance of attempting the task. Good answers were given by candidates who understood the science behind the investigation and who explained it by linking their explanation to results obtained.

E: It is important to realise that the experiment described must answer the question posed. Alternative experiments scored few marks. In order to score four marks the experiment must be described in sufficient detail to allow it to be performed by a third party. The variables and how they will be controlled/measured must be there as must a range of values to be used. Without a sufficient plan, answers to the second part of the question could be given no marks.

Research Study

A : Over the years, candidates have become better at scoring marks for this quality. In many Centres most candidates scored well with answers to all five questions clearly referenced with their sources. The sources were referenced either with a full URL or with sufficient details of a book and author.

B: Again the performance of candidates seems to have improved over the life of the specification. Candidates are including some science in their answers and even where this is copied or paraphrased from a source it is worth some credit if it is relevant. The best answers were where candidates had internalised the science and then used it to explain their answers to the questions.

C: Similarly candidates were, for the most part, able to relate their answers to the topic of the study through exploring areas on the specification in more depth or in explaining links to connected everyday topics. Again the best answers were those in the candidate's own words making use of information gleaned from sources.

D: Centres were usually quite accurate in awarding marks for this quality and it was quite rare to have to change them. Where this did prove necessary it was because there were many 'quotes' from sources which were not in the candidate's own words. Only the candidate's own work can be given credit for QWC.

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