General Comments

The tasks caused few problems – any significant colour change in Task 1 allowed students to see how the pH indicator from cabbage could be used. In Task 2, there were no distinct colour differences for each pH, so students were required to use their judgement to select the most appropriate pH for their unknowns. This was expected and no marks were awarded for the actual pH value that the student selected, only for the way in which they presented this in their table and graph.

The unit overall was slightly more difficult than in 2014 with a mean mark of 29/50 but a wider spread of marks was seen.

Task 1

Question 1

Most students could label the cell-surface membrane and the cell wall (although some got these the wrong way round) but further labels were often omitted. The vacuole was often labelled but less common was labelling of the vacuole membrane as a structure that the pigment must pass through.

It was surprising how difficult students found question 1(b). Many appreciated that the membrane would be disrupted; although often in combination with the idea that the cell wall would also be destroyed (this gained credit for marking point 1 but negated marking point 4). Few students used their knowledge of membrane structure to describe the cause of the membrane disruption for marking point 2. Many students suggested that the pigment would diffuse out. ‘Leaked out’ and ‘seeped out’ were seen but these were insufficient to gain credit. Several students mistakenly answered this question by relating to the cells bursting as a result of osmosis.

Question 2

Most students successfully answered this question. They could use the colour change seen in the Task to suggest adding acid and many knew an example of an acid used in cooking.

Question 3

Some students did not gain credit here because their answers were not specific to this situation; for example, by simply stating ‘to reduce enzyme activity’. Many simple statements equivalent to ‘so it keeps’ were seen but these were not considered credit worthy.

Question 4

Few students scored full marks here although there were six marking points available. It was important that students attempted to include details of practical protocol (marking points 1, 4 and 5 were available for these details), even if they were unfamiliar with either a colorimeter or the use of a calibration curve.
Task 2

Some centres elected to provide their students with a colorimeter, although this was not included in the Task Sheet or the Teachers’ Notes. This made the table and graph much more difficult for these students and few could gain full marks for Task 2.

Question 5

Many students gave more than was required to gain the marks; including tables that showed pH values or colours of the reference set. This often resulted in the heading for the first column being ‘test tube’ and so did not include a full description of the independent variable to achieve marking point 1.

Question 6

A straightforward graph was required but some students tried to overcomplicate it and did not fulfil all the mark points. Again, some students plotted all data for the reference set and labelled the y-axis ‘test tube’ and gave no reference to C and H being gastric juice from a carnivore and a herbivore and thus did not gain marking point 2. Some students inappropriately tried to plot graphs with colour rather than pH on the y-axis.
Written Test: Section A

Question 7

Better responses confidently explained why both actions were carried out but many could only suggest they were both important for mixing. Some students tried to give a second explanation relating to why it was necessary to insert the bung (to prevent spillage); this was not given credit.

Question 8

Several students gave reasons for their choice without stating which apparatus they used and so did not gain credit; it was important to answer both parts of the question. Many students could state that the smaller syringe would give them a more accurate measurement (thus increasing the precision of repeated measurements) but most found it difficult to explain why this was the case in order to gain the second mark point.

Question 9

Most students could convert the concentration to standard form.

Question 10

Most students could explain that removing 1cm³ ensured all tubes contained the same volume. Some failed to gain this mark, as they referred to ‘amount’ rather than ‘volume’. Many students suggested that the removal was important to ensure the concentration of acid in the final tube was correct, demonstrating a fundamental misunderstanding of concentration and serial dilution. Only the best answers showed appreciation that this removal of 1 cm³ ensured the concentration of the indicator was the same in all tubes.

Question 11

The majority of students answered this successfully. All mark points were seen but the idea of the colour match being subjective was by far the most common. Incorrect answers that were seen included ‘the data not being quantative’, ‘there were no repeats’ and ‘due to human error’.

Question 12

Most students realised that strong acid would kill bacteria to score mark point 1. It was important here that students appreciated the difference between digestion and denaturation. Mark point 2 was not awarded simply for digesting proteins; very strong acid might cause some hydrolysis of protein and this was accepted as an alternative. Mark point 3 required some idea that the low pH would provide optimum conditions for the proteases, not just that proteases ‘work’ in acid conditions.
Written Test: Section B

Question 13

Very few students gained this mark; many gave generic answers relating to making the sample representative with no further explanation. Some got closer to ideas of genetics or lifestyle but few appreciated the importance of having a range/variety.

Question 14

The vast majority of students could give an acceptable method for dividing the patients randomly. Those who failed to gain these marks explained why dividing the patients randomly was important, or divided the patients systematically, for example, by putting the patients in alphabetical order by name and then putting the first half in group 1.

Question 15

Most students suggested that this was to reduce bias. Only a few appreciated that it was not important in this particular investigation and gained marking point 2. Some demonstrated misunderstanding of the placebo effect by suggesting that this double-blind trial would reduce the placebo effect.

Question 16

Most students completed the calculation successfully, with only a few selecting the wrong data. Most students appreciated that some bacteria were resistant to the antibiotic. Some used the incorrect term ‘immune’ and therefore did not gain credit. Some went on to suggest that the bacteria had undergone mutation, without specifying that this mutation was in the genetic material and so did not give sufficient detail to achieve mark point 2.

Question 17

Students found these data difficult to interpret with many getting confused between the presence of bacteria and the presence of ulcers. Some students gave a comparison of the data for group 1 and group 2 but this question only required the use of the data for group 1 to fulfil the mark points.

Question 18

Most students tried to answer this question by writing all they knew about the use of the centrifuge in cell fractionation, rather than applying their knowledge of the use of the centrifuge to this example of obtaining a cell free liquid. Mark points 2 and 3 were still available if the cells were homogenised first. Mark point 3 was rarely awarded, as many students simply referred to removing the pellet (rather than the supernatant), or they suggested filtering which would break up the pellet and mix the contents once again.

Question 19

The vast majority of students could recall the function of lysosomes. Some only stated that lysosomes stored enzymes rather than identifying their active role.
Question 20

This question was generally well answered, with just a few students showing confusion by suggesting that ‘bacteria would be denatured’ or that ‘neutralising acid would lower the pH’.

Question 21

Mark points 1 and 2 were commonly awarded but few students could correctly describe the relevance of the standard deviation and the overlap with other strains. Some students tried to explain why the damage was caused to human cells, rather than explain how the data support the conclusion drawn.

Question 22

Students who fully understood Resource B and the principle of the cell-free liquid answered this question very well. Many students gave answers suggesting the \( H. pylori \) cells were still present. They were often unable to score mark point 2, as they were suggesting there was no toxin as a result of the cells being unable to produce it; the incorrect context for awarding this mark.

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 [www.aqa.org.uk/umsconversion](http://www.aqa.org.uk/umsconversion)