OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science B

Gateway Science Suite

General Certificate of Secondary Education **J262**

Examiner's Report

January 2013

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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.

CONTENTS

General Certificate of Secondary Education

Additional Science B (Gateway)(J641)

OCR REPORT TO CENTRES

Overview

This session presented the second opportunity for candidates to enter a paper for this specification. B721 was offered at foundation and higher tier and both tiers attracted a significant number of entries.

The standard of the candidates' responses was higher than in the corresponding paper last summer and the mean mark in both tiers has increased.

Answers to the extended writing questions have improved, as have answers to questions involving data analysis. This includes both graphical and numerical questions. The exception to this was in the calculations involving atom economy, where many candidates confused this idea with efficiency. Candidates also need to pay more attention to stating the correct units in their answers to calculations.

More care is being shown in the writing of chemical equations using symbols. Fewer marks were lost through incorrect subscripts and errors with the case of letters. In many scripts it was clear that it was the recall questions that candidates found most difficult.

More detailed comments on specific questions are provided in the Principal Examiner reports.

B721/01 Foundation Tier

General Comments Section

Candidates used their knowledge and skills appropriately to respond to the questions that involved interpreting graphs. These included the growth curve, rates of reaction curve and the level of response question comparing acceleration between two different speed-time graphs. Candidates also used their knowledge and skills to answer questions involving data and the interpretation of data. These included questions about VO_2 max, relative formula mass and fuel consumption. Candidates used their skills to answer questions requiring an explanation or a suggestion to new situations. These included the suggestions about why having a larger heart helps cross-country skiers, why new drugs must be tested before they are used and the benefit of wearing a padded harness.

Candidates did not seem to have the knowledge required to respond to questions about practical methods. These questions included the preparation of a microscope slide to observe cells in onion tissue and the level of response question asking for a description of an experiment used to compare the energy content of different fuels. Candidates also did not seem to have the knowledge to calculate atom economy.

Comments on Individual Questions

Q1(a)(i)   Most candidates gained the mark by identifying 'the diameter' as the measurement made to show growth.

Q1(a)(ii)   Most candidates correctly suggested a comparative reason for choosing 'Spencer's Glory'.

Q1(b)   To get marks, candidates needed to describe the practical procedure required to make a microscope slide of onion tissue. Answers including 'use small pieces of onion' and 'use a slice of onion' were not sufficient for the requirement to have a thin layer of onion tissue.

Q2(a)   Good answers included an understanding that muscle contraction requires energy.

Q2(b)(i)   Most candidates correctly described the relationship between fitness and VO_2 max.

Q2(b)(ii)   Using the graph to calculate the VO_2 max was well done by candidates.

Q2(b)(iii)   Most candidates gained the mark by describing the calculated value as being below the minimum required to be a cross-country skier.

Q2(c)(i)   The best answers linked a larger heart to being able to pump more blood and therefore oxygen to the muscles. Some candidates, although knowing a larger heart pumps more blood, had difficulty relating this to how it helped cross-country skiers.

Q2(c)(ii)   Most candidates used their knowledge of platelets to suggest a problem they would cause if they accumulated in the heart. Good answers also included linking the blood clotting to the blood vessels becoming blocked.

Q2(c)(iii)   Candidates gained the mark by explaining that the percentage in the sample and the percentage in the whole population were similar. Some candidates had difficulty explaining the similarity.

Q3   Candidates achieved higher marks when they described or gave specific examples of natural and artificial cloning in animals and plants. The best answers were those that were well organised and clearly identified the different types of cloning.

Q4(a)   Candidates needed to know that a change in the structure of a gene is a mutation.

Q4(b)(i)   This question differentiated well. To get all the marks candidates had to name the acid as lactic acid and state that it is made by anaerobic respiration.

Q4(b)(ii)   Candidates answered this question either in terms of the blood cell not fitting through blood vessels or in terms of a reduced surface area.

Q5(a)   To get marks for this question, candidates needed to identify a property of diamond that would be useful in cutting tools. Answers such as 'strong' and 'sharp' did not get marks.

Q5(b)   Most candidates gave at least one property of graphite.

Q6(a)   Good responses described 'continuous' as constantly being made and 'batch' as being made on demand. When candidates did not get both marks it was because they wrote about quantities rather than processes.

Q6(b)(i)   Candidates needed to know the difference between reactants and products and also the difference between formula and the names of chemicals.

Q6(b)(ii)   Candidates gained the mark for calculating the relative formula mass of hydrogen chloride. Some candidates gave the relative formula mass for just chlorine.

Q6(b)(iii)   This was a challenging question. Candidates needed to know how to calculate atom economy.

Q6(c)   Most candidates gained the mark by giving the reason for testing medicine as 'to check for   side effects'.

Q7   Candidates were able to gain marks by describing the experiment. Higher marks were achieved when the descriptions of the experiment were detailed and included all the measurements required. A detailed method together with fuel C identified as the one with the least mass burnt gave some candidates all six marks. The best answers were those that wrote a clear, detailed and organised method with a conclusion identifying the correct fuel.

Q8(a)   Most candidates gained the mark for a correct word equation. The inclusion of 'gas' or 'solution' did not get the mark.

Q8(b)(i)   Using the graph to find the time taken to produce 50 cm^3 of gas max was well done by candidates.

Q8(b)(ii)   Using the graph to find the volume of gas made when the reaction finished was well done by candidates.

Q8(c)   Candidates needed to explain why the reaction stopped. It was necessary to name one or both of the reactants or to mention the word 'reactant' to get this mark.

Q8(d) Most candidates gained a mark for describing the rate of reaction as increasing. Good answers linked this to an increase in surface area. Some candidates chose to answer this question in terms of collisions and were able to achieve both marking points with this approach.

Q8(e) This question differentiated well. To get all the marks candidates had to write about different ways of increasing the rate of reaction. Good answers included different methods or an explanation of a particular method.

Q9(a) Candidates needed to know that the highest position in this situation had the greatest gravitational potential energy.

Q9(b) Candidates needed to know that the most mass in this situation had the highest momentum.

Q9(c)(i) To get a mark for this question, candidates needed to understand that force acts on people as the car stops. Answers such as 'momentum' and 'push' did not get marks.

Q9(c)(ii) Good responses included the padding absorbing energy and changing shape. Most candidates appreciated that harnesses are used to keep people in their seats. Answers such as 'reduces injury' and 'protects them' did not get marks.

Q10 Good responses identified the changes in acceleration over the whole race and compared them for the two runners. When candidates did not get all the marks it was because they described the shapes of the graphs or the changes in terms of speed rather than the acceleration. The best answers were those that used the numbers on the graphs to describe the different sections of the race.

Q11(a) Candidates needed to know that the unit of power is the watt.

Q11(b) This question differentiated well. To get all three marks candidates had to use the data in the table to find the type of fuel, the size of the engine and the fuel consumption of the most efficient car. Most candidates were able to estimate the fuel consumption but some candidates had difficulty choosing the type of fuel.

Q12(a)(i) Most candidates gained the mark by describing the braking distance as the distance taken once the brakes have been pushed.

Q12(a)(ii) Most candidates gained a mark for describing the relationship between deeper tyre tread depth and a shorter braking distance. Good answers also linked this to stopping quicker or less likely to hit the car in front.

Q12(b) This was a challenging question. Candidates needed to use the data in the table to discuss the advantages and disadvantages of the new tyres. When candidates did not get marks it was because they repeated the information in the table without explaining it or only described the advantages of the new tyre.

Q13(a) Most candidates named the upward force as air resistance.

Q13(b) Good responses included details of the position of the body to reduce the horizontal surface area.

Q13(c) Most candidates gained a mark for describing what happens to the terminal velocity. Good answers linked this to an increase in surface area or air resistance.

B721/02 Higher Tier

General Comments:

This is the first sitting with significant numbers of candidates in this new specification. This paper seemed to be targeted at an appropriate level but there were few cases where many answers were left blank. On the other hand, examiners reported that candidates were often writing outside the lined answer areas. It may be that this lack of conciseness caused some candidates to be short of time on the paper. For some candidates it was probably more a case of them being entered for the higher tier whereas a foundation tier entry would have been more appropriate.

It was pleasing to see that candidates were improving in terms of graphical and mathematical skills but Q8(b)(ii) indicated that they need to pay more attention to stating the correct units. Also it was good to witness a continued improvement in the writing of chemical equations.

The longer answer questions were generally well answered, although only a small number of candidates could clearly describe the nature and therapeutic use of stem cells.

Comments on Individual Questions:

Q1(a) Most candidates correctly compared the movement of skiers and runners; however few were able to correctly link this to the role of the mitochondrion. There were a number of references to mitochondria 'making or producing energy'.

Q1(b)(i) Many candidates missed the link to anaerobic respiration and simply wrote about the short time needed.

Q1(b)(ii) This question was well answered, with only a few candidates misreading the graph or clearly not having a calculator to work out the answer.

Q1(b)(iii) Most candidates were able to easily identify that he was below the range needed.

Q1(c)(i) There was a range of incorrect answers to this question, including ventricles, valves, aorta and vena cava.

Q1(c)(ii) Unfortunately, few candidates used numbers to show that the results were similar – most gave a qualitative answer.

Q2 In their answers candidates were expected to refer to the nature of stem cells, how they could be used to treat certain medical conditions and the pluripotent nature of embryonic stem cells. The nature of stem cells as undifferentiated/unspecialised cells was referred to by a range of candidates. The use of stem cells was sometimes a little vague, with some just referring to them being life saving (as stated in the question). There were a number of references to leukaemia, cancer, genetic diseases and saviour siblings. The comparison of the properties and use of the two types of stem cells was a good differentiator of the better candidates.

Q3(a) Those candidates who scored marks tended to state 'haemoglobin carries oxygen' or referred to the formation of oxyhaemoglobin. Few gained the consequential mark ('lungs') and fewer wrote about the release of oxygen at the tissues. A number of candidates wrote about red blood cells rather than haemoglobin.

Q3(b) This was an excellent differentiator question, with only the most able candidates understanding the change in base sequence of DNA and the consequential change of amino acid sequence.

Q3(c) Some candidates were confused with ideas of enzymes and referred to the cell being denatured. Others stated that new shape is not as good at holding oxygen as it no longer has a dip in it. The surface area idea was correctly identified by some candidates and some correctly mentioned the possibility of getting stuck in capillaries, although many answers vaguely referred to movement difficulties and so did not score.

Q4(a) Most candidates correctly identified mitosis but there were a number stating meitosis, meiosis or miosis.

Q4(b)(i) Well answered.

Q4(b)(ii) Most candidates realised that this was a size issue, although there were incorrect ideas that plant cells do not have ribosomes, ribosomes are only found in the nucleus and ribosomes are not yet developed.

Q5(a) Many candidates described diamond as 'strong' rather than 'hard'. Others referred to 'hard to break', although a number achieved both marking points. Many made references to strong covalent bonds, without applying this to the question.

Q5(b) The majority of candidates were not clear on the structure of graphite and made references to weak bonds between strong bonds or weak covalent bonds. There was a clear divide between those who knew exactly what was right and those who were trying to make something of the diagram.

Q6(a) There was considerable confusion between ideas of efficiency and atom economy, with a number of answers coming up with 100%. Some candidates clearly ignored the information given in the table and tried to work out the relative molecular mass of each compound.

Q6(b) There were a number of vague ideas about cost, although many candidates are starting to correctly qualify cost ideas. Many made it unclear if they were referring to either the wanted or waste product.

Q6(c) Some candidates gave lists of how medicines were tested rather than explaining the problems in the testing process. Some candidates seem to think it is illegal to test on humans or animals.

Q7 Good numbers of candidates gained marks for calculating the two temperature differences for B and C, with some partial calculation beyond that. A much smaller number were able to see the full calculations through to level 3.

Some either gave a method description without any attempt at calculation, while others gave no method.

Q8(a) Candidates are certainly getting better at writing equations, with fewer candidates losing marks through poor presentation, being unclear about capitalisation and using superscripts.

Q8(b)(i) 105 was the most commonly seen incorrect answer.

Q8(b)(ii) A large number of candidates forgot units or used incorrect units here. A few calculated 50 x 20 or 20/50.

Q8(c) Many candidates had learnt this explanation and scored all 3 marks.

Q8(d) Again, many candidates understood the idea of more surface area and scored full marks.

Q9(a) Many answers included a clear statement of D being the highest point, with a few concisely tying the answer to 'h' in the equation.

Q9(b) A number of candidates correctly referred to the mass of the car itself but many used the term weight, which did not gain credit, while others referred to the fact that it was moving or attached to the other cars and therefore had momentum.

Q9(c) Most candidates wrote about 'absorbing energy' or 'cushioning the sudden stop'. The majority did not see the parallel with car safety and did not use ideas of increasing stopping time or stopping distance.

Q10 Many candidates could make something of the graphs and appreciated that Finn was faster than Helen at the start but did not express the idea of acceleration clearly. Far more were able to say that 'Finn slows down (dramatically)', but that Helen's speed remained constant. Some candidates thought Helen had stopped running at 900 seconds.

Actual calculations were variable; many candidates being out by a factor of x10, x100 if they attempted to work out the comparative accelerations.

Q11(a) Very few marks were scored on this question. Candidates wrote long paragraphs, but were not able to clearly identify reasons for the differing emissions. Most usually they simply re-phrased information in the question without adding anything original.

Q11(b) Driving styles, speed, mass of car and size of engine were common responses. Some candidates continued with a link to the previous question and tried to write about emissions.

Q12(a)(i) Most candidates only doubled the braking distance and so few achieved a mark.

Q12(a)(ii) Descriptive answers about taking a long time to stop, skidding or crashing were all non-productive answers.

Q12(b) Many candidates appreciated that the new style tyre would last longer and regular checking or changing the tyre at 4mm was a good way of limiting risk. Others wanted drivers to use the car less, drive more slowly or brake less harshly.

Q13(a) Only a minimal number of candidates explained the dynamics of the parachutist accurately. Many scored one mark for the idea that speed was reduced when the parachute was deployed, often making reference to the increased air resistance.

Q13(b) Very few candidates really understood the concept of 'g' increasing as one approached the earth. Often they linked the idea to when terminal speed was reached, i.e. gravity increased until terminal velocity was reached.

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