



LEVEL 3 EXTENDED CERTIFICATE **APPLIED SCIENCE**

ASC4: The Human Body
Report on the Examination

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General

Several of the questions on this paper were challenging for many of the students, although it was pleasing to see that the vast majority of students attempted all the questions asked.

Generally, students found explaining concepts or processes more difficult. The question related to a calculation was not well answered and it would help students to practise calculation of percentages, percentage increases and percentage decreases as well as unit conversions.

There were a small number of students whose answers were difficult to read, and they should ensure they use blue or black pen and a sharp pencil for graph work.

Question 1

- 01.1** Approximately half of all students gained full marks in this question and only 7% gained one mark. Consequently, in this question students gained either 0 or 2. This is because students could accurately label the organ they named. The most common misconception seen was that the large intestine was the affected organ. Students were told that IBS reduces the absorption of some nutrients in the blood and hence the correct answer would be small intestine.
- 01.2** This question required students to name two organs, the gall bladder and pancreas, and it was well answered with 92% of students gaining credit, and 74% gaining full marks. Students do need to take care with the spelling of pancreas, although phonetic spellings were allowed.
- 01.3** In this question students were asked to explain how part A (gall bladder) helped to speed up the digestion of fats. It was pleasing that only a minority of students directly stated that bile is an enzyme which breaks down fats. However, a significant number did lose marking point 2, emulsification, because their descriptions of emulsification implied that it broke down fats. Answers such as 'to break large globules of fat to smaller globules of fat' were awarded marking point 2.

The most commonly awarded mark was for marking point 1, gall bladder releases bile, and only the most able students explained that emulsification increased surface area (marking point 3). Only 10% of all students gained all three marks, 17% gained two marks and 29% gained one mark.

01.4 This question discriminated well, with approximately one third of all students gaining 3 marks, one third gaining 2 marks and one third gaining 1 mark.

Most students correctly identified carbohydrates and proteins as the substrates for the two enzymes. In some cases, students named specific carbohydrates and proteins which was not allowed for this mark.

For marking point 2, the place where the enzyme is made, the most frequent incorrect answer seen was for carbohydrase to be made in the stomach. Other incorrect locations included: liver and large intestine.

For marking point 3, the place where the enzymes act, the most frequent incorrect answers were for:

- carbohydrase acting in the salivary gland or stomach
- carbohydrase and / or protease acting in the pancreas or large intestine.

01.5 In this question, students were asked to name the deficiency disease caused by a lack of vitamin C. Only 58% gained a mark here, and a variety of incorrect deficiency diseases were seen, including:

- anaemia
- rickets
- osteoporosis

Students should know the deficiency diseases for the nutrients and vitamins stated in the specification.

01.6 This was the first question asking for symptoms. Students must be encouraged to identify the key symptoms for the diseases / disorders they are expected to know, as general symptoms such as sick, nausea, headache, pale and dizzy are not appropriate for all diseases.

In this question we accepted the following as symptoms of scurvy and 53% gained one mark, with a further 5% gaining two marks.

- swollen / bleeding gums – this was seen a few times
- fatigue – this was the most common answer
- painful limbs / joints – very rarely, if ever, seen
- shortness of breath – very rarely, if ever, seen
- bruising easily – seen occasionally
- bulging eyes - very rarely, if ever, seen
- slower healing of cuts or skin cracking – seen occasionally.

01.7 Two thirds of all students could correctly identify two ways of increasing vitamin C in the diet. Most students could identify the two different ideas on the mark scheme or could identify two distinct groups of foods high in vitamin C, such as citrus fruits and broccoli or spinach.

01.8 98% of all students attempted an answer to this question, but only 4% gained marks. Students were asked to calculate the percentage **increase** in cases of vitamin C deficiency. It seemed that students did not understand the idea of percentage increase or did not know how to calculate this.

There was a range of incorrect calculations seen but the most common incorrect method and hence answer was:

$$\frac{237}{26} \times 100 = 911.5$$

However, it was reassuring to see that the vast majority of students did show their working out to this calculation.

01.9 Students needed to interpret data to evaluate a conclusion made in this question and 26% of all students gained 2 marks, with a further 55% gaining 1 mark and 18% not gaining any credit.

Most students who gained credit, could state that the data showed a rise in children with vitamin C deficiency which supported the conclusion. Those students who gave a second credit worthy point, often stated that either there are other causes of malnutrition or that the numbers involved are very small.

Question 2

- 02.1** 30% of all students gained full credit in this multiple-choice question which discriminated well for the higher attaining students. A further 10% gained 3 marks, 30% gained 2 marks and 21% gained 1 mark.

Of the four lobes of the brain, students most commonly identified the function of the frontal lobe and the occipital lobe correctly.

- 02.2** Three quarters of all students correctly identified the location of the lobes of the brain as the cerebral cortex. Both incorrect answers were seen, but the most common was the cerebellum.

- 02.3** Just over two thirds of all students correctly identified the sympathetic nervous system as causing an increase in heart rate and pupil dilation when a person is frightened. All other incorrect answers were seen, but the most common was for parasympathetic.

- 02.4** This was the second question where students were asked to give symptoms of a disease / disorder and the vast majority of students gave three answers. Often only one or two marks were awarded as the three symptoms given were versions of the same symptom, most commonly the idea of forgetfulness. As such, only 6% gained 3 marks, 40% gained 2 marks and 52% gained one mark.

Correct symptoms seen were: verbal repetition, difficulty with decision making, getting lost, obsessive behaviour, mood swings or depression, hallucinations, loss of speech and difficulty eating or swallowing. The very best answers gave three symptoms that were very distinct from each other, for example 'forgetfulness, mood swings and loss of speech'.

- 02.5** This question discriminated well amongst the higher attaining students, with 19% gaining 3 marks, 20% gaining 2 marks and 20% gaining 1 mark.

Students had to describe what happens to allow an impulse to pass from one neurone to the next at a synapse. It was pleasing to see that many students had a good understanding of this and gave very detailed and accurate answers.

The ideas of neurotransmitter release and diffusion across the synapse were the most commonly seen marking points, but all the marking points were seen. In a small number of cases students were getting confused between the pre-synaptic neurone and the post-synaptic neurone. In some cases, students stated the neurotransmitter moved to the post-synaptic membrane but did not state that this was by diffusion and so did not gain the mark.

Question 3

- 03.1** 91% of all students correctly identified the type of joint in the hip. However, all other incorrect answers were seen from the other students.
- 03.2** 60% of all students gained credit in this question for correctly describing the range of movement in the hip joint. There were a wide variety of ways students correctly described this, but a significant number of students negated the mark by stating that the joint could flex and extend which is incorrect and appropriate for a hinge joint. The most succinct way students gained this mark and avoided the potential to contradict themselves was to state 'rotation'.
- 03.3** 80% of all students gained full or partial credit in this question, with nearly half of all students gaining both marks. The most common correct answer was for identifying Q as the cartilage. Common incorrect answers for P included: tendon, ligament, cartilage. Membrane and bone marrow were also seen.
- 03.4** Only 16% of students gained credit for giving the function of the ligaments (part R). Often students gave answers that lacked precision / accuracy and hence they did not gain the mark. A common example was to see an answer such as 'ligaments join the bones together' which is inaccurate, and the bones are not joined and move within the joint. Students needed to describe the role as holding the joint or the bones together. A number of students did mistakenly think the role was as a shock absorber, which was not creditworthy.
- 03.5** Three quarters of all students gained credit in this question for correctly giving the function of the plastic in the artificial knee joint. Most commonly this mark was awarded for the idea of reducing friction or rubbing between the metal and the bone, although shock absorption and enabling smoother movement were seen.
- 03.6** Students answered this question well, with 78% gaining the mark for the advantage of the artificial knee joint. Most commonly students stated that the advantage was the lack of exposed bone, but some did describe the better fit or that the movement of the knee would be more stable.

Question 4

04.1 This question discriminated well, with 40% gaining 2 marks and 37% gaining 1 mark. Students were asked to give two adaptation of slow-twitch muscle fibres and there were a number listed in the specification that students could have stated. The most common correct answers seen were: the idea of slow to fatigue, aerobic respiration, glycogen storage, presence of myoglobin and having many mitochondria. By far the most common was the idea of many mitochondria. The ability to respire fat and having a good blood supply were rarely seen.

Some students who wrote about mitochondria, alas went on to state that they produced energy, and this was not allowed for this marking point.

04.2 83% of all students were able to plot the graph in this question well, although 3.4% did not attempt the question. Some students lost one mark as the plots were not clear enough to be accurate. Students must ensure they plot graphs using a sharp pencil and not pen, as was sometimes seen.

04.3 Virtually all students attempted to answer this question which was based on their interpretation of the graph. However, only 15% gained 2 marks, with 55% gaining 1 mark and 30% scoring 0. Answers that were not credit worthy often described the graph as force declining over time in both muscle fibre types, without making conclusions. The most commonly seen conclusion was for the idea that the fast-twitch fatigue faster than the slow-twitch.

04.4 This question discriminated well at the higher attainment range, although many students found it difficult to gain the marks, with 11% gaining 2 marks and 27% gaining 1 mark.

Students often described what happens when a muscle contracts without going far enough to state that the ATP was used up, so the myosin head could not change shape or that the myosin could not detach.

04.5 This question discriminated well between the higher attaining students, with 2% gaining all 3 marks, 14% gaining 2 marks and 25% gaining 1 mark. Many students stated that the creatine provided ATP without explaining that the creatine allow more creatine phosphate to be made, from which a phosphate is used to make ATP. As in other questions the idea of phosphate being used to create energy was not allowed. A small minority of students thought the creatine joins to ADP to form ATP or that the phosphate was used to make ADP from ATP.

Question 5

- 05.1** In this question, students were asked to name various parts of a neurone. This was generally well answered, with 38% gaining full marks, a further 20% gaining 2 marks and 15% gaining 1 mark.

A common mistake seen was to label T (node of Ranvier) as the myelin sheath and U (myelin sheath) as the node of Ranvier.

- 05.2** Only the higher attaining students scored well in this question, with less than 1% gaining full marks, 13% gaining 2 marks and 32% gaining 1 mark.

The most common correct answer seen was for the idea of myelin being an insulator and some students also explained that the action potentials could jump from node to node or gap to gap. A few references to saltatory conduction were seen. Marking point 3 was rarely seen.

- 05.3** In this question students were required to describe what happens to cause the change in membrane potential between two points on a graph (depolarisation). It was pleasing to see that nearly 50% gained full or partial credit in this. Some students did not gain the second marking point as they described sodium moving into the axon instead of sodium ions.

- 05.4** Only 27% of all students gained full or partial credit in this question, for explaining how resting potential is maintained. However, it was pleasing to see several very detailed responses that described the difference in the number of sodium ions and potassium ions moved when the neurone is at rest. As in question **05.3**, some students wrote about sodium and potassium moving as opposed to the ions.

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.

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