



**General Certificate of Secondary Education
January 2011**

**Applied Science (Double Award) APSC/2H
Science for the Needs of Society
Unit 2**

***Report on the
Examination***

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**Applied Science (Double Award)
Higher Tier APSC/2H****General**

This was a much higher demand paper than previous years with the highest mark being 61 and the mean being in the 30s.

Candidates found questions 1, 4, 7, 8 and 9 harder which includes all the biology questions. This is probably due to the greater number of longer prose questions.

It is apparent that candidates are not given the opportunity to look at past papers as some of the common mistakes are those that have been made in previous series.

Question 1 (Standard Demand)

- (a) Lots of comments about the path of air through the body to the lungs rather than the movement of the diaphragm or the ribcage. Most candidates who got one or two marks forgot to mention the volume or pressure change. Only a tenth of candidates picked up all three marks here but nearly a half gained no marks at all.
- (b) (i) Fewer than half of the candidates scored the mark here. Many candidates wrote bpm and some gave a unit based on the information in the table.
- (b) (ii) A quarter of candidates gained one mark for this question as some stopped at $55 - 45 = 15$ while others got $\frac{40}{55} \times 100 = 73$ both of which were worth one mark only. Over a half of candidates did not score any marks.
- (b) (iii) Hardly any candidates gained two marks as only a few candidates made a link with breathing rate and fitness. Nearly three quarters of candidates scored one mark with a quarter failing to gain any marks. Common incorrect responses included, not as out of breath, not as much oxygen needed and a discussion of heart rate.

Question 2 (Standard Demand)

- (a) Only a third of candidates were able to correctly write down the formula for calcium carbonate. Many gave the formula for quick lime, others got the wrong number or put the number in the wrong place.
- (b) (i) Over half of the candidates did not get this mark with incorrect responses including blast furnace, combustion, add clay or water, fractional distillation and reduction.
- (b) (ii) Well over a half of candidates gained the mark for this question. Common mistakes were carbon monoxide, and just 'greenhouse gas'.
- (b) (iii) Two thirds of candidates were successful here. Incorrect responses for this part included pollution, acid rain and lots of pupils wrote something about the ozone layer.

- (c) (i) Most candidates who got one or two marks got them for limestone and quicklime. Lots of incorrect responses as nearly three quarters of candidates did not get anything.
- (c) (ii) Again nearly a half of the candidates gained no marks and a further tenth did not even attempt the question. Incorrect responses included, takes place outside, reaction involving heat and adding water
- (d) Two thirds of candidates knew one of the ingredients but a quarter knew neither. The most common mistaken ingredient was water.

Question 3 (Standard Demand)

- (a) (i) Over two thirds of candidates gained two marks for this part. Candidates who got it wrong put Jupiter at (760, -150) or (765, -150)
- (a) (ii) Two thirds of candidates got this part right. Many candidates who got it wrong did not give a negative answer and others were just shy of the range.
- (a) (iii) Nearly all the candidates gained two marks for this part. The wrong answers did not give a comparison. There were still, though only a very few, references to carbon dioxide levels.
- (a) (iv) Most candidates put that it is too cold or that it is below freezing which led to four fifths of candidates not getting this mark.
- (b) It seems that most candidates have not seen past papers as this has come up before but over four fifths of candidates did not get this mark. Common incorrect responses were, clearer picture (without qualification), nearer, can be moved, less pollution and no buildings or mountains in the way.
- (c) (i) Again four fifths of candidates did not get a mark and hardly any gained two marks. Incorrect responses included, the planets are moving away, stars are further away and global warming references.
- (c) (ii) A half of candidates were successful here but some responses were just 'red shift' on it's own, so have they understood the question? There was some reference to global warming. It is moving away from us or it is dying were also common as was the stars are moving away from us.

Question 4 (High Demand)

- (a) (i) A tenth of candidates gained all four marks here. A quarter of candidates got no marks and a fifth did not attempt the question. The others were split roughly equally between getting one two or three marks. Some candidates got the chemicals in the wrong order but mostly the equation was not balanced. Common incorrect answers included CO^2 , CO_2 , and Co_2 .
- (a) (ii) A third of candidates were successful here. Many candidates incorrectly put osmosis but respiration and photosynthesis were also seen.
- (a) (iii) Hardly any of candidates got full marks for this question and over a fifth did not write anything at all. Some candidates described osmosis while other candidates

believe that the cells move or just wrote simply, the reactants move. Candidates were given a mark for correctly identifying that the movement is from a high to a low concentration but they did not go into detail about where these were.

- (b) Really poorly answered question with the large majority of candidates getting no marks or not attempting the question. Incorrect answers included, cells expand to gain more solutes, cells absorbed blood, not enough oxygen ion blood, low concentration of solutes makes them swell, cells move from a high concentration to a low one, to let blood in and not enough blood. Most candidates who gained a mark got it for osmosis while very few made the link with cells swelling and water.

Question 5 (High Demand)

- (a) (i) A sixth of candidates managed three or four marks for this part. Some candidates believe that methanol would be left after the other liquid had boiled off. Many candidates believe that if you heat the mixture then the steam would condense as ethanol while a number responded filter or freeze.
- (a) (ii) Only a handful of candidates were able to name the type of solvent. It was clear that this was not taught very well as the responses were so wide ranging.
- (b) (i) A slightly large number of candidates were successful here. Incorrect responses included solid spread out as a liquid, solid in a liquid and description of emulsion. Some candidates could have been describing a rock in water.
- (b) (ii) A few candidates gained two marks for this question and over a quarter gained one. Incorrect responses included cleaner, easier, cheaper, contains chemicals, easy to put on brush, removes dirt, lasts longer, not too hard, easily stored and turns into a foam. Common correct responses included spread around easier and stay on toothbrush.
- (c) Half of candidates managed to get marks here with a tenth gaining three, a sixth two and a quarter one. Incorrect responses included compound, solute and solvent. Solution was surprisingly not answered well as the most common answers were liquids dissolved together, substance dissolved in a liquid, solid dissolved in water and solid mixed with a liquid. Mostly those candidates who gained two marks for this question missed emulsion. Those who only got one mark knew aerosol.

Question 6 (High Demand)

- (a) This was answered better with a tenth of candidates getting three marks a third two and a further third one. Instead of boiler some candidates wrote heater, heating tubes or pipes. For turbine, many students wrote fan.
- (b) (i) The marks were spread fairly evenly across the mark range with a fifth of candidates getting three, two or no marks and nearly a third getting one. A tenth of candidates did not attempt the question. Mostly the incorrect responses had the correct chemicals but in the wrong order.
- (b) (ii) A third of candidates were able to correctly identify a renewable fuel. The common incorrect responses were non-renewable fuels.

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- (c) (i) Over a half of the candidates answered this part correctly with copper being the most common answer. The incorrect responses included steel, lead, glass and plastic.
- (c) (ii) This was better answered with nearly a half of candidates getting two marks and a similar number one mark while only a sixth failed to score. Cheaper or ductile were given as incorrect responses as were insulator, reference to boiling point and that metal has a high density. Other candidates gave two similar responses eg unreactive and does not corrode. Most candidates wrote, got high melting point and good conductor.
- (d) While over a third of candidates gained two marks many candidates were not able to rearrange the equation. Some candidates forgot to divide by 100 and others worked out the correct answer then put it back into equation and made the answer 58. Over half of the candidates got no marks for this question.

Question 7 (Standard Demand)

- (a) This was very poorly answered and only a quarter of the candidates picked up any marks. Some candidates seem to think that insulin absorbs or catches glucose. Very few mentioned the liver or glycogen at all. Few just wrote that insulin controls glucose levels without qualification or that insulin is released from the pancreas.
- (b) (i) A sixth of candidates were successful here. Most common incorrect answers were pancreas, parents, nucleus (which was not enough).
- (b) (ii) Very few candidates knew this well enough to get the three marks. Lots of candidates wrote bacteria nucleus which was accepted. Some candidates thought that the insulin gene was swapped for other genes in the bacteria. The word cell was used in the wrong place. Only one or two candidates knew the word plasmid.
- (c) The most common answer that was not given the mark was, pigs could have a disease as this does not imply the transfer of the disease to a human or that we have different insulin to pigs. Having to kill pigs came all too often and that we have not got enough pigs. Only just over a quarter of candidates got any marks at all here.
- (d) A sixth of candidates managed to get two marks for this part and another half gained one mark. Named organs gave no marks for the first part and blood cells were commonly given as the answer to the second.

Question 8 (High Demand)

- (a) Less than a tenth of candidates gained two marks on this and it was surprising how many candidates did not know the formula for steam. Many candidates did not know the ammonia formula and NH_4 was seen a number of times. A half of the candidates picked up one mark mainly for water and carbon dioxide.
- (b) A tenth of candidates gained two marks and a sixth one mark. Incorrect responses included, rain, ozone layer, into space, evaporated and taken up by plants. Many answers referred to increased CO_2 levels or global warming.

- (c) (i) Few candidates named the process although many correctly identified that plants create oxygen. Some candidates just described the graph. Less than half of the candidates got any marks.
- (c) (ii) A tenth of candidates gained two marks in this part. However some candidates incorrectly remembered photosynthesis and respiration equations. The word photosynthesis was expected so late in the paper. Pollution and global warming were incorrectly referred to. Many candidates wrote that it decreased but did not say why or said it was that oxygen was increasing.

Question 9 (High Demand)

- (a) Only a tenth of candidates gained a mark here with candidates either getting three, very few, or one mark. Most of the alpha and beta answers referred to charge or penetration while the gamma answers mostly talked about uses. There was some confusion between gamma and x-rays.
- (b) (i) A sixth of candidates managed a mark for this part. It is obvious that this has not been taught. A number of candidates wrote that the photographic film will change colour but not that it will darken. Several candidates knew that aluminium absorbs beta radiation but did not mention alpha radiation. Similarly candidates wrote that beta will be detected behind the plastic but no mention of gamma.
- (b) (ii) A number of candidates wrote an answer which was too simple indicating that alpha radiation is harmless but not explaining why. Other candidates were confused and thought that gamma was too dangerous.
- (c) (i) Hardly anyone got the first marking point but a half of candidates did gain one mark.
- (c) (ii) The most common answer here was about tumour location or finding where an artery is blocked. Detect blockages was not enough for the mark. There was some confusion with X-rays, radiotherapy or the treatment of cancer. Only half of the candidates were awarded any marks here.

Mark Ranges and Award of Grades

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