2024

Name_____

Combined Science

Foundation

Biology: Paper 1

AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 1F

Tuesday 14 May 2019 Afternoon Time allowed: 1 hour 15 minutes

Materials
For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

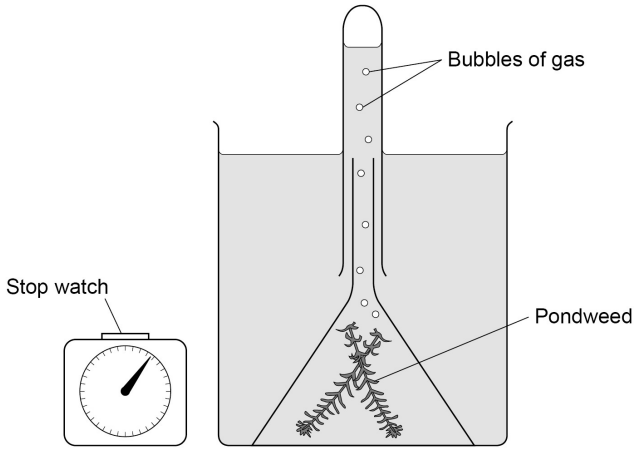
For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

Do not write outside the box

0 1 A student investigated the effect of light intensity on the rate of photosynthesis.

Figure 1 shows some of the apparatus used.

Figure 1



0 1 . 1 Name the gas produced by the pondweed in the light.

[1 mark]

_____

0 1 . 2 Describe **one** way the student could change the intensity of light reaching the pondweed.

[2 marks]

_____

_____

_____

Do not write outside the box

0 1 . 3 Describe how the student could use the apparatus in **Figure 1** to measure the rate of photosynthesis.

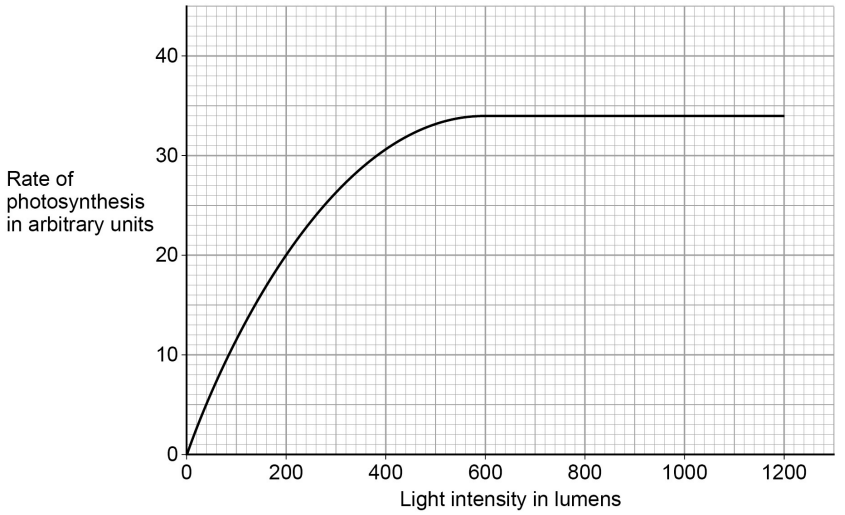
[2 marks]

Question 1 continues on the next page

Do not write outside the box

Figure 2 shows the student's results.

Figure 2



0 1 . 4 What was the maximum rate of photosynthesis?

[1 mark]

Maximum rate = _____ arbitrary units

Do not write outside the box

0 1 . 5 At which light intensity was light a limiting factor?

[1 mark]

Tick (✓) **one** box.

200 lumens ☐

600 lumens ☐

1200 lumens ☐

0 1 . 6 Light intensity can affect the rate of photosynthesis.

Give **one** other factor that can affect the rate of photosynthesis.

[1 mark]

_____

8

Do not write outside the box

0 2 A single-celled organism has a large surface area to volume ratio.

0 2 . 1 How does oxygen enter a single-celled organism?

[1 mark]

Tick (✓) **one** box.

Active transport ☐

Diffusion ☐

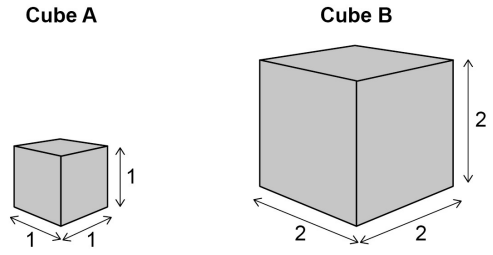
Osmosis ☐

Do not write outside the box

Figure 3 shows two cubes.

The surface area to volume ratio for cube **A** is 6:1

Figure 3



0 2 . 2 Calculate the surface area to volume ratio of cube **B**.

[4 marks]

Surface area of one face of cube **B** _____

_____

Surface area of one face = _____

Total surface area of cube **B** _____

_____

Total surface area = _____

Volume of cube **B** _____

_____

Volume = _____

Surface area to volume ratio = _____ : _____

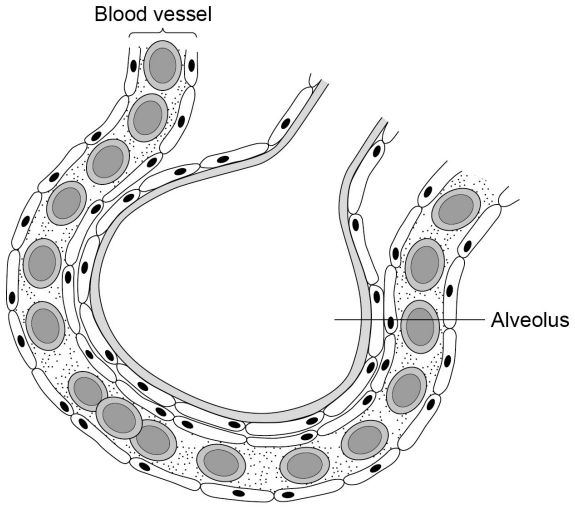
Turn over ►

Do not write outside the box

Multicellular organisms have exchange surfaces to absorb substances.

Figure 4 shows part of the exchange surface in the lungs.

Figure 4



0 2 . 3 Oxygen passes from the alveolus into the blood.

Name the part of the blood that carries the most oxygen.

[1 mark]

_____

0 2 . 4 Name the gas that passes out of the blood into the alveolus.

[1 mark]

_____

Do not write outside the box

0 2 . 5 Alveoli provide a large surface area for gas exchange.

Give **two** other ways the lungs are adapted for efficient gas exchange.

[2 marks]

1 _____

_____

2 _____

_____

9

Turn over for the next question

Do not write outside the box

0 3 This question is about organisation in living organisms.

0 3 . 1 Write the biological structures from the box in the correct size order.

[3 marks]

cell	**nucleus**	**organ**	**tissue**

Smallest ↓ Largest

_____

_____

_____

_____

0 3 . 2 Name **one** animal organ.

[1 mark]

_____

0 3 . 3 Which is a plant tissue?

[1 mark]

Tick (✓) **one** box.

Flower ☐

Leaf ☐

Phloem ☐

Root ☐

Figure 5 shows part of a root viewed using a microscope.

Figure 5

This image cannot be reproduced here due to third-party copyright restrictions

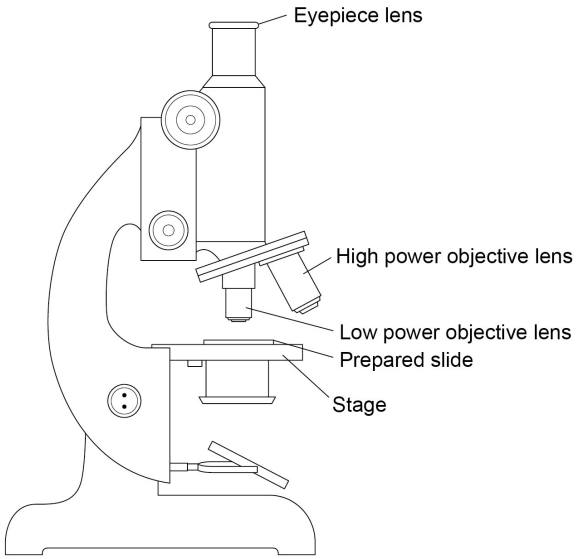
0 3 . 4 Explain how a root hair cell is specialised for its function.

[2 marks]

Question 3 continues on the next page

Figure 6 shows a microscope.

Figure 6



0 3 . 5 It is easier to view the cells using the low power objective lens first.

Give **one** reason why.

[1 mark]

0 3 . 6 To focus the image the objective lens should be moved away from the stage.

Give **one** reason why the objective lens should **not** be moved towards the stage.

[1 mark]

Do not write outside the box

0 3 . 7 The image of the prepared slide in **Figure 6** is viewed with the ×10 objective lens.

The total magnification is ×50

What was the power of the eyepiece lens used?

[1 mark]

Power of eyepiece lens = × _____

0 3 . 8 Root hair cells do **not** contain chloroplasts.

Suggest **one** reason why.

[1 mark]

11

Turn over for the next question

Do not write outside the box

0 4 Water is lost from the leaves of a plant through stomata.

0 4 . 1 What is the process by which water is lost from the leaves of a plant?

[1 mark]

Tick (✓) **one** box.

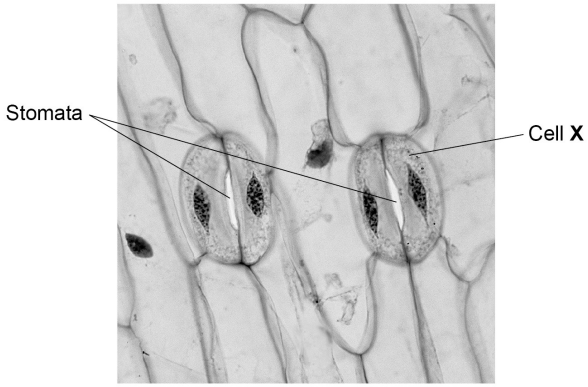
Osmosis ☐

Photosynthesis ☐

Transpiration ☐

Figure 7 shows stomata on the lower surface of a leaf.

Figure 7



Do not write outside the box

0 4 . 2 What is the name of cell **X**?

[1 mark]

Tick (✓) **one** box.

- Epidermal cell ☐
- Guard cell ☐
- Palisade cell ☐
- Xylem cell ☐

0 4 . 3 The length of cell **X** is 25 mm when viewed at a magnification of ×800

Calculate the real length of cell **X**.

Give your answer in micrometres (μm).

1 mm = 1000 μm

Use the equation:

$$\text{real length of cell} = \frac{\text{size of image}}{\text{magnification}}$$

[3 marks]

Real length of cell **X** = _____ μm

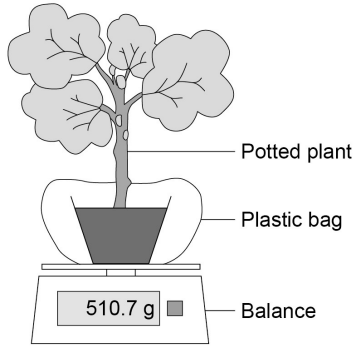
Question 4 continues on the next page

Do not write outside the box

A student measured the mass of water lost from some similar plants.
The plants were at different temperatures.

Figure 8 shows the apparatus used.

Figure 8



This is the method used.

1. Seal a plastic bag around the pot of a potted plant.
2. Place the potted plant with the bag on a balance in a room at 20 °C
3. Record the mass.
4. After 3 hours record the mass again.
5. Calculate the mass of water lost from the plant.
6. Repeat steps 1–5 at 25 °C and at 30 °C with other similar plants.

0 4 . 4 What was the independent variable in this investigation?

[1 mark]

Tick (✓) **one** box.

- Initial mass of the plant ☐
- Length of time the plant was left ☐
- Mass of water lost ☐
- Temperature of the room ☐

Do not write outside the box

0 4 . 5 Suggest why the student sealed a plastic bag around the pot.

[1 mark]

Question 4 continues on the next page

Do not write outside the box

Table 1 shows the student's results.

Table 1

Temperature in °C	Mass at the start in g	Mass after 3 hours in g	Mass of water lost in 3 hours in g
20	510.7	508.6	2.1
25	510.4	507.1	3.3
30	**X**	506.3	4.9

0 4 . 6 What is the resolution of the balance used in this investigation?

[1 mark]

Tick **one** box.

0.1 g ☐ 1.0 g ☐ 100 g ☐ 500 g ☐

0 4 . 7 Calculate value **X** in **Table 1.**

[1 mark]

X = _____ g

0 4 . 8 Give **one** conclusion that can be made from the results in **Table 1.**

[1 mark]

0 4 . 9 Give **two** factors that might affect the rate of water loss from the leaves.

Do **not** refer to temperature in your answer.

[2 marks]

1 _____

2 _____

12

Do not write outside the box

Turn over for the next question

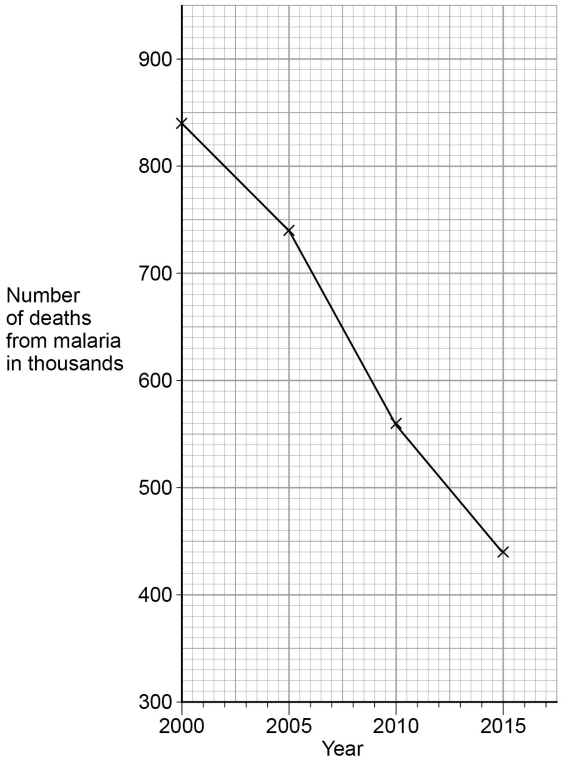
DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 5 Malaria is a disease transmitted by mosquitos.

Figure 9 shows information about the number of deaths from malaria.

Figure 9



0 5 . 1 Calculate the decrease in the number of deaths between 2000 and 2015.

[2 marks]

Decrease in number of deaths = _____

Do not write outside the box

0 5 . 2 Which time period shows the greatest decrease in the number of deaths?

[1 mark]

Tick (✓) **one** box.

2000 to 2005 ☐

2005 to 2010 ☐

2010 to 2015 ☐

0 5 . 3 A student looked at **Figure 9** and concluded that there were 800 000 deaths from malaria in 2002.

Suggest **one** reason why this conclusion might **not** be correct.

[1 mark]

0 5 . 4 What type of pathogen causes malaria?

[1 mark]

Tick (✓) **one** box.

Bacterium ☐

Fungus ☐

Protist ☐

Virus ☐

Do not write outside the box

0 5 . 5 Scientists are developing a vaccine against malaria.

Suggest how a vaccine against malaria could reduce the spread of the disease.

[2 marks]

0 5 . 6 Give **one** way of controlling the spread of malaria.

Do **not** refer to a vaccine in your answer.

[1 mark]

8

Do not write outside the box

Turn over for the next question

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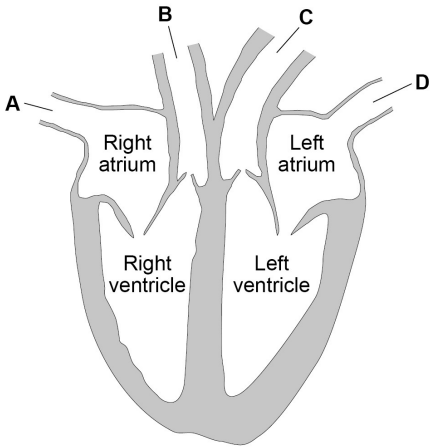
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 6 **Figure 10** shows a human heart.

Figure 10



0 6 . 1 Which blood vessel carries deoxygenated blood away from the heart to the lungs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 2 The natural resting heart rate is controlled by a group of cells that act as a pacemaker.

Where in the heart are 'pacemaker cells' found?

[1 mark]

Tick (✓) **one** box.

Left atrium ☐

Left ventricle ☐

Right atrium ☐

Right ventricle ☐

Do not write outside the box

Some people may be treated with a drug to slow their heart rate.

0 6 . 3 Digitalis is a drug that slows the heart rate.

Where does the drug digitalis originate from?

[1 mark]

Tick (✓) **one** box.

- Bacteria ☐
- Foxgloves ☐
- Mould ☐
- Willow ☐

Question 6 continues on the next page

Do not write outside the box

Beta blockers are another type of drug that slows the heart rate.

Table 2 shows information for people who do not take beta blockers and for people who do take beta blockers.

- Stroke volume is the volume of blood pumped out of the heart each time it beats.
- Cardiac output is the total volume of blood pumped out of the heart each minute.

Table 2

	No beta blockers taken		**Taking beta blockers**	
	At rest	**During exercise**	**At rest**	**During exercise**
Heart rate in beats per minute	68	150	52	88
Stroke volume in cm^3	80	120	**X**	98
Cardiac output in cm^3 per minute	5440	18 000	2800	8624

0 6 . 4 Calculate stroke volume **X** in **Table 2.**

Use the equation:

cardiac output = stroke volume × heart rate

Give your answer to 2 significant figures.

[3 marks]

Stroke volume **X** = _____ cm^3

Do not write outside the box

0 6 . 5 Some people who take beta blockers get out of breath when they exercise.

Explain why beta blockers can have this effect during exercise.

You should refer to information given in **Table 2.**

[6 marks]

12

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

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0 7 This question is about digestion.

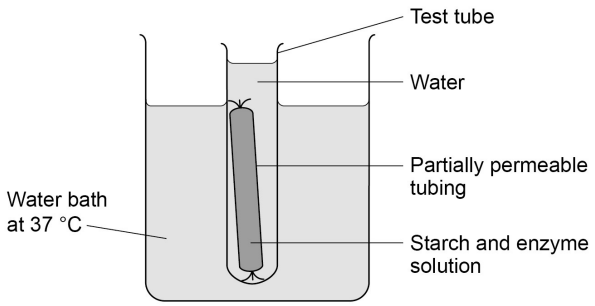
0 7 . 1 Name the enzyme that digests starch in the human digestive system.

[1 mark]

A student set up a model to represent the digestion and absorption of food molecules in the digestive system.

Figure 11 shows the student's model.

Figure 11



This is the method used.

1. Fill a test tube with water at 37 °C
2. Test the water for starch and for sugar.
3. Mix together starch and enzyme solution and immediately test it for starch and for sugar.
4. Fill some partially permeable tubing with the starch and enzyme mixture.
5. Seal the tubing and place it in the test tube of water.
6. Place the test tube in a water bath at 37 °C
7. After 30 minutes, test the mixture inside the partially permeable tubing and test the water in the test tube for starch and for sugar.

0 7 . 2 Suggest which parts of the body the partially permeable tubing and the water in the test tube represent.

[2 marks]

Partially permeable tubing _____

Water in the test tube _____

Turn over ►

Do not write outside the box

Table 3 shows the results.

Table 3

Test	Description of liquid	Result of starch test	Result of sugar test
1	Mixture inside tubing at start	✓	✗
2	Water in the test tube at start	✗	✗
3	Mixture inside tubing after 30 minutes	✓	✓
4	Water in the test tube after 30 minutes	✗	✓

Key
✓ = Present
✗ = Not present

0 7 . 3 Name the reagents used to test for starch and for sugar.

[2 marks]

Starch _____

Sugar _____

0 7 . 4 Why was there no sugar present in test **1**?

[1 mark]

_____

_____

0 7 . 5 Explain the results for test **3**.

[2 marks]

_____

_____

_____

_____

_____

Do not write outside the box

0 7 . 6 Explain the results for test **4.**

[2 marks]

10

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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GCSE
COMBINED SCIENCE: TRILOGY
8464/B/1F

Biology Paper 1F

Mark scheme

June 2019

Version: Final 1.0

I96G8464b1f/MS

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	oxygen	name takes precedence allow O_2 ignore O^2 / O / O2	1	AO1 4.4.1.1 4.4.1.2
01.2	(use) a lamp / light (source) (and) move away and / or towards pondweed	 allow use different power ratings **or** use a dimmer switch allow change the opacity of the beaker for **2** marks	1 1	AO1 4.4.1.2
01.3	count the number of bubbles in a given time	allow measure the volume of gas collected allow for **2** marks measure time taken to collect a specific number of bubbles	1 1	AO1 4.4.1.2 AO2/2 4-5 RPA5 WS2.3
01.4	34 (arbitrary units)	allow a value in the range 33.5 – 34.5 (arbitrary units)	1	AO2 4.4.1.2
01.5	200 lumens		1	AO3 4.4.1.2
01.6	any **one** from: • temperature • carbon dioxide (concentration) • amount of chlorophyll	ignore light (intensity) ignore heat ignore oxygen allow light colour / wavelength allow water ignore pH	1	AO1 4.4.1.2
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	diffusion		1	AO1/1 4.1.3.1
02.2	(SA of one face = 2 × 2) =4 (Total SA = 4 × 6) = 24 (Volume = 2 × 2 × 2) =8 (SA:volume ratio =) 24:8 **or** 3:1	ignore units allow correct calculation using their calculated SA of 1 face x 6 ratio must be consistent with their figures	1 1 1 1	AO2 4.1.3.1
02.3	red (blood) cell(s)	allow erythrocyte(s)	1	AO1 4.2.2.3
02.4	carbon dioxide	name takes precedence allow CO_2 ignore CO^2 / CO2 ignore water (vapour)	1	AO2 4.2.2.2 4.2.2.3 4.4.2.1
02.5	any **two** from: • wall of alveolus (only) one cell thick • wall of capillary (only) one cell thick • cells of alveolus / capillary wall are flattened / thin • good blood supply • (well) ventilated	ignore large surface area ignore many alveoli ignore moist lining if none of these mentioned allow **1** mark for idea of short distance between (air in) alveolus and blood	2	AO1 4.1.3.1 4.2.2.2
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	nucleus cell tissue organ	all in correct order allow **1** mark for each consecutive pair of structures	3	AO2 4.1.1.1 4.1.1.2 4.2.1
03.2	any **one** from: • bladder • brain • heart • (small **or** large) intestine • kidney • liver • lung • pancreas • skin • stomach	allow any organ found in an animal ignore blood	1	AO1 4.2.1
03.3	phloem		1	AO1 4.2.3.1
03.4	large surface area (so) it can absorb (a lot of) water / minerals / (mineral) ions	allow long allow **1** mark for (many) mitochondria allow for **2** marks (many) mitochondria for active transport	1 1	AO1 4.1.1.3 4.2.3.2
03.5	any **one** from: • biggest / widest field of view • easier to focus		1	AO3 4.1.1.2
03.6	to avoid damage to lens / slide	ignore references to focussing	1	AO3 4.1.1.2

03.7	(×)5		1	AO2 4.1.1.2
03.8	any **one** from: (root hair cells) • are not exposed to light • do not photosynthesise	allow are underground	1	AO2 4.1.1.2 4.1.1.3 4.2.3.2 4.4.1.1
Total			**11**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	transpiration		1	AO1 4.2.3.2
04.2	guard cell		1	AO1 4.2.3.1 4.2.3.2
04.3	(real length of cell =) $\frac{25}{800}$ 0.03125 31.25 (µm)	an answer of 31.25 (µm) scores 3 marks allow 2 marks for $\frac{25\,000}{800}$ allow 31 or 31.3 allow correct unit conversion of incorrect answer	1 1 1	AO2 4.1.1.5
04.4	temperature of the room		1	AO2 4.2.3.2
04.5	any water / mass lost was from the leaves / plant	allow so no water was lost (directly) from the soil	1	AO3 4.2.3.2
04.6	0.1 g		1	AO2 4.2.3.2
04.7 View with Table 1	511.2 (g)	answer line takes precedence	1	AO2 4.2.3.2
04.8	the higher the temperature the more water lost	cause and effect must be the correct way round	1	AO3 4.2.3.2

04.9	any **two** from: • humidity • air movement • light (intensity) • water availability • rate of photosynthesis	 allow wind allow time of day allow number / size of leaves / allow number of stomata on plant ignore type of plant ignore time plant left for	2	AO1 4.2.3.2
Total			**12**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	840 000 – 440 000 400 000	an answer of 400 000 scores 2 marks allow tolerance of +/- half a small square allow 840 – 440 = 400	1 1	AO2 4.3.1.5
05.2	2005 to 2010		1	AO3 4.3.1.5
05.3	any **one** from: • data not collected (for 2002) • only shows a trend line • not all deaths reported / recorded	allow no data plotted for 2002	1	AO3 4.3.1.5
05.4	protist		1	AO1 4.3.1.5
05.5	 makes people immune **or** they do not develop the disease (so) fewer (infected) people to pass pathogen on (to mosquitos)	allow ecf from 05.4 allow correct description of immunity allow idea of disrupting life cycle of parasite	 1 1	AO1 AO2 4.3.1.5
05.6	any **one** from: • (mosquito) nets / long clothing • prevent mosquitos breeding • insecticides • insect repellents • anti-malarial tablets • kill mosquitos	 allow specific method e.g. drain swamps, release GM mosquitos allow DEET / mosquito band allow names e.g. Larium / Malarone allow antibiotics	1	AO1 4.3.1.5 4.3.1.7
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	**B**		1	AO2 4.2.2.2
06.2	right atrium		1	AO1 4.2.2.2
06.3	foxgloves		1	AO1 4.3.1.9
06.4		an answer of 54 (cm^3) scores 3 marks		AO2 4.2.2.2
	X = 2800 / 52		1	
	53.846153		1	
	54 (cm^3)	allow correct rounding of an incorrectly calculated value of stroke volume	1	

Question	Answers	Mark	AO / Spec. Ref.
06.5	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3 4.2.2.2 4.2.2.4 4.4.2.1 4.4.2.2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2 AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	
	Indicative content effect of exercise • during exercise body needs to transfer (more) energy • energy transferred during respiration • rate of respiration increases during exercise • (so) more oxygen is needed effect of beta blockers • beta blockers reduce (the increase in) heart rate (during exercise) • beta blockers reduce stroke volume (or described) • beta blockers reduce cardiac output • (so) heart cannot supply oxygen fast enough / in sufficient quantity to muscle cells effect on breathing rate • breathing rate increases to increase rate / amount of oxygen absorbed • breathing rate increases to increase rate / amount of carbon dioxide removed from body • (but) increased breathing rate cannot fully compensate for changes in heart function A level 3 response should make links between all three sections of indicative content A level 2 response should attempt to link effect of exercise with oxygen / energy requirement **and** beta blockers to effect on heart function. .		
Total		**12**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	amylase	allow phonetic spelling allow carbohydrase ignore references to source of enzyme e.g. salivary / pancreatic do **not** accept amylose	1	AO1 4.2.2.1
07.2	(partially permeable tubing) small intestine (water in test tube) blood	allow stomach ignore intestine unqualified do **not** accept large intestine allow plasma	1 1	AO3 4.2.2.1
07.3	(Starch): Iodine (solution) (Sugar): Benedict's (solution)	all allow phonetic spelling ignore iodide unqualified	1 1	AO1 4.2.2.1
07.4	enzyme had not started to work **or** none of the starch had been digested / broken down	allow idea of not enough time (for digestion)	1	AO2 4.2.2.1
07.5	(enzyme) digested / broke down starch to form sugar (however) not all the starch was digested / broken down		1 1	AO2 AO3 4.2.2.1
07.6	sugar molecules formed are small enough to pass through tubing (but) starch molecules too large (to pass through tubing)		1 1	AO3 4.2.2.1 AO2 4.2.2.1
Total			**10**	

AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 1F

Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

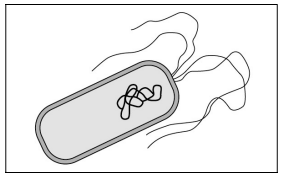
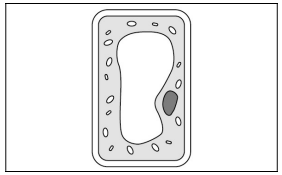
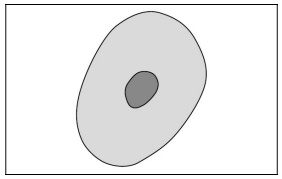
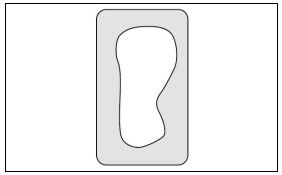
For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Do not write outside the box

0 1 Cells are the building blocks of life.

0 1 . 1 Draw **one** line from each type of organism to the diagram of one of its cells. **[3 marks]**

Type of organism	Diagram of one cell
Animal	
Bacterium	
Plant	
	

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0 1 . 2 Cells contain structures. These structures have different functions.

Draw **one** line from each function to the correct structure.

[3 marks]

Function	Structure
Contains genetic information	Cell membrane
Controls what enters and leaves a cell	Cell wall
Where photosynthesis happens	Chloroplast
	Nucleus

Question 1 continues on the next page

Do not write outside the box

0 1 . 3 Chemicals are produced in cells.

Complete the sentences.

Choose answers from the box.

[4 marks]

cellulose	**DNA**	**glycogen**	**starch**	**urea**

A chemical excreted by animals is _____ .

A chemical stored in animal cells is _____ .

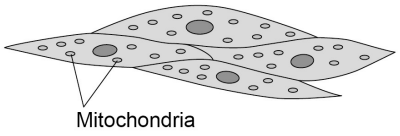
A chemical stored in plant cells is _____ .

A chemical that strengthens plant cell walls is _____ .

Do not write outside the box

Figure 1 shows a diagram of muscle cells.

Figure 1



0 1 . 4 Give **one** function of muscle cells.

[1 mark]

0 1 . 5 Explain how muscle cells are adapted for their function.

Use **Figure 1**.

[2 marks]

Question 1 continues on the next page

Do not write outside the box

0 1 . 6 One muscle cell was 0.05 mm wide.

When viewed using a microscope the image of the muscle cell was 2 mm wide.

Calculate the magnification used to view the cell.

Use the equation:

$$\text{magnification} = \frac{\text{width of image}}{\text{width of real cell}}$$

[2 marks]

Magnification = ×

15

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 2 Antibiotics are used to treat bacterial infections.

0 2 . 1 Which substance is used as an antibiotic?

[1 mark]

Tick (✓) **one** box.

Aspirin ☐

Digitalis ☐

Penicillin ☐

Gonorrhoea and chlamydia are two sexually transmitted infections.

Gonorrhoea and chlamydia infections can be treated with antibiotics.

0 2 . 2 Give **one** symptom of gonorrhoea.

[1 mark]

A scientist investigated which antibiotics were most effective at treating gonorrhoea and chlamydia.

This is the method used.

1. Grow gonorrhoea bacteria in a Petri dish.

2. Prepare four different antibiotic solutions, **A**, **B**, **C** and **D**, of the same concentration.

3. Cut four filter paper discs to the same size.

4. Soak each paper disc in a different antibiotic solution.

5. Put the four paper discs into the Petri dish.

6. Repeat steps 3 to 5 using a Petri dish with chlamydia bacteria growing in it.

7. Keep both Petri dishes at 25 °C for 3 days.

0 2 . 3 Give **two** control variables used in this investigation.

[2 marks]

1 _____

_____

2 _____

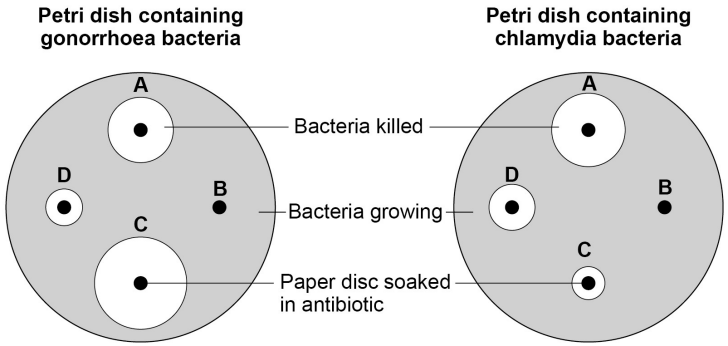
_____

Question 2 continues on the next page

Figure 2 shows the results.

A clear area around a paper disc is where the antibiotic has killed the bacteria.

Figure 2



0 2 . 4 Which antibiotic did **not** kill either type of bacterium?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 2 . 5 Which antibiotic would be the most effective to treat a person with a **gonorrhoea** infection?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Do not write outside the box

0 2 . 6 Which antibiotic would be the most effective to treat a person who had both gonorrhoea **and** chlamydia infections?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 2 . 7 Antibiotics **cannot** be used to treat HIV infections.

Suggest **one** reason why.

[1 mark]

Fungi can cause an infection of the fingernails and toenails.

Fungal nail infections can spread from one person to another person.

0 2 . 8 Some people go to nail salons to have their nails shaped and painted.

Suggest **one** way workers in nail salons can reduce the risk of infections being spread.

[1 mark]

0 2 . 9 Suggest **one** reason why fungal infection of toenails is more common than fungal infection of fingernails.

[1 mark]

10

Do not write outside the box

0 3 Anaerobic respiration in yeast is called fermentation.

The equation for fermentation is:

glucose → ethanol + carbon dioxide

0 3 . 1 How does the equation show that fermentation is an **anaerobic** reaction?

[1 mark]

Fermentation in yeast is used in the manufacture of beer, wine and bread.

0 3 . 2 Why is fermentation used when making beer and wine?

[1 mark]

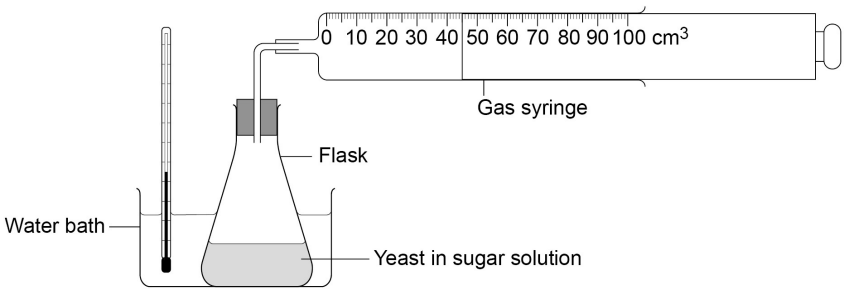
0 3 . 3 Explain why fermentation is used when making bread.

[2 marks]

A student investigated fermentation in yeast.

Figure 3 shows the apparatus.

Figure 3



This is the method used.

1. Mix yeast with sugar solution in a flask.
2. Put the flask in a water bath at 35 °C.
3. After 10 minutes attach a gas syringe to the flask.
4. Record the volume of carbon dioxide collected every 5 minutes for 1 hour.

0 3 . 4 What volume of carbon dioxide has been collected in the gas syringe in **Figure 3**?

[1 mark]

Volume of carbon dioxide = _____ cm^3

0 3 . 5 Why did the student wait 10 minutes before attaching the gas syringe?

[1 mark]

Tick (✓) **one** box.

To allow time for the mixture to reach 35 °C ☐

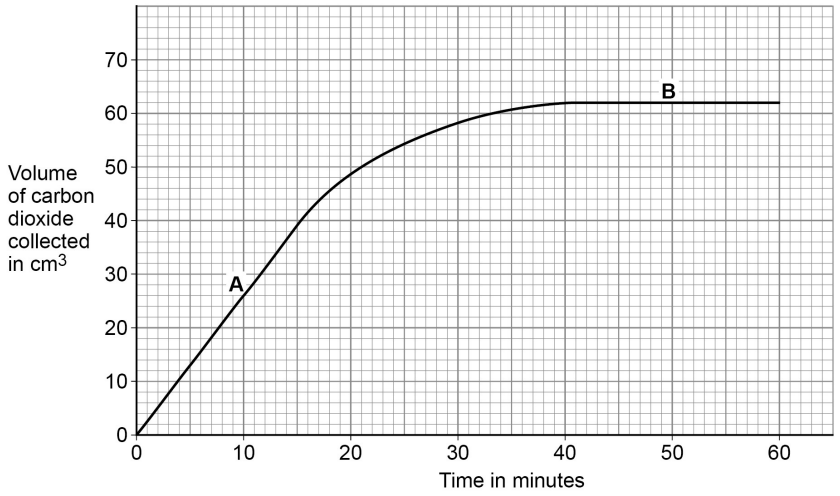
To allow time for the sugar to dissolve ☐

To allow time to draw a results table ☐

Turn over ►

Figure 4 shows the results.

Figure 4



Do not write outside the box

0 3 . 6 **A** and **B** are different parts of the graph in **Figure 4.**

Draw **one** line from each part of the graph to the description of the reaction.

[2 marks]

Part of the graph	Description of the reaction
	Carbon dioxide is **not** being produced
A	
	Carbon dioxide production is **fastest**
B	
	Carbon dioxide production is **slowing down**

Question 3 continues on the next page

Do not write outside the box

The equation for fermentation is repeated here.

glucose → ethanol + carbon dioxide

0 3 . 7 Suggest **one** reason why fermentation in the flask stopped.

[1 mark]

0 3 . 8 Fermentation is controlled by enzymes.

The investigation was repeated at 2 °C and at 75 °C.

No carbon dioxide was produced at either of these temperatures.

Suggest why **no** carbon dioxide was produced at 2 °C or at 75 °C.

[2 marks]

Reason at 2 °C

Reason at 75 °C

0 3 . 9 Anaerobic respiration also happens in animal cells.

Complete the equation for anaerobic respiration in animal cells.

Choose answers from the box.

[2 marks]

carbon dioxide	**ethanol**	**glucose**	**lactic acid**	**water**

____ → ____

13

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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0 4 This question is about plant transport systems.

0 4 . 1 Which **organ** in a plant absorbs water from the soil?

[1 mark]

_____

0 4 . 2 The concentration of nitrate ions in the soil is lower than the concentration of nitrate ions inside a plant.

How would the nitrate ions move from the soil into the cells of this plant?

[1 mark]

Tick (✓) **one** box.

By active transport ☐

By diffusion ☐

By osmosis ☐

Do not write outside the box

Dissolved sugars are transported in the phloem.

0 4 . 3 What is the name of the process that moves dissolved sugars through the phloem?

[1 mark]

Tick (✓) **one** box.

Evaporation ☐

Osmosis ☐

Translocation ☐

0 4 . 4 Give **one** use of sugars in a plant.

[1 mark]

Question 4 continues on the next page

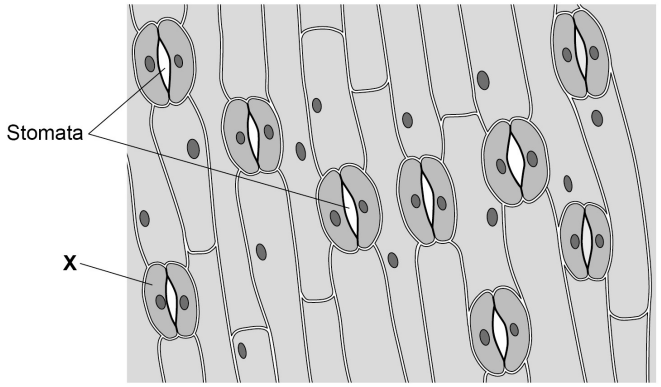
Do not write outside the box

Stomata are openings on the surface of a leaf.

Stomata allow gases to move into and out of a leaf.

Figure 5 shows the surface of a leaf.

Figure 5



0 4 . 5 What is cell **X**?

[1 mark]

Tick (✓) **one** box.

Guard cell ☐

Meristem cell ☐

Palisade cell ☐

Do not write outside the box

0 4 . 6 Why do the stomata open during the day?

[1 mark]

Tick (✓) **one** box.

To allow carbon dioxide in ☐

To allow nitrogen in ☐

To allow oxygen in ☐

0 4 . 7 The area of the leaf shown in **Figure 5** is 0.25 mm^2.

Calculate the number of stomata per mm^2 for the leaf in **Figure 5**.

Use the equation:

$$\text{number of stomata per mm}^2 = \frac{\text{number of stomata}}{\text{area in mm}^2}$$

[2 marks]

Number of stomata per mm^2 = _____

Question 4 continues on the next page

Do not write outside the box

A student investigated the number of stomata per mm^2 on the upper and lower surfaces of leaves.

The leaves were taken from the same plant.

Table 1 shows the results.

Table 1

Leaf	Number of stomata per mm^2	
	Upper surface	Lower surface
1	0	37
2	1	36
3	2	30
4	1	32
5	1	35
Mean	1	**X**

0 4 . 8 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____

Do not write outside the box

0 4 . 9 Water vapour is lost through stomata.

Explain the difference in the number of stomata on the upper and lower surfaces of the leaves.

Use **Table 1**.

[3 marks]

13

Turn over for the next question

Do not write outside the box

0 5 Plants absorb light for photosynthesis.

0 5 . 1 Which is the equation for photosynthesis?

[1 mark]

Tick (✓) **one** box.

$C_6H_{12}O_6 + 6\,O_2 \rightarrow 6\,CO_2 + 6\,H_2O$ ☐

$6\,CO_2 + 6\,H_2O \rightarrow C_6H_{12}O_6 + 6\,O_2$ ☐

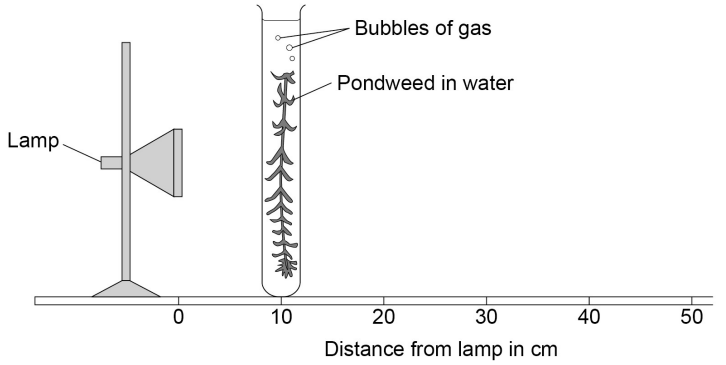
$6\,H_2O + 6\,O_2 \rightarrow C_6H_{12}O_6 + 6\,CO_2$ ☐

$6\,O_2 + 6\,CO_2 \rightarrow C_6H_{12}O_6 + 6\,H_2O$ ☐

A student investigated the effect of light intensity on the rate of photosynthesis.

Figure 6 shows the apparatus.

Figure 6



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This is the method used.

1. Set up the apparatus as shown in **Figure 6**.
2. Place the pondweed 10 cm away from the lamp.
3. Switch on the lamp.
4. Record the number of bubbles of gas produced in 5 minutes.
5. Repeat steps 2 to 4 with the pondweed at different distances from the lamp.

0 5 . 2 What was the independent variable in this investigation?

[1 mark]

Tick (✓) **one** box.

- Distance of the pondweed from the lamp ☐
- Length of the piece of pondweed ☐
- Number of bubbles of gas produced ☐
- Time taken to collect the gas ☐

Question 5 continues on the next page

Do not write outside the box

The lamp gets warm when it is on. This causes the temperature of the water to increase.

0 5 . 3 Explain how an increase in temperature would affect the results of this investigation.

[2 marks]

0 5 . 4 Suggest **one** way the investigation could be improved so the temperature of the water does **not** increase.

[1 mark]

0 5 . 5 Suggest **two** improvements to the investigation so the results would be more valid.

Do **not** refer to controlling the temperature of the water.

[2 marks]

1

2

Do not write outside the box

Question 5 continues on the next page

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ANSWER IN THE SPACES PROVIDED

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Table 2 shows the results.

Table 2

Distance of pondweed from the lamp in cm	Number of bubbles of gas produced in 5 minutes
10	120
20	56
30	31
40	16
50	10

0 5 . 6 Calculate the rate of photosynthesis when the pondweed was 40 cm from the lamp.

Give the rate of photosynthesis as the number of bubbles of gas produced per minute.
[1 mark]

Rate = _____ bubbles of gas produced per minute

0 5 . 7 Give **one** conclusion that can be made from **Table 2.**
[1 mark]

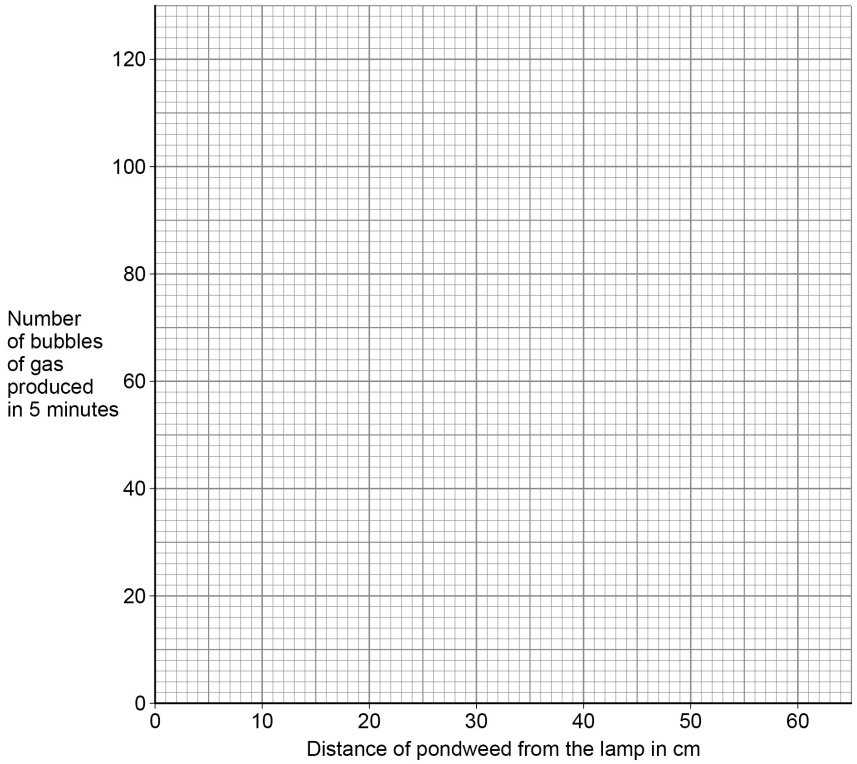
Do not write outside the box

0 5 . 8 Plot the data from **Table 2** on **Figure 7**.

Draw a line of best fit.

[3 marks]

Figure 7



0 5 . 9 Predict the number of bubbles that would be produced in 5 minutes if the pondweed was 60 cm from the lamp.

Use **Figure 7**.

[1 mark]

Number of bubbles produced in 5 minutes = _____

13

Turn over ►

Do not write outside the box

0 6 Describe how to test a sample of food for protein, starch and sugar.

Give the colours that would be seen if the food sample contained protein, starch and sugar.

[6 marks]

6

END OF QUESTIONS

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Question number	**Additional page, if required. Write the question numbers in the left-hand margin.**

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GCSE
COMBINED SCIENCE: TRILOGY
8464/B/1F

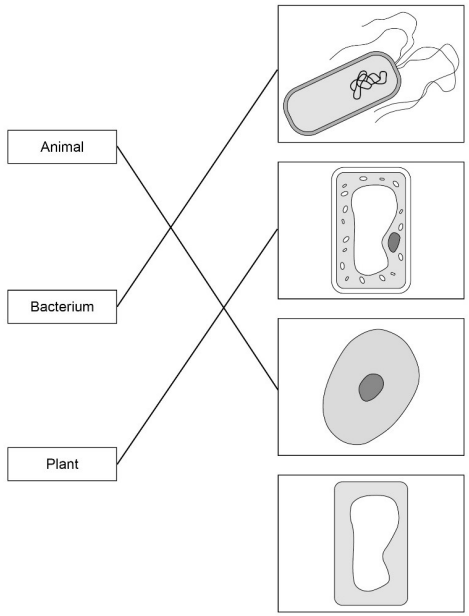
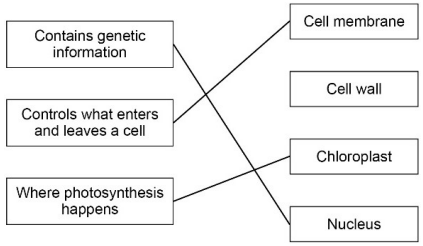
Biology Paper 1F

Mark scheme

June 2021

Version: 1.0 Final Mark Scheme

216G8464B1F/MS

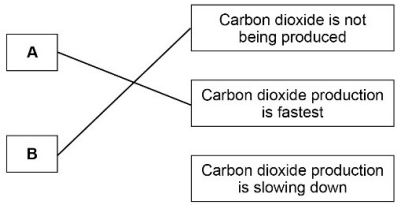
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	 do **not** accept more than one line from a box on the left		1 1 1	AO1 4.1.1.1 4.1.1.2
01.2	 do **not** accept more than one line from a box on the left		1 1 1	AO1 4.1.1.2 4.1.2.1 4.1.3.1 4.4.1.1

01.3	urea glycogen starch cellulose	must be in this order	1 1 1 1	AO1 4.1.1.2 4.4.1.3 4.4.2.3
01.4	any **one** from: • (to cause) movement • to contract / shorten	allow example of movement ignore to relax / expand ignore references to strength / energy / power	1	AO1 4.1.1.3 4.4.2.2
01.5	(many) mitochondria to transfer / release (a lot of) energy	allow (mitochondria) for respiration do **not** accept to produce / make / create energy ignore reference to the shape / strength of the cells	1 1	AO2 4.1.1.2 4.1.1.3 4.4.2.1
01.6	$\frac{2}{0.05}$ (×) 40	do **not** accept if a unit is given	1 1	AO2 4.1.1.5 RPA 1
Total			**15**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	penicillin		1	AO1 4.3.1.8 4.3.1.9
02.2	any **one** from: • (yellow / green / white / beige) discharge from vagina / penis • pain on urinating	ignore colour of urine allow yellow / green / white / beige discharge ignore pain unqualified allow pain in abdomen allow pain in testes allow inflammation of foreskin allow bleeding between periods allow bleeding after sex allow fever / nausea / vomiting	1	AO1 4.3.1.3
02.3	any **two** from: • concentration (of antibiotic) • type of disc • size of disc • temperature **or** kept at 25 °C • time **or** kept for 3 days	allow same type of (filter) paper allow use sterile Petri dish **or** use sterile agar	2	AO2 4.3.1.3 4.3.1.8
02.4	B		1	AO3 4.3.1.3 4.3.1.8 4.3.1.9

02.5	C		1	AO3 4.3.1.3 4.3.1.8 4.3.1.9
02.6	A		1	AO3 4.3.1.3 4.3.1.8 4.3.1.9
02.7	any **one** from: • antibiotics do **not** destroy viruses • viruses are inside cells	 allow antibiotics do **not** kill viruses allow antibiotics **only** kill bacteria allow HIV is a virus allow HIV is **not** a bacterium allow idea that it is difficult to get the antibiotic to the virus	1	AO1 4.3.1.2 4.3.1.8
02.8	any **one** from: • disinfect / sterilise tools / scissors / files • use a new file for each customer • do not treat people with a fungal nail infection • disinfect hands between customers • use new gloves for each customer	 allow put tools / scissors / files in fungicide allow washing / cleaning tools allow use a new tool / scissors for each customer ignore gloves / PPE unqualified allow wear masks	1	AO2 4.3.1.1 4.3.1.4

02.9	any **one** from: • feet are washed less • feet are in (more) moist conditions • feet are (often) warmer	allow converse statements allow idea that less air gets to feet allow idea that feet are wetter / warmer (inside socks) allow idea of (bare) feet in contact with the floor allow idea of sharing footwear	1	AO3 4.3.1.1 4.3.1.4
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	no oxygen (reacting with the glucose)	ignore there is no air	1	AO2 4.4.2.1
03.2	produces ethanol / alcohol		1	AO1 4.4.2.1
03.3	produces carbon dioxide / gas (which) makes the bread / dough rise	 allow idea related to making the bread lighter **or** affecting its texture	1 1	AO1 AO2 4.4.2.1
03.4	45 (cm^3)		1	AO2 4.4.2.1
03.5	to allow time for the mixture to reach 35 °C		1	AO3 4.4.2.1
03.6	**Part of the graph** / **Description of the reaction**  do **not** accept more than one line from a box on the left		1 1	AO3 4.4.2.1

03.7	any **one** from: • glucose / sugar / food ran out • ethanol / alcohol killed the cells / yeast	 ignore yeast / cells died unqualified ignore produced ethanol / alcohol unqualified	1	AO2 4.4.2.1
03.8	(2 °C) too cold (for enzymes / yeast to work) (75 °C) enzymes denatured	allow yeast / enzyme was inactive ignore yeast killed allow no / few successful collisions do **not** accept enzymes are denatured allow enzymes destroyed allow description eg change in shape of active site or of enzyme allow yeast killed do **not** accept enzymes killed ignore references to collisions unqualified	1 1	AO2 4.2.2.1 4.4.2.1
03.9	glucose → lactic acid	**1** mark for each chemical must be in this order ignore formulae	2	AO1 4.4.2.1
Total			**13**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	root	do **not** accept root hair (cells)	1	AO1 4.2.1 4.2.3.2
04.2	by active transport		1	AO2 4.1.3.3
04.3	translocation		1	AO1 4.2.3.2
04.4	any **one** from: • respiration • (used) to produce starch • (used) to produce fat / oil • (used) to produce cellulose • (used) to produce amino acids / protein	allow to release energy do **not** accept to produce / make / create energy allow for growth	1	AO1 4.2.3.2 4.4.1.3
04.5	guard cell		1	AO1 4.2.3.1 4.2.3.2

04.6	to allow carbon dioxide in		1	AO2 4.2.3.1 4.2.3.2
04.7	$\frac{9}{0.25}$ 36	 do **not** accept if a unit is given allow correct calculation using $\frac{9}{25}$	1 1	AO2 4.2.3.2
04.8	$\frac{37 + 36 + 30 + 32 + 35}{5}$ 34	allow $\frac{170}{5}$	1 1	AO2 4.2.3.2
04.9	there are fewer stomata on the upper surface of the leaves (conditions on upper surface will:) any **one** from: • be warmer • be drier • be more exposed to wind • have more light (so) less water will be lost	allow converse statements a comparative term is required	1 1 1	AO3 AO2 AO2 4.2.3.2
Total			**13**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	$6\,CO_2 + 6\,H_2O \rightarrow C_6H_{12}O_6 + 6\,O_2$		1	AO1 4.4.1.1
05.2	distance of the pondweed from the lamp		1	AO1 4.4.1.2 RPA5
05.3	bubbles (of gas) would be produced faster	allow more / bigger bubbles of gas would be produced (in a given time)	1	AO3 4.4.1.2 RPA5
	(because) enzymes work faster	allow (because) photosynthesis is controlled by enzymes allow (because) photosynthesis would be faster	1	AO2 4.2.2.1 4.4.1.2
05.4	any **one** from: • use an LED (lamp) • place a tank / beaker of water between the lamp and tube / pondweed • put the tube in a beaker of water • put the tube in a (thermostatically controlled) water bath • place a piece of glass between the lamp and tube / pondweed	allow use a light that does not emit (a lot of) infrared / thermal radiation allow place a heat shield between the lamp and tube / pondweed	1	AO3 4.4.1.2 RPA5

05.5	any **two** from: • measure the volume of gas produced • allow the pondweed time to equilibrate • repeat **and** calculate a mean **or** repeat **and** remove anomalies • control the concentration of carbon dioxide (in the water) • use the same bulb / lamp	allow amount for volume allow use a cylinder / gas syringe to collect the gas allow a description of this ignore repeat unqualified allow put the pondweed in sodium hydrogen carbonate (solution) **or** sodium bicarbonate (solution) allow use the same type / size / age / piece of pondweed allow record the number of bubbles of gas produced in a longer period of time	2	AO3 4.4.1.2 RPA5
05.6	3 (bubbles of gas produced per minute)	allow 3.2 (bubbles of gas produced per minute) do **not** accept 3.0 (bubbles of gas produced per minute)	1	AO2 4.4.1.2 RPA5
05.7	as light intensity decreases the rate of photosynthesis decreases	allow as distance from lamp increases rate of photosynthesis decreases allow as distance from lamp increases number of bubbles produced decreases	1	AO3 4.4.1.2 RPA5

05.8	all points plotted correctly line of best fit through their points	allow tolerance of ± ½ a small square allow **1** mark for four points plotted correctly do **not** accept line extended to 0, 0 ignore extrapolations of line	2 1	AO2 4.4.1.2 RPA5
05.9	8	allow correct value from their line ± ½ a small square allow value in range 6 to 9 if a curved line of best fit is not drawn	1	AO3 4.4.1.2 RPA5
Total			**13**	

Question	Answers	Mark	AO / Spec. Ref.
06	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.2.2.1 RPA3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method 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	
	No relevant content	0	
	Indicative content **Protein** • grind up food • add Biuret (reagent / solution) **or** add copper sulfate (solution) **and** sodium hydroxide (solution) **or** add Biuret 1 and Biuret 2 • turns purple / lilac **Starch** • add iodine (solution) • turns black / blue-black / dark blue - ignore blue / purple **Sugar** • grind up food • mix with water • add Benedict's (reagent / solution) • heat mixture (≥ 65 °C) • in a water bath • turns (brick) red / orange / brown / green / yellow For Level 3 correct references to all three tests are needed.		
Total		**6**	

AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 1F

Time allowed: 1 hour 15 minutes

Materials
For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

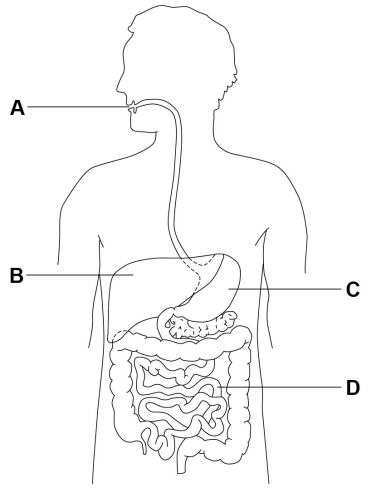
Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Do not write outside the box

0 1 Foods are digested before they are absorbed into the blood.

Figure 1 shows organs in the human digestive system.

Figure 1



0 1 . 1 Which organ is the stomach? **[1 mark]**

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 2 What type of enzyme is produced in the stomach? **[1 mark]**

Tick (✓) **one** box.

Carbohydrase ☐

Lipase ☐

Protease ☐

Do not write outside the box

0 1 . 3 Which term describes the pH in the stomach?

Give **one** reason why the stomach is this pH.

[2 marks]

Tick (✓) **one** box.

Acidic ☐

Alkaline ☐

Neutral ☐

Reason _____

_____

0 1 . 4 Which organ produces bile?

[1 mark]

Tick (✓) **one** box.

Large intestine ☐

Liver ☐

Mouth ☐

Pancreas ☐

Question 1 continues on the next page

Do not write outside the box

0 1 . 5 How does bile help in the digestion of foods?

[1 mark]

Tick (✓) **one** box.

It increases the surface area of fats. ☐

It is an enzyme that digests protein. ☐

It makes the pH in the small intestine acidic. ☐

A student tested different foods for the presence of protein, starch and sugar.

0 1 . 6 Draw **one** line from each food molecule to the reagent used to test for the food molecule.

[2 marks]

Food molecule	Reagent
Protein	Benedict's solution
Starch	Biuret reagent
Sugar	Iodine solution

Do not write outside the box

0 1 . 7 Give **one** safety precaution a student should take when using Benedict's solution.

[1 mark]

0 1 . 8 **Table 1** shows the results for one food sample.

Table 1

Test	**Benedict's test**	**Biuret test**	**Iodine test**
Colour after test	Red	Blue	Black

Which of the tests show positive results?

[1 mark]

Tick (✓) **one** box.

- All three tests ☐
- Benedict's and Biuret tests only ☐
- Benedict's and iodine tests only ☐
- Biuret and iodine tests only ☐

0 1 . 9 Starch molecules are **not** absorbed into the blood from the digestive system.

Give **one** reason why.

[1 mark]

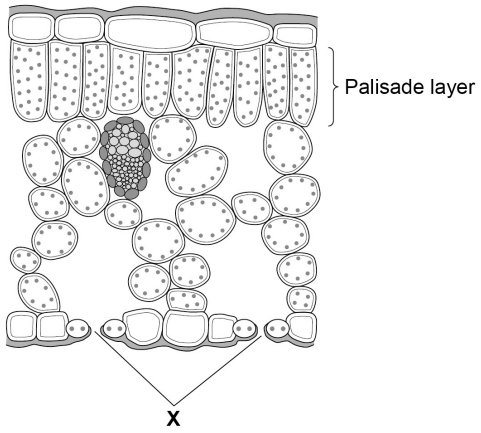
11

Turn over ►

Do not write outside the box

0 2 **Figure 2** shows a section through a leaf.

Figure 2



0 2 . 1 Give **one** way that the palisade layer is adapted for photosynthesis.

[1 mark]

0 2 . 2 Gases pass into and out of the leaf through small pores in the surface of the leaf.

What are the small pores labelled **X** called?

[1 mark]

Tick (✓) **one** box.

- Guard cells ☐
- Stomata ☐
- Xylem vessels ☐

Do not write outside the box

0 2 . 3 A student viewed a section of a leaf using a microscope.

The student measured the length of one of the palisade cells.

The cell image measured 28 mm in length when viewed at a magnification of ×400

Calculate the real length of the palisade cell in millimetres (mm).

Use the equation:

$$\text{real length} = \frac{\text{image length}}{\text{magnification}}$$

[3 marks]

Real length = _____ mm

Convert the real length of the cell from millimetres to micrometres (μm).

1 mm = 1000 μm

Real length = _____ μm

0 2 . 4 Carbon dioxide can move into and out of cells.

What is the process by which carbon dioxide can move into and out of cells?

[1 mark]

Tick (✓) **one** box.

- Active transport ☐
- Diffusion ☐
- Osmosis ☐

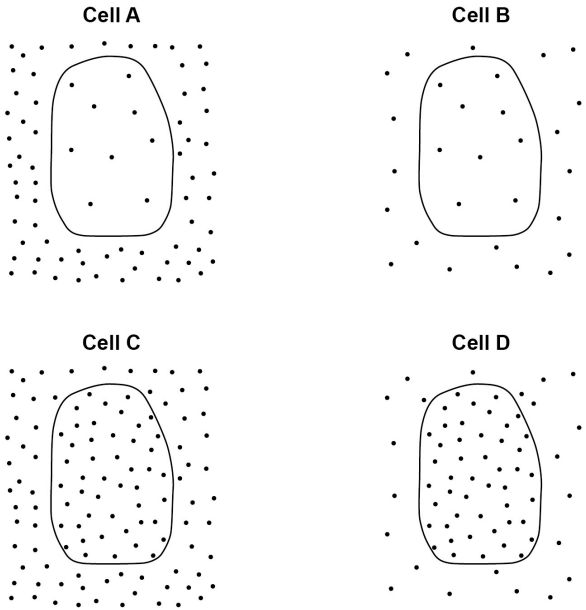
Turn over ►

Do not write outside the box

Figure 3 shows a diagram of four cells.

Each cell is surrounded by carbon dioxide molecules.

Figure 3



Key

• Carbon dioxide molecule

0 2 . 5 Which cell will carbon dioxide move into at the fastest rate?

Give a reason for your answer.

[2 marks]

Tick (✓) **one** box.

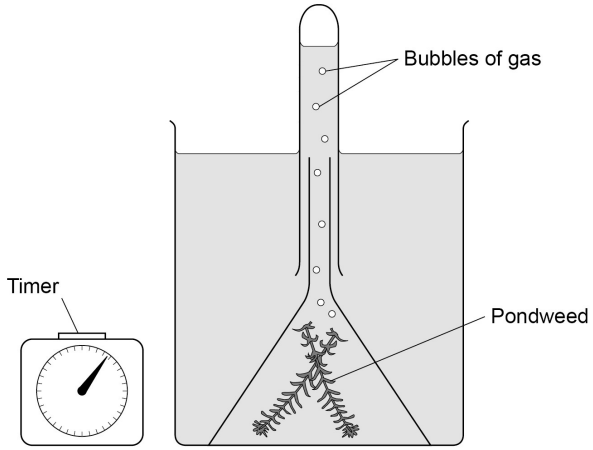
A ☐ **B** ☐ **C** ☐ **D** ☐

Reason _____

A student investigated the effect of different colours of light on the rate of photosynthesis.

Figure 4 shows some of the apparatus the student used.

Figure 4



The student placed the apparatus in blue light, then in green light and then in red light.

The student measured the rate of photosynthesis in each colour of light.

0 2 . 6 What **two** measurements should the student make to calculate the **rate** of photosynthesis?

[2 marks]

1 _____

2 _____

Question 2 continues on the next page

0 2 . 7 Give **two** variables the student should keep the same in this investigation.

[2 marks]

1 _____

_____

2 _____

_____

Table 2 shows the results.

Table 2

Colour of light	Rate of photosynthesis in arbitrary units
Blue	9
Green	1
Red	8

Do not write outside the box

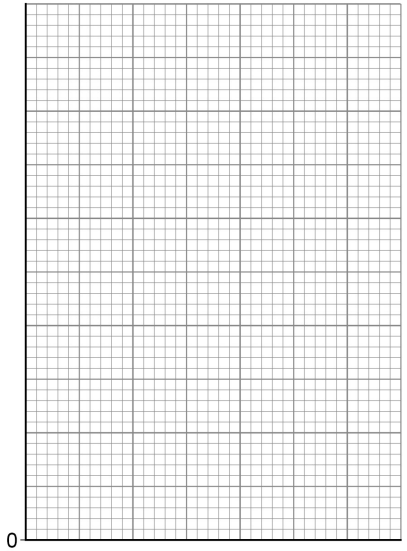
0 2 . 8 Complete **Figure 5**.

You should:

- label the y-axis
- use a suitable scale
- plot the data from **Table 2** as a bar chart
- label each bar.

[4 marks]

Figure 5



0 2 . 9 Look at **Table 2**.

What colour of light should be used to grow plants in a greenhouse?

[1 mark]

Tick (✓) **one** box.

Blue ☐ Green ☐ Red ☐

17

Do not write outside the box

0 3 This question is about disease.

Rose black spot is a disease where black spots develop on the leaves of rose plants.

0 3 . 1 What type of pathogen causes rose black spot disease?

[1 mark]

Tick (✓) **one** box.

Bacterium ☐

Fungus ☐

Protist ☐

Virus ☐

0 3 . 2 Plants with rose black spot disease often have yellow leaves.

Suggest **one** reason why the leaves are yellow instead of green.

[1 mark]

0 3 . 3 Explain why plants with yellow leaves grow slowly.

[2 marks]

Do not write outside the box

0 3 . 4 The spread of rose black spot can be controlled using different methods.

Draw **one** line from each method of control to the explanation of how it works.

[2 marks]

Method of control	Explanation
Remove and burn infected leaves	Creates a barrier to the movement of pathogens
Water the roots of the plant only, **not** the leaves	Pathogens are killed
	Reduces the chance of pathogens being spread by water droplets
	Reduces the temperature so pathogens reproduce less

Question 3 continues on the next page

Do not write outside the box

0 3 . 5 Tobacco plants may become infected with a pathogen called TMV.

What type of pathogen is TMV?

[1 mark]

Tick (✓) **one** box.

- Bacterium ☐
- Fungus ☐
- Protist ☐
- Virus ☐

Malaria is a disease caused by a protist.

0 3 . 6 How is the malaria pathogen transferred to humans?

[1 mark]

0 3 . 7 How can the spread of malaria pathogens be reduced?

[1 mark]

Tick (✓) **one** box.

- Avoid sexual contact ☐
- Cook food thoroughly ☐
- Drain water from swamps ☐
- Use a tissue when sneezing ☐

9

Do not write outside the box

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 4 Cigarette smoking is the main cause of cancer in the UK.

0 4 . 1 Mutations in cells cause cancer.

Where in a cell do mutations happen?

[1 mark]

Tick (✓) **one** box.

- Cell membrane ☐
- Cytoplasm ☐
- Nucleus ☐

0 4 . 2 Why do some cancers develop into large tumours?

[1 mark]

Tick (✓) **one** box.

- Cells never stop dividing ☐
- Cell respiration is slowed down ☐
- Enzyme activity is stopped ☐

Cigarette smoking has been linked to many different types of cancer.

0 4 . 3 Lung cancer is the most common type of cancer caused by smoking.

Suggest **one** reason why.

[1 mark]

0 4 . 4 A person with lung cancer can develop secondary cancers in other parts of the body.

Describe how this can happen.

[1 mark]

0 4 . 5 Sometimes a person may need a lung transplant.

The National Health Service (NHS) will **not** offer a lung transplant to a person who smokes.

Suggest **one** reason why.

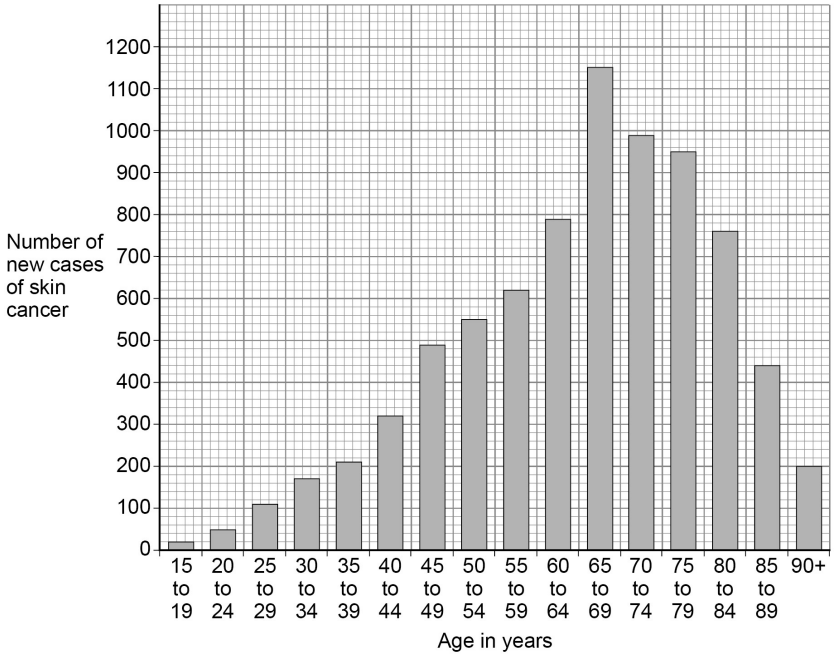
[1 mark]

Question 4 continues on the next page

Figure 6 shows data about skin cancer in males for different age groups in the UK.

The data shows the number of new cases of skin cancer in one year.

Figure 6



0 4 . 6 How many more new cases of skin cancer are there in males aged 40 to 44 than in males aged 15 to 19?

[1 mark]

Number of new cases = _____

Do not write outside the box

0 4 . 7 There are no new cases of skin cancer diagnosed in males younger than 15 years of age.

Suggest **one** reason why.

[1 mark]

0 4 . 8 Give **one** conclusion from the data in **Figure 6.**

[1 mark]

0 4 . 9 Survival rates for all types of cancers have improved over the last 20 years.

Suggest **two** reasons why.

[2 marks]

1

2

10

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

0 5 Bacteria can cause a variety of diseases in humans.

0 5 . 1 What are **two** similarities between a bacterial cell and an animal cell?

[2 marks]

Tick (✓) **two** boxes.

- Both have a cell membrane. ☐
- Both have a cell wall. ☐
- Both have a nucleus. ☐
- Both have cytoplasm. ☐
- Both have plasmids. ☐

0 5 . 2 Salmonella food poisoning is caused by bacteria in food.

Give **one** symptom of salmonella food poisoning.

Do **not** refer to vomiting or diarrhoea in your answer.

[1 mark]

Question 5 continues on the next page

Do not write outside the box

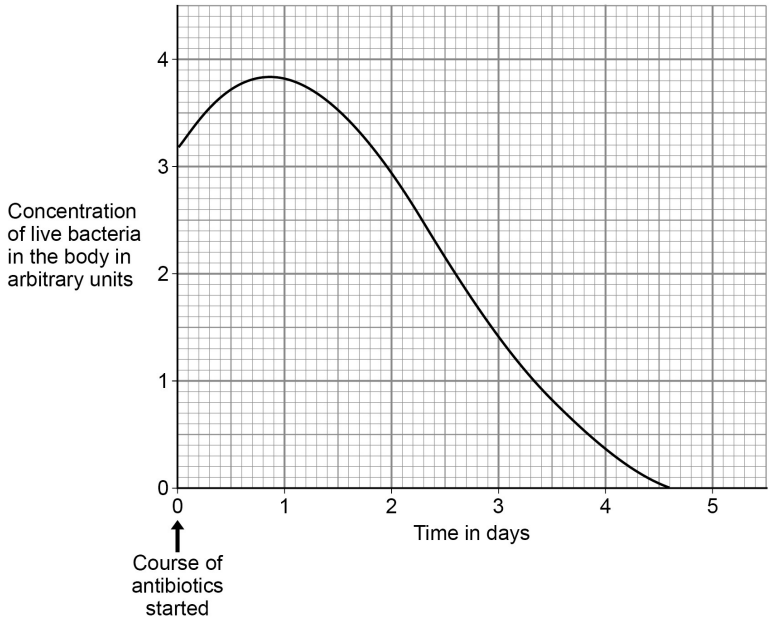
0 5 . 3 What is the name of the first antibiotic developed?

[1 mark]

A child with a severe bacterial infection was given a course of antibiotics.

Figure 7 shows how the concentration of live bacteria in the child's body changed when taking the course of antibiotics.

Figure 7



Do not write outside the box

0 5 . 4 The concentration of live bacteria in the body continued to increase after starting the course of antibiotics.

Suggest **one** reason why.

[1 mark]

0 5 . 5 After 3 days of taking the antibiotic:

- the child felt better
- there were still bacteria in the child's body.

Why did the child feel better?

[1 mark]

Tick (✓) **one** box.

Bacteria had become immune to the antibiotic. ☐

The child had become resistant to the bacteria. ☐

There were fewer toxins in the body than at day 0 ☐

0 5 . 6 Suggest why doctors do **not** give antibiotics to patients with minor infections.

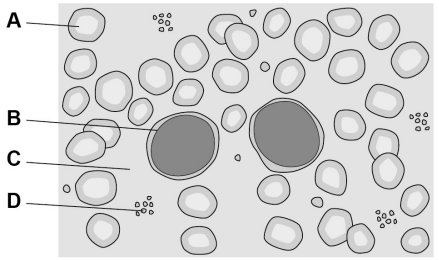
[1 mark]

Question 5 continues on the next page

Do not write outside the box

Figure 8 shows blood viewed using a microscope.

Figure 8



0 5 . 7 A vaccine will stimulate the production of antibodies.

Which part of the blood in **Figure 8** produces antibodies?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 5 . 8 Which part of the blood in **Figure 8** starts the clotting process?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

9

Do not write outside the box

0 6 This question is about cell division.

0 6 . 1 Write the biological structures from the box in the correct order of size.

[1 mark]

cell	**chromosome**	**gene**	**nucleus**

Smallest ↓ Largest

_____

_____

_____

_____

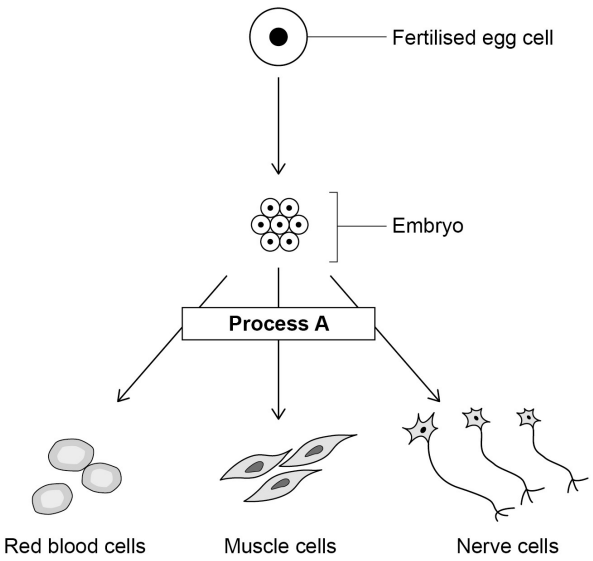
Question 6 continues on the next page

Turn over ►

Do not write outside the box

Figure 9 shows how a fertilised egg cell can produce specialised cells.

Figure 9



0 6 . 2 Name **Process A**.

[1 mark]

_____

0 6 . 3 How many cell divisions are needed to form a 16-cell embryo from the original fertilised egg cell?

[1 mark]

_____

_____

Number of cell divisions = _____

Do not write outside the box

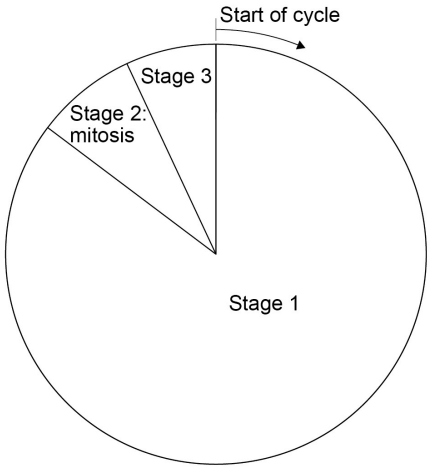
0 6 . 4 In humans a fertilised egg cell contains 23 pairs of chromosomes.

How many chromosomes will there be in each of the embryo cells?

[1 mark]

0 6 . 5 **Figure 10** represents a cell cycle for a human embryonic cell.

Figure 10



Describe **one** change in the cell that occurs during **each** of the stages of the cell cycle.

[3 marks]

Stage 1

Stage 2

Stage 3

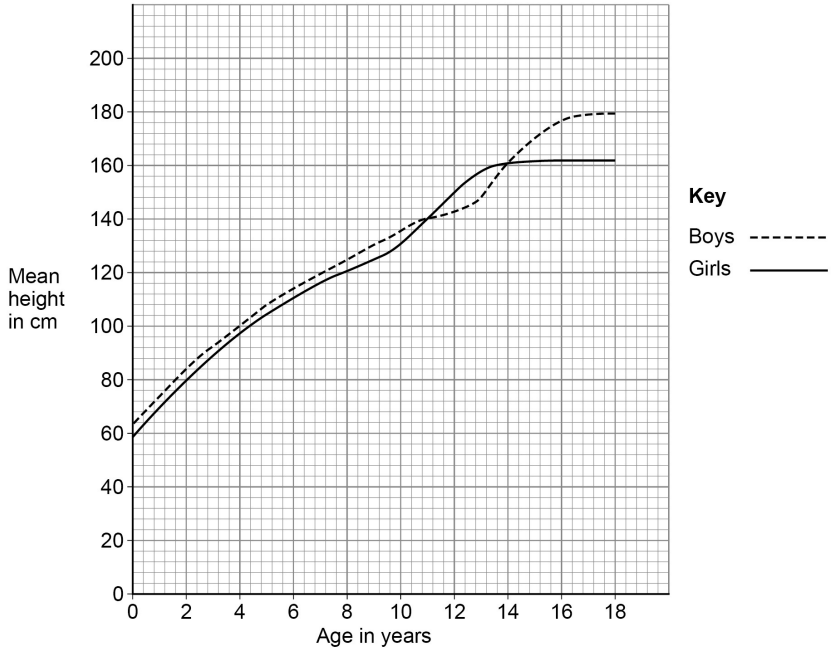
Turn over ►

Do not write outside the box

Cell division is important in the growth of multicellular organisms.

0 6 . 6 **Figure 11** shows the mean height of boys and of girls from birth to age 18 years.

Figure 11



Do not write outside the box

Compare the growth of boys with the growth of girls.

Use data from **Figure 11** in your answer.

[6 marks]

0 6 . 7 Give **one** way that cell division by mitosis is important in **fully grown** animals.

[1 mark]

14

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

Question number	**Additional page, if required. Write the question numbers in the left-hand margin.**

Do not write outside the box

Question number	**Additional page, if required. Write the question numbers in the left-hand margin.**

AQA

GCSE
COMBINED SCIENCE: TRILOGY
8464/B/1F

Biology Paper 1F

Mark scheme

June 2022

Version: 1.0 Final Mark Scheme

2 2 6 G 8 4 6 4 B 1 F / M S

Question 1

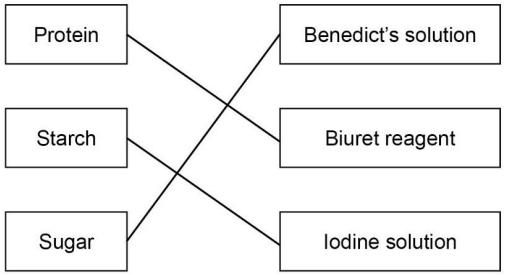
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	C		1	AO1 4.2.1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2 Mark with **01.3**	protease		1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3 Mark with **01.2**	acidic reason: any **one** from: • produces (hydrochloric) acid • optimum / best condition for enzyme / protease to act	 allow contains (hydrochloric) acid allow optimum / best condition to digest food / protein allow ecf from question **01.2** allow to kill microorganisms / bacteria / pathogens	1 1	AO1 AO2 4.2.2.1 4.3.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	liver		1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	it increases the surface area of fats		1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	 all three correct for **2** marks one or two correct for **1** mark extra line from a box negates that box		2	AO1 4.2.2.1 RPA3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	any **one** from: • wear goggles • use a water bath to heat the solution / mixture • wash spills from bench / skin	allow wash hands allow wear gloves ignore examples such as tie hair back or move bags under bench	1	AO1 4.2.2.1 RPA3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	Benedict's and iodine tests only		1	AO3 4.2.2.1 RPA3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.9	any **one** from: • starch (molecule) is (too) large • starch (molecule) is insoluble	allow idea that starch needs to be broken down into small / soluble molecules	1	AO1 4.2.2.1

Total Question 1		**11**

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	cells contain (many) chloroplasts	allow positioned nearest to the light **or** at the top of the leaf allow cells are closely packed **or** no gaps between cells allow chlorophyll for chloroplast	1	AO1 4.1.1.3 4.2.1 4.2.3.1 4.4.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	stomata		1	AO1 4.2.3.1 4.2.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	(real length) = $\frac{28}{400}$ (real length in mm =) 0.07 (real length in μm =) 70	 allow answer given for length in mm correctly multiplied by 1000	1 1 1	AO2 4.1.1.1 4.1.1.2 4.1.1.5 RPA1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	diffusion		1	AO1 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	A Reason any **one** from: • steeper (diffusion) gradient • bigger difference in concentration of carbon dioxide inside and outside the cell	no marks if wrong cell chosen allow higher concentration of carbon dioxide outside the cell than inside the cell allow particles / molecules for carbon dioxide	1 1	AO3 AO2 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	(number / amount of) bubbles time	allow volume of gas / oxygen allow suitable time eg 1 / 5 / 10 minutes	1 1	AO1 4.4.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	any **two** from: • temperature (of water) • light intensity **or** distance of light (from pondweed) • concentration of carbon dioxide (in water)	do **not** accept colour of light ignore time allow amount of light ignore light unqualified allow amount / mass of sodium hydrogen carbonate (in water) allow type / size of plant ignore volume of water / solution	2	AO3 4.4.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.8	y-axis labelled: rate of photosynthesis in arbitrary units		1	AO2 4.4.1.2 RPA5
	suitable scale		1	
	all **bars** plotted correctly	allow ± ½ a small square the bars can be in any order	1	
	all bars labelled correctly		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.9	blue		1	AO3 4.4.1.2 RPA5

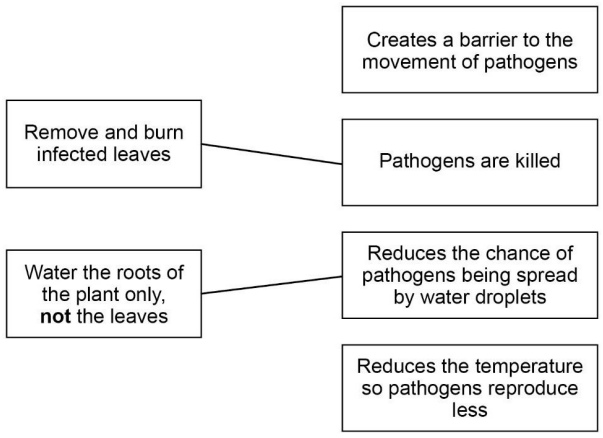
Total Question 2		**17**

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	fungus		1	AO1 4.3.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	less / no chlorophyll **or** chlorophyll has been broken down	allow reference to chloroplasts for chlorophyll	1	AO2 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	less photosynthesis **or** less light absorbed (so) less glucose / sugar formed **or** less light absorbed (1) (so) less photosynthesis (1)		1 1	AO2 4.3.1.4 4.4.1.1 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	 extra line from a box negates that box		1 1	AO2 4.3.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	virus		1	AO1 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	by mosquito bites	allow by mosquitos	1	AO1 4.3.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	drain water from swamps		1	AO2 4.3.1.5

Total Question 3		**9**

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	nucleus		1	AO2 4.1.1.1 4.1.1.2 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	cells never stop dividing		1	AO1 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	any **one** from: • chemicals enter the lungs (first) • chemicals are inhaled • chemicals are more concentrated in the lungs	allow smoke / tar / carcinogens for chemicals ignore nicotine unqualified	1	AO2 4.2.2.6 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	(cancer cells transported) in the blood		1	AO2 4.2.2.2 4.2.2.3 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	any **one** from: • (smoking) will damage the new lung • (NHS has) limited financial resources • the lung could be used for someone else (who does not smoke) • illness is self-inflicted **or** person is not attempting to help themselves	allow poor chance of success allow (smoking) will increase the risk of cancer developing in the new lung allow wastes a healthy lung allow there is a shortage of lungs	1	AO3 4.2.2.6 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	300	answer line takes precedence	1	AO2 4.2.2.6 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	any **one** from: • little exposure to ionising radiation • little exposure to the sunlight / UV (light) • more use of sunscreen • little exposure to carcinogens • little cell / DNA / gene damage	ignore references to smoking allow do not use sunbeds allow better sunscreen allow named carcinogen allow skin cancer takes a long time to develop	1	AO2 4.2.2.6 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	any **one** from: • most new cases each year are in males / people aged 65–69 (years) • new cases per year increases (from age 15) up to 69 (years) • new cases per year decreases from age 69 to 90 (+ years)	allow any upper age of 65-69	1	AO3 4.2.2.6 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.9	any **two** from: • improved treatment / drugs • earlier diagnosis • improved cancer screening • improved patient / doctor knowledge (of dangers / treatments)	allow improved technology / machinery allow improved patient diet / lifestyle	2	AO3 4.2.2.6 4.2.2.7

Total Question 4		**10**

Question 5

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	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.
05.3	penicillin	allow phonetic spelling	1	AO2 4.3.1.9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	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.
05.5	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.
05.6	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

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

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

Total Question 5		**9**

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	gene chromosome nucleus cell	must be in this order	1	AO1 4.1.1.1 4.1.1.2 4.1.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	differentiation	ignore specialisation	1	AO1 4.1.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	4	allow 15	1	AO2 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	46	allow 23 pairs (of chromosomes)	1	AO2 4.1.2.1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	**Stage 1** any **one** from: • (cell) growth • increase in number of sub-cellular structures • DNA replicates • chromosomes double / duplicate / replicate	 allow increase in number of organelles / ribosomes / mitochondria allow genetic material for DNA allow DNA doubles / duplicates	1	AO1 4.1.2.2
	Stage 2 any **one** from: • (one set of) chromosomes pulled to each end of cell • two nuclei form	ignore mitosis occurs allow chromosomes line up across the centre of the cell allow chromosomes move to opposite ends of the cell allow nucleus divides / splits (into two)	1	
	Stage 3 any **one** from: • cytoplasm / membrane divides • two identical cells formed	 allow cytokinesis	1	

Question	Answers	Mark	AO / Spec. Ref.
06.6	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.	4–6	AO3
	Level 1: Relevant features are identified and differences noted.	1–3	AO2
	No relevant content	0	

	Indicative content General comparisons: • boys height at birth (slightly) greater than girls height • boys are (slightly) taller than girls up to age 11 • correct height comparisons eg boys are approximately 4 / 5 cm taller than girls up to age 11 • girls and boys are the same height at age 11 • girls are taller than boys between age 11 and age 14 • girls and boys are the same height at age 14 • boys are taller than girls above age 14 • correct height comparisons eg boys are 5 to 18 cm taller than girls above age 14 • boys (eventually) grow taller than girls • boys carry on growing for a longer time than girls • girls stop growing age 13 / 14 / 15 **and** boys stop growing age 17 / 18 Rate comparisons: • rate of growth similar up to age 10 / 11 • girls grow faster than boys between 10 / 11 and 14 allow girls have a greater increase in height between 11 and 14 • growth spurt occurs at a younger age in girls • growth spurt starts age 10 / 11 in girls **and** age 13 / 14 in boys • increased rate of growth in girls aged 10 to 13 /14 **and** in boys aged 13 to 17 / 18 Key points for Level 2 are correct reference to 0-11 year period, 11-14 period and after age 14, with at least one correct reference to rate of growth or use of correct values of height and age to illustrate rate.		4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	repair of tissues **or** replacement of cells	ignore growth allow repair of organs ignore repair of cells allow replacement of tissues ignore replacement of organs	1	AO1 4.1.1.4

Total Question 6		**14**