

GCSE  
**COMBINED SCIENCE:**  
**TRILOGY**

8464/B/1F: Paper 1 - Biology (Foundation)  
Report on the Examination

---

8464  
June 2019

---

Version: 1.0

---

---

Further copies of this Report are available from [aqa.org.uk](http://aqa.org.uk)

Copyright © 2019 AQA and its licensors. All rights reserved.

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

## General

There were seven questions on this Foundation tier paper. Questions one to five mainly targeted grades 1–3. Questions six and seven targeted grades 4–5 and were common with the Higher tier paper.

Practical skills have to be assessed in the question papers. Paper 1 specification content covers five of the seven Required Practical Activities (RPAs). These should be used to teach skills related to:

- planning investigations
- the different types of variable
- use of apparatus
- identifying errors in methods and suggesting improvements
- presenting and analysing results.

These skills can then be applied to different investigations. It was noticeable in the quality of response when a student had carried out practical work effectively, particularly, the effect of light intensity on the rate of photosynthesis and the use of a microscope.

Students demonstrated good graph skills. A significant number of students did not know how to calculate surface area and volume. Some students could not round to a specified number of significant figures.

Many students did not appreciate the difference between the command words ‘Explain’ and ‘Describe’.

## Levels of demand

Questions are set at two levels of demand for this paper:

- **Low demand** questions are designed to broadly target grades 1–3.
- **Standard demand** questions are designed to broadly target grades 4–5.

A student’s final grade, however, is based on their attainment across the qualification as a whole, not just on questions that may have been targeted at the level at which they are working.

## Question 1 (low & standard demand)

- 01.1** Over half of the students correctly named the gas that is produced when the pondweed is in the light as oxygen. When students are asked for the name of a chemical, they should write the name, not give the formula. If an incorrect formula is given, for example O<sub>2</sub>, O or O<sup>2</sup>, the mark cannot be awarded.
- 01.2** About 58% of students gained two marks for saying the light intensity could be changed by moving a lamp nearer to, or further from, the pondweed. Some suggested altering the temperature, using more pondweed or leaving it for a longer period of time. None of these gained credit.

**01.3** Half the students gained full marks for this question which differentiated between students very well. It was very clear when students had a real practical grasp of the investigation. They gave a concise response describing counting the bubbles of gas produced in a given time, or in one minute.

When only one mark was awarded this was usually for the first marking point; to count the bubbles. Other students described how to vary the light intensity, rather than describing what should be measured in order to calculate a rate.

**01.4** Around 83% of students correctly gave the maximum rate of photosynthesis as 34 arbitrary units. As is usual for graph readings, a tolerance of  $\pm \frac{1}{2}$  a small square was allowed. Therefore a value between 33.5 and 34.5 was allowed. Incorrect readings of 35 and 40 were commonly seen. Some students read the wrong axis and gave an answer of either 600 or 1200.

**01.5** About 12% of students identified the correct part of the graph when light intensity was limiting the rate of photosynthesis. The vast majority selected 600 lumens as the answer.

**01.6** The question asked for a factor that affects the rate of photosynthesis. Many students gave light intensity, which had been given in the question and was therefore ignored. Around 64% of students answered correctly with the most common correct response being temperature. The amount of carbon dioxide and water availability were other correct responses that were seen.

### **Question 2 (low & standard demand)**

**02.1** About 43% of students knew that oxygen enters a single celled organism by diffusion. Active transport was the most common incorrect response.

**02.2** This structured calculation question differentiated between students very well. Approximately 17% of students gained full marks. Many students did not know how to calculate area or volume. Some of them tried to use squared or cubed numbers in their calculation. Many students gave a volume of 6, presumably by adding the numbers instead of multiplying them together.

For marking point 2, the total surface area calculation, students could make an error in calculating the surface area of one face and correctly multiply their answer by 6 to gain the second mark. Similarly, the surface area:volume ratio mark could be awarded if they gave a correct ratio for their calculated values of total surface area and volume.

**02.3** Around 60% of students correctly named red blood cells as the part of the blood that carries the most oxygen. Just saying blood cells was insufficient. The most common incorrect responses related to naming a type of blood vessel.

**02.4** About 56% of students correctly named carbon dioxide as the gas that passes out of the blood into the alveolus. Some students attempted to give the formula, rather than the name of the gas and errors were often made. For example CO<sub>2</sub> or CO<sup>2</sup> did not gain the mark.

- 02.5** About 18% of students gained one or two marks for this question. A lot of students repeated the stem of the question and said there are many alveoli providing a large surface area, which was ignored.

Common correct responses included having thin walls or having a good blood supply. Some students referred to villi, whilst others wrote about the heart.

### Question 3 (low demand)

- 03.1** Around 56% of students gained full marks for putting the biological structures in the correct order of size. Most errors related to the size of a nucleus. For example, some thought a cell was smaller than a nucleus.

- 03.2** Three-quarters of students correctly named an animal organ. Incorrect responses included the name of a cell structure, for example cell membrane or nucleus. Others named structures found in plants, for example xylem and chloroplasts.

- 03.3** Approximately 57% of students identified phloem as a plant tissue. Many students thought the leaf was a tissue.

- 03.4** Around 59% of students gained at least one mark in this question that was very effective at differentiating between students. The first marking point was for saying the root hair cell had a large surface area, or for a description of this. Reference to having a partially permeable membrane or a thin wall did not gain credit.

The second marking point was for giving the function of a root hair cell. To absorb food was ignored. To absorb water, minerals, mineral ions or nutrients was required.

Some students said the root hair stabilised the plant in the soil, which is incorrect. Some students did not realise the cell was on the root of a plant and either thought they were hairs on the head or were cilia that trapped microorganisms.

- 03.5** About 11% of students scored this mark. It was clear when students had good experience of the RPA and had used a microscope. These students usually said it is easier to focus using the lowest power lens first. Saying it focuses 'better' or 'clearer' was insufficient.

The second marking point was seen less frequently, and usually phrased as you see a bigger area, which was sufficient for a bigger field of view. Some said you could see a whole cell, which was ignored, as the idea of more cells or a bigger area of cells being viewed was needed.

- 03.6** Around 14% of students scored this mark. Students who had good practical knowledge of a microscope knew that the objective lens should not be moved towards the stage because the lens or the slide may be damaged or crack. Most responses related to problems with focusing or that only a blurry image could be produced.

- 03.7** Approximately 38% of students scored the mark. A lot of students either multiplied together, or divided, the two numbers given in the question. This gave incorrect answers of 500 or 0.2. Other responses appeared to be guesses based on the objective lenses they had used in school, namely 10 or 40.

- 03.8** Around 29% of students scored the mark for saying that root hair cells do not contain chloroplasts because they are not exposed to light, or because they do not

photosynthesise. Others said that it is because they do not contain chlorophyll, or because they are not green, which were ignored. Some students thought the presence of chloroplasts would stop the cells absorbing water.

#### **Question 4 (low and standard demand)**

- 04.1** Half of the students knew that water is lost from the leaves of a plant by transpiration. The most common incorrect response was osmosis.
- 04.2** Around 40% of students correctly identified the guard cell. The most common incorrect response was xylem cell.
- 04.3** Less than half of the students scored full marks for calculating the real length of the cell and converting the answer into micrometres. Various methods of doing this were seen. Some carried out the unit conversion as the final step of the calculation, whilst others converted the size of the image from 25 mm to 25 000  $\mu\text{m}$ . Quite a lot of students made errors in their substitution or calculation, but could still gain the unit conversion mark.
- 04.4** Around 40% of students correctly identified the temperature of the room as the independent variable. The dependent variable, the mass of water lost, was the most common incorrect response. Students often confuse the dependent and independent variables.
- 04.5** Very few students scored this mark for this more demanding question. A lot of students said that the bag was to prevent water being lost, or to stop water evaporating, both of which were insufficient. The bag was to prevent any water being lost from the soil, or to ensure any loss in mass was due to water lost from the leaves.

There were a lot of responses that related to maintaining the correct temperature or to preventing gases or water entering the apparatus. Some said to prevent wind evaporating the water, or to stop light reaching the roots.

- 04.6** About 14% of students identified 0.1 g as being the resolution of the balance. The most common incorrect response was 1.0 g.
- 04.7** Over half of the students correctly added 506.3 and 4.9 to give a starting mass of 511.2 g. Some made errors in this addition and gave an answer of 510.2 g. The most common error was to use the numbers in the column and subtract 0.3 from 510.4 giving an answer of 510.1 g. Others subtracted 4.9 from 506.3 giving an answer of 501.4 g.
- 04.8** When a conclusion is asked for there should be some value added in the response, not just a description of the results. Over half of the students scored the mark for saying that as the temperature increased the mass of water lost increased. Saying: as the temperature increased the mass decreased, was insufficient to gain the mark. It had to be linked to the mass of water lost in order to be a conclusion. The cause and effect also had to be the correct way round.

Responses that did not gain credit as they are incorrect included:

- the mass decreased over time
- the mass lost increased every hour
- water loss decreased every hour.

- 04.9** Around 56% of students scored at least one mark. The question indicated that temperature should not be given as a factor that might affect the rate of water loss from leaves. Many students missed this instruction.

Common correct responses were light and water availability. Few gave humidity or air movement, which was mentioned in the specification. The rate of photosynthesis would affect transpiration, but photosynthesis unqualified was ignored. Some students seemed to have misread the question, and gave two factors that would affect the rate of photosynthesis.

#### **Question 5 (low and standard demand)**

- 05.1** About 34% of students scored both marks for an answer of 400 000. The most common error was to omit the thousands and give an answer of 400, which was awarded one mark.
- 05.2** Around 87% of students correctly identified the time period on the graph when there was the greatest decrease in the number of deaths.
- 05.3** Almost a quarter of students scored the mark for this question. The most common correct response was that some deaths may not have been recorded. Others said that no data was plotted for 2002, or that the number was just an estimate.

The most common incorrect response was that 800 000 could not be correct because the graph only went up to 900. Others said the value was 820 000 for 2002, because they misread the scale on the x-axis.

- 05.4** Around 31% of students knew that malaria is caused by a protist. 40% of students thought that malaria is caused by a virus.
- 05.5** About 38% of students scored one mark. This was generally for a description of immunity. Some confused descriptions were also seen, referring to antitoxins or the body fighting the pathogen, which were ignored.

The second marking point was rarely seen. Some students implied that malaria can be passed from person to person, which is incorrect.

- 05.6** Around 42% of students scored the mark usually for saying use mosquito nets. Using a bug spray was insufficient and reference to insecticide, insect repellent or mosquito repellent was needed. Many students said the people with malaria should be quarantined, and various references to hygiene were seen, all of which were ignored.

#### **Question 6 (standard demand)**

- 06.1** About 35% of students could identify which blood vessel carries deoxygenated blood away from the heart to the lungs.
- 06.2** Around 22% of students knew that the group of cells that act as a pacemaker in the heart are located in the right atrium. Most students thought they are in the left ventricle.
- 06.3** About 29% of students knew that digitalis originates from foxgloves. Almost as many thought that it originates from bacteria.

- 06.4** Around 32% of students gained full marks for calculating the stroke volume and rounding their answer to two significant figures. More students are showing their working for calculations which helps them achieve compensation marks should their final answer be incorrect.

The first marking point was for reorganisation of the equation. This could be written in words, but writing the equation as a triangle was not creditworthy. 38% of students gained two marks. This was usually for the first two marking points. There were some errors seen in the rounding of the answer, either to 53 or to more than two significant figures.

- 06.5** In this extended response question around 29% of students attained Level 2 or above; very few students gave an answer fitting of the Level 3 descriptor. This proved to be a tough question for students and differentiated across the ability range well.

Most students described the effect of beta blockers on heart function, but few went on to link this to exercise. Poor language skills meant a lot of the responses were very confused.

### **Question 7 (standard demand)**

- 07.1** Almost a quarter of students correctly named amylase or carbohydrase as the enzyme that digests starch. Phonetic spellings were allowed.

- 07.2** The question informed students that Figure 11 was a model to represent the digestion and absorption of food molecules in the digestive system. Students should know that digestion and absorption occur in the small intestine. Named parts of the small intestine, including villi and microvilli, were all allowed. The stomach was also allowed.

Just saying the gut or intestines was insufficient. Reference to the large intestine was incorrect. Other incorrect responses included organs such as the pancreas or lungs. Some students gave partially permeable membrane as their answer, but this was labelled on the diagram.

The second marking point, for stating that the water represented the blood or bloodstream was the mark most commonly scored. Many of those who gave the stomach, thought the water in the test tube was stomach acid, so only gained the first marking point. There were quite a lot of unusual suggestions such as body temperature, saliva, enzymes or another organ.

- 07.3** About 17% of students gained both marks. About 23% of students did not attempt the question. A few students gave the names of other food test reagents, for example Sudan III and Biuret reagent, whilst others gave bromine for Benedict's solution.
- 07.4** Around 17% of students gained the mark. Quite a few students said that no sugar had been put in at the start, which was ignored. Misconceptions included that the sugar had dissolved, or that the mixture hadn't been heated. Some wrote confused statements about the sugar not being broken down.
- 07.5** Very few students could explain why both starch and sugar were inside the tubing after 30 minutes. Some students described the test results, saying that starch and sugar were both present, which didn't gain credit as an explanation was required.



- 07.6** Very few students on the Foundation tier scored any marks for this question. A fifth of students did not attempt the question. Some students described the results, saying that sugar was present in the tube, but not starch. Most attempts at an explanation either referred to the starch being fully digested to sugar, or confused references to diffusion, osmosis or active transport were given.

### **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.