LEVEL 3 CERTIFICATE AND EXTENDED CERTIFICATE

APPLIED SCIENCE

ASC1: Key Concepts in Science
Report on the Examination

TVQ01028 & TVQ01029
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General

Presentation was generally good with handwriting being legible. It was clear that the space provided for answering questions was sufficient for the vast majority of students. There appeared to be sufficient time to complete the paper as the vast majority of students wrote answers to all questions.

Students usually showed working for the calculation but this was often poorly set out. This made it unclear which quantities were involved and, invariably, led to incorrect answers. Students should be taught to write down the correct equation from the formulae sheet, rearrange it and then substitute the correct data.

Section A – ASC1/B (Biology)

Overall, students demonstrated knowledge and understanding across the different topics in this section of the paper. However, there did appear to be a lack of understanding in some aspects of the paper, such as blood glucose control, naming parts of the heart and the role of intrinsic proteins in the cell surface membrane.

Question 1

1.1 The vast majority of students gained full or partial credit in this question and most commonly for the idea of there not being a nucleus in the prokaryotic cell and that it has a flagellum.

1.2 Over a third correctly identified the production of protein as the role of the function of the rough endoplasmic reticulum. All incorrect answers were seen, but the most common misconception is that the role is in packaging protein for secretion.

1.3 Most students correctly identified the protein and/or the phospholipid. Answers stating phosphorous were not seen. In a small minority of cases, some students stated that the intrinsic protein was an extrinsic protein.

1.4 Only approximately one-fifth of students gained credit in this question. Students needed to identify the role of the protein in facilitated diffusion or active transport. Alternatively, they could describe one of these. However, student answers were often too vague to gain credit, with many describing the role as allowing things to pass through.

Question 2

2.1 Approximately 40% of students gained full or partial credit for identifying the atrioventricular node, Purkinje fibres and sinoatrial node.

2.2 Only a very small minority of students were able to give answers with enough clarity and precision to gain credit. Students often wrote about impulses not reaching the ventricles so there is no regular rhythm which was insufficient to gain credit.

Students needed to appreciate the importance of the impulses reaching the base of the heart in order for the ventricles to contract upwards at the same time.

Question 3

3.1 Only 17% of all students could correctly state the normal range for blood glucose. Students must be encouraged to learn these reference values for the purposes of the examinations.

3.2 Only a quarter of all students gained credit in this question. Students needed to identify the dipstick test so that they could describe the dipstick being dipped in urine and then the colour being compared to a standard colour chart.

Some answers were too vague in nature and simply comparing to a colour chart is not specific enough to gain credit as there are a number of assorted colour charts that students could be referring to.

3.3 Half of all students gained full credit in this question and only 4 % did not gain any credit. There were many ways of expressing a creditworthy answer but, essentially the two ideas were for reducing sugar and increasing exercise. Some students wrote about reducing fat or protein which did not gain credit.

3.4 27% of students gained some credit in this question, but less than 1 % gained full credit. Students were often unable to spell glycogen and glucagon and potentially lost marks because of this. Only a very small number of students could identify the role of enzymes and adrenaline in the control of blood glucose.

Section C – ASC1/C (Chemistry)

Overall, many students did not seem to have adequate knowledge with regard to basic chemical concepts whether that be element symbols and formulae or laboratory apparatus and experimental technique.

Question 1

1.1 Whilst a significant number drew a correct profile, many students seemed unaware what was required. Many did not draw the correct general shape whilst a number of students transposed the labels for reactants and products.

1.2 A large number of students seemed unaware where the activation energy should be shown. Many were not careful when drawing their lines on the diagram and so failed to score even though they were marking the correct energy change.

1.3 Some correct answers were seen but the majority of students seemed unaware of how to determine an ionic formula.

1.4 Some students described the experimental procedure in good detail. Several however, omitted the need to use the same volume of the acid and the base. A sizable proportion of students seemed unaware of the correct procedure. Incorrect answers included heating the neutralised solution with a Bunsen burner, carrying out a titration and measuring only pH change, and neutralising both the acid and the base with limewater.

Question 2

2.1 Many students correctly discussed ion formation. As the question did not ask for this they scored no marks. Many students incorrectly mentioned sharing electrons. Only a few students were able to identify that ionic bonding involved negative and positive ions. There were many incorrect discussions of metals bonding with metals or non-metals bonding with non-metals.

2.2 Many students attempted to define covalent bonding by simply stating the atoms were covalently bonded. Other students who correctly stated sharing was involved then went on to state it was just one electron being shared; covalent bonding involves a pair of electrons. Unfortunately, many seemed to think covalent bonding occurred in metals.

2.3 A significant number stated that the empirical formula was the number of elements in a compound. However, only a small number mentioned that an empirical formula is the smallest whole number ratio.

2.4 Many students were able to score fully here. However, a significant number calculated the correct ratio but left their answer as a ratio or as the molecular formula. Some students failed to recognise that the chlorine accounted for the remainder of the abundance. Some incorrectly divided by the atomic number or divided the relative atomic mass by the abundance.

2.5 Some correct answers were seen. However, many students seemed unaware of what was required of them. Some calculated that a factor of 2 was required but did not then work out the correct molecular formula.

Section C – ASC1/P (Physics)

The paper gave students the opportunity to apply their knowledge and understanding across two of the topics of the unit – Electricity and circuits and Dynamics. It was clear that most aspects of the paper proved to be challenging. Students would benefit from careful preparation of all aspects of the content of the unit.

Question 1

1.1 This proved to be the most accessible question in the paper with almost a quarter of students gaining full marks; approximately two-thirds gained at least 2 marks.

Students were generally very good at choosing appropriate scales for and correctly labelling both axes (with the title and unit). Most students could also correctly and clearly plot all the points clearly (with a × rather than a •). However, a significant number of students did not plot the (0,0) which was given in the table of results.

The vast majority of students failed to recognise that a line of best fit can be a curve – instead straight lines were drawn.

1.2 Less than 40% of students recognised that the graph they plotted showed the voltage-current characteristics of a filament lamp.

Students should have carried out experiments to collect voltage and current data for a range of components including standard resistors, thermistors and lamps, so should have been familiar with the shape of the graph in question 1.1.

1.3 Just over 20% of students gained two marks in this question with over two-thirds getting one mark. Of those students who got one mark, this was largely due to them stating the correct unit (in symbol or word form).

Too many students could not rearrange the formula, given as $I = V/R$ on the equations sheet, correctly. The most common incorrect answer was 0.37 (from 0.74/2). Students need to be able to rearrange formulae correctly. A large number of students lost marks through the incorrect rounding of 2.7027 to 2.702 (it rounds to 2.703).

1.4 This proved to be the second most demanding question on the paper with just over 70% of students getting zero. Indeed, less than 1% of students gained full marks.

Many students wrote answers in terms of $R = V/I$, suggesting that as the voltage increased, the resistance must increase. This does not take into account any changes in current.

The specification states that learners should develop their knowledge and understanding of 'free electrons and the electrical behaviour of conductors and semiconductors and the effect of temperature on the resistance of conductors and semiconductors'. We would expect students to provide a clear qualitative description of the behaviour of ions in a filament lamp as it heats up and that this leads to electrons colliding more frequently.

Question 2

2.1 This was the most demanding question on the paper with three-quarters of students getting zero marks. Indeed, about 10% of students missed this question out completely. It was clear that many students got this confused with Newton's Third Law with answers referring to equal and opposite forces. Many students referred to the conservation of energy in their answers too. The Law of Conservation of Momentum is part of the specification and students should know it.

2.2 The crumple zone is a common example of applied physics. There were some excellent answers for this question but these were few and far between. About 40% of students gained one mark which was generally for being able to state that the force (on the driver/passengers) would be reduced.

The best students referred to the increased time for the collision and related it to the change in momentum, stating the formula $F = \Delta p/t$ (given in the equations sheet).

2.3 Questions of this type have appeared over many years in Applied Science exams however, less than a third of students were able to gain at least two marks. About half of students were able to correctly state at least one energy; this was generally the kinetic energy of the car before the collision.

A large proportion of students did not write about energy in their answers and instead discussed the changes in momentum or forces.

2.4 About two-thirds of students gained one mark here with over a quarter of getting full marks. The specification states that students should know about 'the meaning of momentum' and 'the formula $p = mv$'. This question was testing that knowledge.

While most students knew that increasing the speed or velocity would increase the momentum of the car, few knew the mass should be increased too. Many students discussed changing the aerodynamics of the car or reducing its weight. These are, obviously, incorrect.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.
UMS conversion calculator