General Comments

This paper produced a wide range of marks. None of the questions proved inaccessible and there was no evidence that students ran out of time.

There were many excellent scripts, in which students showed sound recall with understanding, used terminology appropriately and gave answers that were concise and related directly to the question. As in previous series, weaker responses included inappropriate terminology, eg ‘making energy’ in question 1(b)(i), confused recall, eg the active site being located on the substrate molecule in question 2(a), and accounts that failed to address the question actually asked.

Despite the frequent appearance of graphs and calculations of percentage change in past papers, many students still fail to interpret graphs correctly, eg, questions 4 and 6, and many made no attempt to perform the calculation in question 5.

Question 1

(a) The majority of students gained both of the marks on this question, although some failed to score because they made unqualified references to protein or lipid. Although some students had learnt the term ‘integral protein’, few qualified this to show they recognised this integral protein spanned the membrane. A few answers referred to guard cells, microvilli and mitochondria, suggesting that the students had not understood the difference between the molecular structure of a membrane and the gross structure of cells or organelles.

(b) (i) Most students knew this term although some were clearly guessing between condensation and hydrolysis, having written both down and then crossed out one or other of the terms.

(b) (ii) The great majority of students gave mark points 3 and 4, with a few failing to score because they used abbreviations such as ER or RER. These abbreviations were not accepted, since students were asked to name the organelle. The full name endoplasmic reticulum is given in the specification, with no abbreviation offered as an alternative. Where Golgi was given as the organelle, the associated function was not often correctly linked to protein formation. For mark point 6 (release of energy/make ATP), references to producing or making energy were not given credit. Incorrect references to cilia, microvilli, stomach acids and lysosomes suggested that some students did not understand what was meant by the term organelle.

Question 2

(a) Most students were able to tackle this successfully, showing a good understanding of enzyme specificity. Where a mark was not awarded, it was usually because the active site had not been specifically identified as the part of the enzyme where the substrate binds. Some incorrect responses referred to the active site of the substrate.

(b) The effect of a competitive inhibitor on the rate of a reaction was generally well known. Some students did not obtain mark point 3 because they stated that no uric acid crystals would be formed, rather than fewer crystals would be formed. A number of poor responses suggested a reaction between xanthine and allopurinol which would form a compound that could not enter the active site, or referred to the tertiary structure of allopurinol.
Question 3

(a) (i) The majority of students knew this term. Some failed to obtain the mark by referring to facilitated diffusion.

(a) (ii) The features of alveoli were well known. When students failed to score, it was often because they failed to answer the question but instead described general properties of all gas exchange surfaces. Common stand-alone answers that did not gain marks were: thin cell walls, one-cell thick membranes, thin membranes, thin lining, and folded lining. No mark was awarded for references to individual alveoli having a large surface area.

(b) This question was usually answered well. Students who did not gain marks often gave a general description of the causes and symptoms of fibrosis, rather than explaining why these prevented air being breathed out of the lungs.

Question 4

(a) The majority of students knew this well and gave detailed and accurate answers involving the correct use of terms such as water potential. A minority failed to score because they did not write clearly enough about the directions of ion and water movements, or did not specify that it was the toxin produce by the bacterium that caused the change in ion movement.

(b) Generally, this question was done poorly. Most students did not restrict themselves to the relationship between sea temperature and the number of people admitted to hospital with cholera between January and June. The mark that was most commonly scored was for recognising that both reached a peak in April/May. Very few students noticed that both remained constant (and low) in January and only a few more noticed that sea temperature started to rise more rapidly than the number of cases of cholera from May onwards. These difficulties could be addressed by students being encouraged to look at graphical data in close detail, in addition to summarising an overall pattern.

(c) Not many students gained both marks, because they were looking across the whole year, rather than specific points on the graph; for example, where sea temperatures were falling as the cholera cases rose in October/November. Some students failed to score because they repeated the question stem, without explaining the idea of the correlation supporting the scientists’ suggestion from January to October. Despite cholera and its treatment being on the specification, the majority of students assumed that people with cholera would automatically be treated in hospital. As a result, the idea that there would be a significant number of cases of cholera that would not be included in the data was only seen in a few responses.

(d) Almost all students knew that memory cells would remain from an earlier infection and, thus, gained mark point 1 but sometimes did not extend their answer to give a complete explanation. A few gave incorrect answers that suggested they believe that oral rehydration therapy functioned as a type of vaccine.

Question 5

(a) Generic answers that included ideas such as improved accuracy, reliability, validity and so on did not gain marks in this question. A few students clearly understood what the units meant and the way in which they would ensure comparability between results at different temperatures. The
majority of the rest of the students who did gain these marks gave rather unconvincing responses and apparently hit the target by accident.

(b) This calculation of percentage increase gave a significant number of students difficulty. The majority selected the correct figures from the table but then had little idea of how to use them, and many scripts showed much crossing out and re-writing. Quite a large number of students did not attempt the calculation. Some students with correct calculations did not do as instructed and give their answer to 1 decimal place.

(c) (i) A number of students did not answer the question as set. Many wrote about the effect of increasing temperature on the kinetic energy available in the system, rather than comparing the data for the two different temperatures. Some read ‘rate of uptake’ as the concentration of imatinib inside the cells and so gave movement up the concentration gradient as the evidence for active transport.

(c) (ii) This was another question that was quite frequently not attempted. Some students had a good understanding of active transport as a process involving trans-membrane carrier proteins and could apply this to the rate of uptake in the cells levelling off at 37°C. Others appeared to be guessing, suggesting that enzymes had been denatured, or that the imatinib had all been used up.

Question 6

(a) A surprising number of students did not do well on this question. Some muddled the names of the reactant with the name of the test, such as the biuret test for starch. Others gave an incorrect procedure, such as boiling with hydrochloric acid. Some gave the wrong colour change, such as turning brown.

(b) This question discriminated clearly between students who had a good understanding of the biochemical nature of starch and students who had only a shaky memory of digestion from GCSE. The slower, two-step process by which starch is hydrolysed, firstly into maltose and then from maltose into glucose, was described well in better answers. Weaker answers referred to starch being insoluble, or a polysaccharide as the explanation for slower absorption.

(c) Almost all students gained this mark.

(d) (i) Almost all students gave a simple description of correlation, which was not true for groups 1 and 2, so did not gain the mark. This was another instance where students did not look closely enough at the data before starting to formulate their answer.

(d) (ii) Although most students seemed to understand the idea behind this, a significant number did not write precisely enough. For example, they may have stated that risk of CHD increases as GL increases but did not specify that this was true for diet group 2 and above. Omitting to name the coronary artery as the site of atheroma development also meant that some students did not obtain mark point 3. The stem of the question stated that a diet with high GL increases the concentration of harmful lipids in the blood. Students should have realised that re-stating this would not obtain a mark and that they needed to make the link with atheroma.

Question 7

(a) To obtain mark point 3, students were expected to note that these cells would have more mitochondria than most cells. Other weak responses referred to the whole ileum rather than the
epithelial absorptive cells. As in (3)(a)(ii), answers involving poor terminology frequently failed to score.

(b) (i) This was done well by many students. Where the mark was not given it was usually because a student stated that the antigen was foreign but did not go on to add that it would cause an immune response.

(b) (ii) Difficulties with this question were linked to poor understanding of the ways in which substances pass through membranes. Weaker answers referred to the antigens not being ‘allowed’ through, rather than incompatibility between the shape of the antigen and the shape of trans-membrane protein channels.

(c) Many students scored full marks. Rather than microfold cells being the route by which vaccines could enter the body, weaker responses included ideas such as the vaccine being given as treatment for a disease, or people being injected with microfold cells.

Question 8

(a) Well-prepared students were able to gain very good marks on this question, giving detailed and logically-written responses. The most commonly missed mark was mark point 2, concerning the band of non-conducting tissue between atria and ventricles that prevents the spread of impulses immediately down to the ventricles. Weaker answers contained fundamental errors, including muddling aorta with atria and the SAN and AVN opening valves to allow blood to pass through.

(b) Again, well-prepared students often gained full marks for this question, giving clear, sequential descriptions of the one-way flow of blood through the left side of the heart. A very small number of responses clearly described movement of blood through the right side of the heart and, having specified right atrium, tricuspid valve and right ventricle, did not gain any marks. Weaker students knew the sequence of events but were not able to explain the movement of blood in terms of changes in the pressure gradients caused by cardiac muscle contraction. Others assumed that since the stem of the question asked for movement of blood from left atrium to aorta that the two structures were directly connected.

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.

UMSconversioncalculator