AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.1.1.2

Animal and plant cells

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**4**
Available paper years	**2018–2023**

Using this booklet

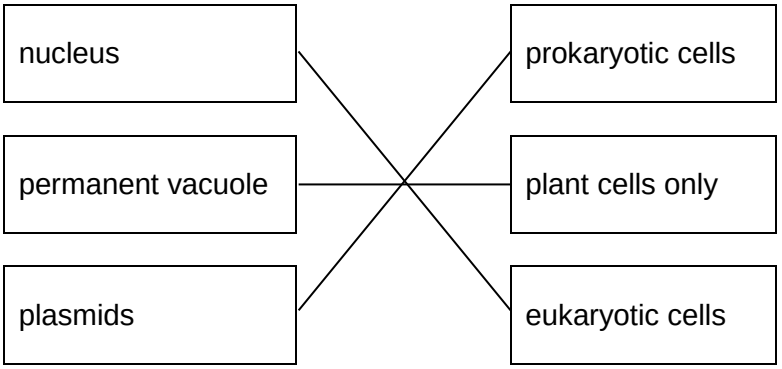
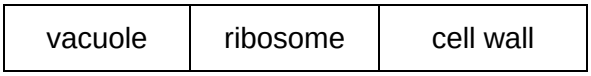
1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.1.1.2 Animal and plant cells

Answer 01 · Mark scheme June 2018 | 8464/B/1H | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	 allow **1** mark for one or two correct links		2	AO1 4.1.1.1 4.1.1.2
01.2	 tick box takes precedence if no tick is given, look at both the figure and the circling of words in the table if writing is seen on the figure and in the table both must be correct		1	AO1 4.1.1.2
01.3	turn the (fine focusing) knob until the cells are in focus	allow focus it do **not** accept increase magnification ignore decrease magnification ignore clear ignore references to resolution / illumination ignore zoom in / out	1	AO2 4.1.1.2

4.1.1.2 Animal and plant cells

Answer 01 · Mark scheme

June 2018 | 8464/B/1H | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	(rotate the) nosepiece / objective lens	allow change the (objective / eyepiece) lens	1	AO2 4.1.1.2
	to a higher power (lens)	allow (to) increase the magnification a comparator is required ignore change / adjust the magnification allow stronger or more powerful lens ignore references to resolution / illumination unqualified ignore zoom in / out ignore references to an electron microscope	1	

4.1.1.2 Animal and plant cells

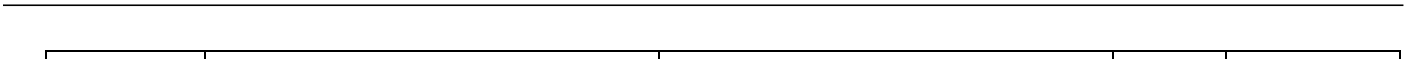
Answer 01 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5		an answer of 400 (×) scores **3** marks		AO2 4.1.1.2
	conversion of units: (112 mm →) 112 000 (µm) **or** (280 µm →) 0.28 (mm)		1	
	(magnification =) $\frac{112}{0.28}$ **or** (magnification =) $\frac{112\ 000}{280}$	allow **1** mark for no conversion of units 112 / 280 **or** incorrect value from step 1 correctly substituted	1	
	400 (×)	do **not** accept if units are given	1	
		if no other mark scored allow **1** mark for: magnification = $\frac{\text{size of image}}{\text{size of real object}}$ a triangle with words or letters in is insufficient, as the correct rearrangement is needed		
Total			**9**	

4.1.1.2 Animal and plant cells

Answer 01 · Mark scheme

June 2018 | 8464/B/1H | Original Q1



4.1.1.2 Animal and plant cells

Answer 02 · Mark scheme

November 2020 | 8464/B/1H | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **four** from: • bacterial cell is smaller (than a plant cell) • bacterial cell does **not** have chloroplasts (plant cell does) • bacterial cell does **not** have its DNA / genetic material inside a nucleus (plant cell does) • bacterial cell (may) have plasmids (plant cell does not) • bacterial cell does **not** have mitochondria (plant cell does) • cell wall in bacterial cells is **not** made of cellulose (cell wall in plant cells is) • bacterial cell does **not** have a large / permanent vacuole (plant cell does) • bacterial cell has smaller ribosomes (than plant cells)	allow converse statements 'it' refers to bacteria ignore chlorophyll allow bacterial cell does **not** have a nucleus (plant cell does) allow bacterial cell has DNA / genetic material in a ring / loop (plant cell does not) allow bacterial cell has DNA / genetic material free in cytoplasm do **not** accept idea that bacterial cells do not have ribosomes allow bacterial cell (may) have a flagellum (plant cells do not) allow bacterial cell (may) have a slime capsule (plant cell does not)	4	AO1 4.1.1.1 4.1.1.2

4.1.1.2 Animal and plant cells

Answer 02 · Mark scheme

November 2020 | 8464/B/1H | Original Q4

04.2	any **four** from: • dead / inactive / weakened form of pathogen / bacterium / microorganism is introduced / injected • white blood cells stimulated to produce antibodies • reference to memory cells made or remain • on re-exposure specific / correct antibodies are made (very) quickly • bacteria / pathogens / microorganisms killed and do not produce a large enough population to cause the disease	allow introduce / inject antigen(s) from the pathogen allow dead / inactive / weakened form of *Gonorrhoea* (bacteria) introduced / injected do **not** accept inject Gonorrhoea disease do **not** accept incorrect white blood cell, eg phagocyte allow on re-exposure specific / correct antibodies are produced in large quantities allow bacteria / pathogens / microorganisms killed and do not produce a large enough population to produce toxins	4	AO1 4.3.1.7 AO2 4.3.1.1

4.1.1.2 Animal and plant cells

Answer 02 · Mark scheme

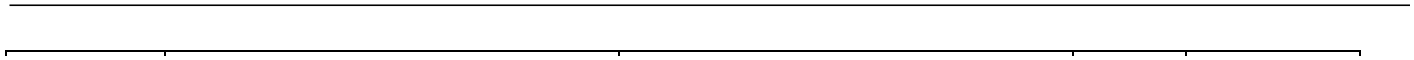
November 2020 | 8464/B/1H | Original Q4

04.3	fewer bacteria / pathogens in chicken / eggs / food (so) fewer bacteria are ingested (by humans) **or** fewer bacteria / pathogens ingested (by humans) (1) (so) fewer toxins produced (1)	ignore references to immunity unqualified allow fewer chickens / eggs will carry the bacteria / pathogens ignore chickens do not get disease / infected allow idea of fewer bacteria being passed on to humans in food allow idea of fewer bacteria being passed on to humans in food (1)	1 1	AO2 4.3.1.3 4.3.1.1
04.4	wash hands before preparing food wash hands after using the toilet	ignore wash hands unqualified allow good food hygiene allow clean areas where a person has been ill allow do not shake hands (with someone who has food poisoning)	1	AO1 4.3.1.1 4.3.1.3
04.5	warmer weather so bacteria reproduce / increase faster	ignore bacteria are killed at low temperatures allow food not cooked properly on barbeques	1	AO3 4.3.1.1 4.3.1.3
Total			**12**	

4.1.1.2 Animal and plant cells

Answer 02 · Mark scheme

November 2020 | 8464/B/1H | Original Q4



4.1.1.2 Animal and plant cells

Answer 03 · Mark scheme

June 2022 | 8464/B/1H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	both have a cell membrane both have cytoplasm		1 1	AO1 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	any **one** from: • fever • abdominal / stomach cramps	ignore vomiting / sickness / diarrhoea ignore feel unwell unqualified ignore rashes allow high temperature allow sweating / chills	1	AO1 4.3.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	penicillin	allow phonetic spelling	1	AO2 4.3.1.9

4.1.1.2 Animal and plant cells

Answer 03 · Mark scheme

June 2022 | 8464/B/1H | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	any **one** from: • only a few bacteria killed so live bacteria continued to reproduce • time delay before antibiotic reached bacteria • time delay before antibiotic could kill bacteria	allow bacteria reproducing when course started allow takes time (for antibiotic) to travel through the body allow takes time (for antibiotic) to work	1	AO3 4.3.1.1 4.3.1.3 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	there were fewer toxins in the body than at day 0		1	AO2 4.3.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	to reduce / prevent resistant strains / bacteria developing **or** to reduce / prevent antibiotic resistance (in bacteria)	ignore references to bacteria becoming immune allow because they will get better without taking any antibiotics ignore body will fight the infection unqualified allow some infections are caused by viruses allow because they have been told not to by NHS / NICE	1	AO1 4.3.1.8

4.1.1.2 Animal and plant cells

Answer 03 · Mark scheme

June 2022 | 8464/B/1H | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	B		1	AO2 4.2.2.3 4.3.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	D		1	AO2 4.2.2.3

Total Question 1		**9**

4.1.1.2 Animal and plant cells

Answer 04 · Mark scheme

June 2023 | 8464/B/1H | Original Q2

Question 2

Question	Answers	Mark	AO / Spec. Ref.
02	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO2 AO1
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	AO1
	No relevant content	0	

	Indicative content Method 1 • place ruler on (microscope) stage • focus on (scale on) ruler • measure diameter / width of field of view • in millimetres • replace ruler with slide • focus on cells • use same magnification • estimate / count number of cells that fit (lengthwise) across field of view • (to calculate mean length of onion cells): divide diameter / width of field of view by (estimated) number of cells **or** divide diameter / width of field of view by 3 cells Method 2 • focus on cells • note magnification • take a photograph of the image • calculate a mean: ○ measure length of several cells (3 or more) cells on the photograph ○ add all image lengths together and divide total by number of cells (to calculate mean cell image length) OR ○ measure the length of one cell ○ calculate the real size ○ repeat for other cells (3 or more) ○ calculate the mean real size • (mean) size of real cell = (mean cell) image size / magnification General points • focus under low power first • using focusing knob • then focus at ×100 magnification • reference to how total magnification is calculated • equation: (mean) size of real cell = (mean cell) image size / magnification For **Level 2** attempt at a method to measure cells plus an indication of how to calculate mean length For **Level 3** suitable method and calculation of mean length		4.1.1.2 4.1.1.5 RPA1

Total Question 2	**6**

4.1.1.2 Animal and plant cells

Answer 01 · Examiner comments

June 2018 | 8464/B/1H | Original Q1

Question 1 (standard demand)

01.1 Students demonstrated a good understanding of prokaryotic and eukaryotic cells. 87% of students achieved two marks. To gain both marks all three structures had to be correctly linked to the type of cell where each structure is found.

When only one mark was awarded it was usually for identifying the nucleus as being found in eukaryotic cells.

01.2 Students demonstrated a good understanding of cell structure. 80% of students were awarded the mark for identifying the vacuole, ribosome and cell wall in the plant cell.

Students were asked to tick one box, but some labelled the diagram, whilst others circled the names of the structures in the table.

01.3 27% of students achieved this mark. The cells on slide A appeared large, but blurred. The required response was a reference to focusing the image.

Many students referred to zooming in or out, to altering the magnification or using an electron microscope. All of these were ignored. However, if they said increase the magnification this was incorrect and negated a correct answer of focusing the image.

01.4 The cells on slide B appeared small but in focus. The required response was a description of how to obtain a larger image. There were two marks available for this question.

- One was for reference to changing the lens.
- One was for stating that the new lens would have a higher power or magnification.

45% of students obtained a mark. Where a mark was awarded it was usually for saying increase the magnification.

Changing or using a better magnification was insufficient. Many students referred to zooming in or out or said use an electron microscope, both of which were ignored.

4.1.1.2 Animal and plant cells

Answer 01 · Examiner comments June 2018 | 8464/B/1H | Original Q1

01.5 There were three marks available for this question.

- The first mark was for conversion of units. Many students did not attempt a conversion but could still go on to achieve two marks. A range of different errors were made which included multiplying or dividing by 10, 100 or 10 000, rather than by 1000. Some did not appreciate that a micrometre is smaller than a millimetre.
- The second mark was for correctly substituting into the rearranged equation to calculate magnification. This mark was allowed even if their initial conversion was incorrect.
- The final mark was for an answer of 400. Some students added a unit to their answer and this negated the mark.

33% of students achieved all three marks, and 33% achieved two marks. 24% of students scored zero. This was often for 280 ÷ 112 = 2.5

4.1.1.2 Animal and plant cells

Answer 03 · Examiner comments — June 2022 | 8464/B/1H | Original Q1

Question 1 (standard demand)

01.1 66% of students scored both marks for identifying the cell membrane and cytoplasm as structures that are found in both bacterial and animal cells.

01.2 One symptom of salmonella food poisoning was asked for, with students instructed not to refer to vomiting and diarrhoea. 60% of the students were awarded the mark, usually for stomach ache or fever. Many described fever as having a high temperature or sweating, which were allowed.

01.3 64% of students knew that penicillin was the first antibiotic developed. A wide range of phonetic spellings were accepted. The most common incorrect answers were the names of well-known painkillers.

01.4 Fewer than half of the students scored this mark. Most correct responses referred to a time delay before the antibiotics became effective, or started working. A few students said the bacteria would be reproducing or multiplying. There was some confusion with antibodies, and incorrect references to bacteria fighting the antibiotics, or antibiotics fighting bacteria.

01.5 Two-thirds of students knew that a child will start to feel better after taking antibiotics for a few days because there will be fewer toxins in the body. Most other students thought the child had become resistant to the bacteria.

01.6 31% of students scored the mark, usually for saying overuse of antibiotics could result in antibiotic resistance. Alternatively, they scored the mark for the idea that the person would get better without taking any antibiotics, which was allowed.

Quite a lot of students said the patient or the antibiotic would become resistant, which was incorrect. A common mistake was to confuse immunity with resistance.

Answer 03 · Examiner comments — June 2022 | 8464/B/1H | Original Q1

01.7 A third of students correctly identified the drawing of the white blood cell as the cell that produces antibodies. More than half of the students thought the red blood cell produced antibodies; potentially as a result of students being unfamiliar with drawings of blood components.

01.8 63% of students identified platelets as the part of the blood that starts the clotting process. Few selected plasma as their answer.

4.1.1.2 Animal and plant cells

Answer 04 · Examiner comments

June 2023 | 8464/B/1H | Original Q2

Question 2

Question 2 was common to both tiers and was set at standard demand.

The question asked students to describe how a microscope, a transparent ruler and a prepared slide of onion cells could be used to estimate the mean length of onion cells on the slide. Many students described how to prepare the slide, which did not gain credit as the students were told that they were provided with this.
Students were not expected to know how to use an eyepiece graticule and stage micrometer. Full marks could be obtained from either of the methods detailed on the mark scheme.

On the Higher tier almost a third of students gave responses that were Level 2 or above, although very few were in Level 3. This was often because they mixed up the two methods, so the key steps were not logically sequenced. A common mistake was to describe how to measure the cells with a ruler using the microscope, but then they divided the measurement by 100.
In order to move into Level 2 an attempt at a method to measure the size of the cells was required, as well as a reference to how to calculate a mean. The latter was often not addressed, so more than a third of students only scored 2 marks.