

GCSE Combined Science

Biology Paper 1

Higher Tier

In addition to this paper you should have:

- A ruler.
- A calculator.

Centre name			
Centre number			
Candidate number			

Time allowed:

- 1 hour 15 minutes

Surname
Other names
Candidate signature

Instructions to candidates

- Write your name and other details in the spaces provided above.
- Answer **all** questions in the spaces provided.
- Do all rough work on the paper.
- Cross out any work you do not want to be marked.

Information for candidates

- The marks available are given in brackets at the end of each question.
- There are 70 marks available for this paper.
- You are allowed to use a calculator.
- You should use good English and present your answers in a clear and organised way.
- For Questions 1.5, 3 and 9.2 ensure that your answers have a clear and logical structure, include the right scientific terms, spelt correctly and include detailed, relevant information.

Advice to candidates

- In calculations show clearly how you worked out your answers.

For examiner's use							
Q	Attempt N ^o			Q	Attempt N ^o		
	1	2	3		1	2	3
1				6			
2				7			
3				8			
4				9			
5							
Total							

1 *Salmonella* is a type of bacteria which causes disease in humans.

1.1 Which of the following infectious diseases is also caused by bacteria?
Tick **one** box.

- Measles
- Gonorrhoea
- Malaria
- HIV

[1 mark]

1.2 Compare how bacteria and viruses cause symptoms in a host.

.....

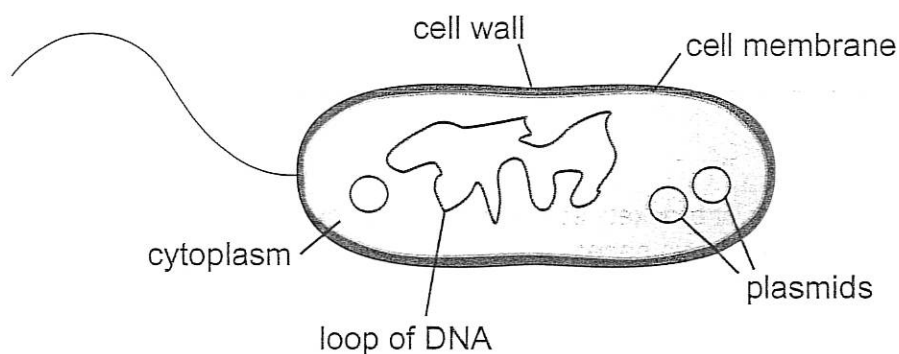
.....

.....

[2 marks]

Figure 1 shows a diagram of a *Salmonella* bacterium.

Figure 1



1.3 Give **one** feature of the bacterium in **Figure 1** which shows that *Salmonella* is a prokaryote and not a eukaryote.

.....

[1 mark]

1.4 An electron microscope image is produced of a *Salmonella* bacterium.

- The length of the bacterium in the image is 18 millimetres (mm).
- The real length of the bacterium is 4 micrometres (μm).

Calculate the magnification of the image.

Use the equation:

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

magnification = \times
[2 marks]

1.5 *Salmonella* bacteria can enter a person's body via contaminated food.

They cause illness when they reach the cells of the intestines.

Explain how the human body defends itself against infection by *Salmonella* once the pathogen has been ingested.

.....

.....

.....

.....

.....

.....

.....

.....

[4 marks]

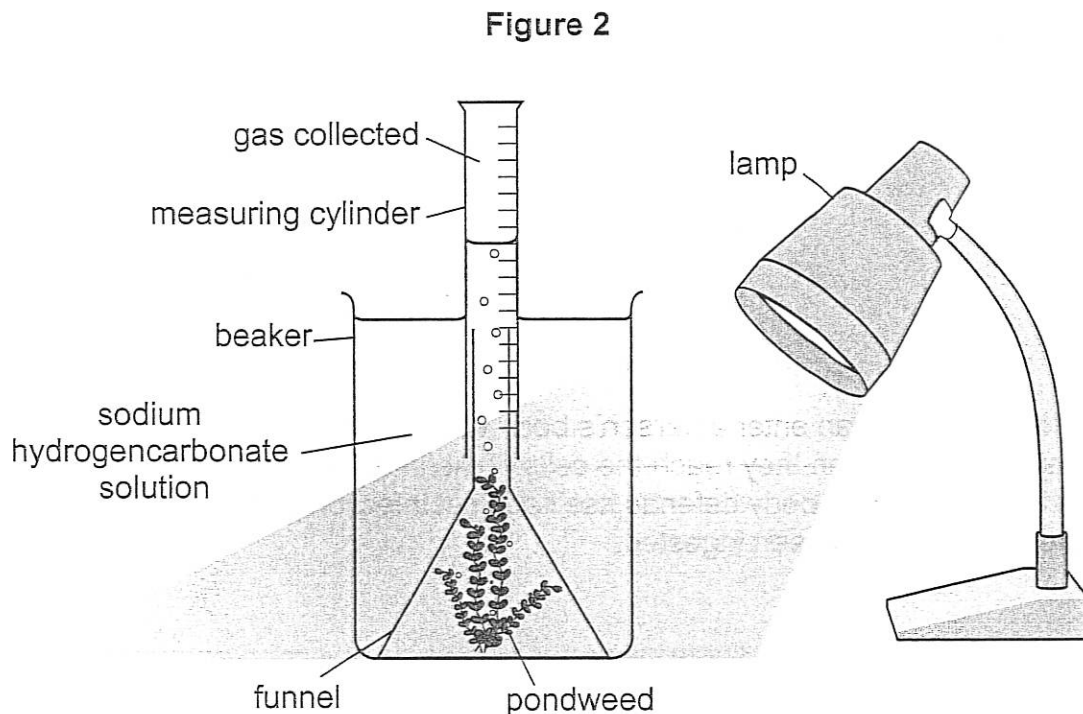
Turn over for the next question

Turn over ►

- 2 Some pondweed was used to investigate how the amount of light available affects the rate of photosynthesis.

Leave
blank

The apparatus that was used for this experiment is shown in **Figure 2**.



- 2.1 What gas is being collected in the measuring cylinder?

.....
[1 mark]

- 2.2 What would happen to the volume of gas collected if the investigation was repeated with the lamp turned off? Give a reason for your answer.

.....
.....
.....
.....
[3 marks]

2.3 Sodium hydrogencarbonate dissolves in water and releases carbon dioxide. Suggest why sodium hydrogencarbonate was added to the water in this experiment.

.....

.....

.....

[2 marks]

Table 1 shows the volume of gas collected in the measuring cylinder over 1 hour.

Table 1

Time (min)	10	20	30	40	50	60
Total volume of gas collected (cm ³)	1.0	3.0	6.0	7.0	7.5	8.0

2.4 Use data from Table 1 to calculate the mean rate of photosynthesis over 1 hour. Give your answer in cm³/min. Give your answer to 2 significant figures.

Rate of photosynthesis = cm³/min
[2 marks]

2.5 Suggest how temperature could have been controlled in the experiment.

.....

.....

[1 mark]

2.6 The investigation could have been conducted by counting the number of bubbles given off in a certain amount of time by the pondweed. Suggest **one** advantage of using a measuring cylinder rather than counting bubbles.

.....

.....

[1 mark]

Turn over for the next question

Turn over ►

4 This question is about the digestive system.

4.1 Describe how starch is broken down in the mouth and small intestine.

.....
.....

[2 marks]

A sample of food contains starch. The sample is crushed and put into a test tube. A solution containing enzymes is added to the test tube.

4.2 Describe a test that could be used to determine whether or not the starch in the sample has been broken down by the enzymes.

.....
.....
.....

[2 marks]

4.3 Bile is a digestive fluid stored in the gall bladder. Which of the following organs produces bile? Tick **one** box.

- Liver
- Stomach
- Small intestine
- Gall bladder

[1 mark]

Gallstones are small, solid stones formed mainly of excess cholesterol. They can block the bile ducts (tubes) that connect the gall bladder to the small intestine.

4.4 Explain why eating fatty foods might cause a problem for people suffering from gallstones.

.....
.....
.....
.....
.....

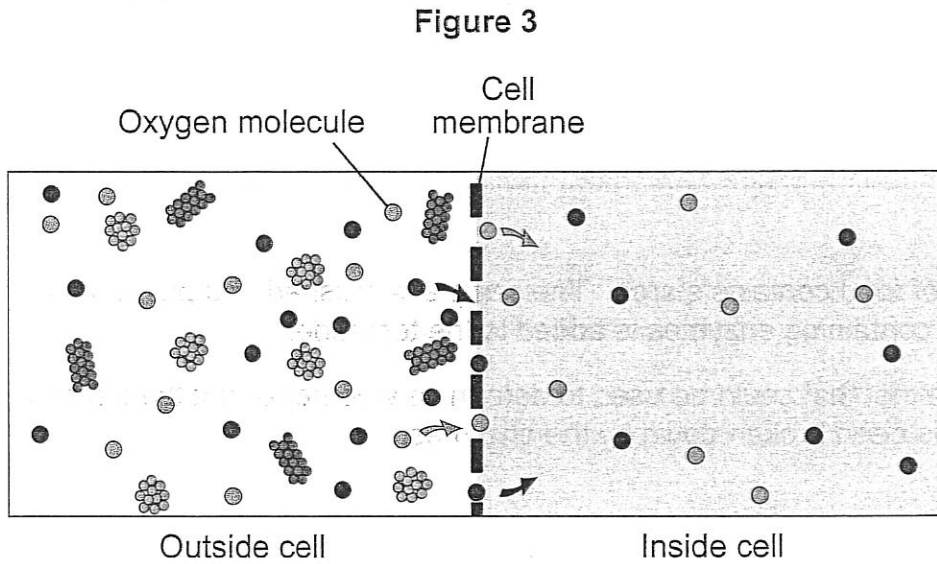
[4 marks]

Turn over for the next question

Turn over ►

5 **Figure 3** shows some molecules moving through a cell membrane.

Leave
blank



5.1 The rate of aerobic respiration increases inside the cell in **Figure 3**. Explain what will happen to the rate of oxygen movement across the cell membrane.

.....

.....

.....

.....

[3 marks]

Trout are freshwater fish. They are relatively large, multicellular organisms with specialised exchange organs.

Euglena are small, single-celled organisms that live in water. They do not have specialised exchange organs.

Both trout and *Euglena* need oxygen to survive.

5.2 Explain why *Euglena* do **not** need specialised organs for absorbing oxygen, but trout do.

.....

.....

.....

.....

.....

.....

.....

.....

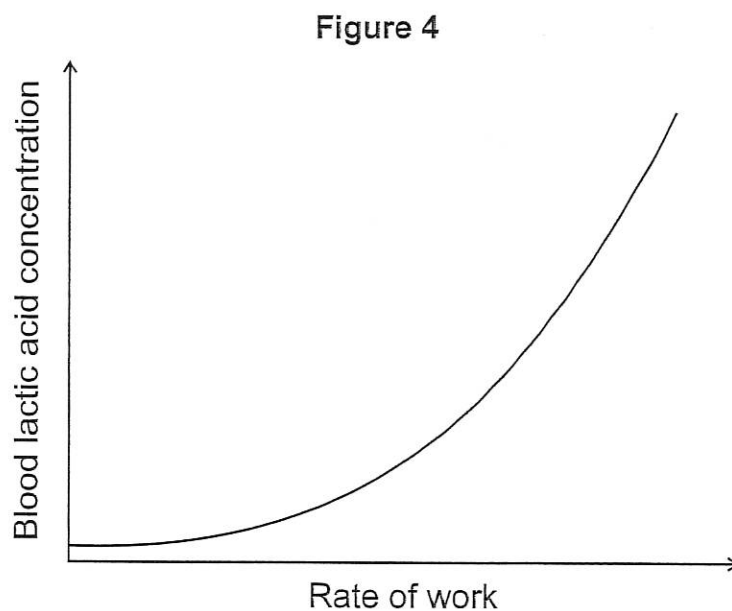
[4 marks]

Turn over for the next question

Turn over ►

6 **Figure 4** shows how the concentration of lactic acid in a cyclist's blood changes with different work rates.

Leave
blank



6.1 Describe the trend shown by **Figure 4**.

.....

.....

.....

[2 marks]

6.2 Suggest a reason for the trend you have described above.

.....

.....

.....

.....

.....

[3 marks]

6.3 The cyclist takes part in a sprint race.
Explain what will happen to the cyclist's pulse rate and breathing rate immediately after her race.

Leave
blank

.....

.....

.....

.....

.....

[3 marks]

Turn over for the next question

Turn over ►

- 7 Tobacco smoke contains chemicals that can cause malignant tumours.
 7.1 Describe why malignant tumours are cancerous but benign tumours are not.

.....

[2 marks]

A study compared the incidence of cancer per 100 000 men and the number of cigarettes they smoke per day. The results are shown in **Table 2**.

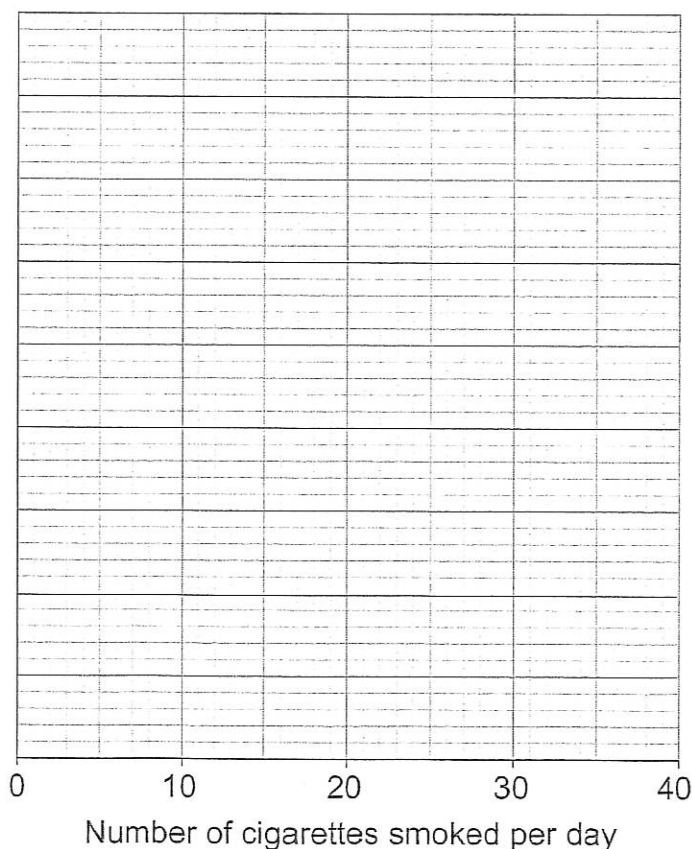
Table 2

Number of cigarettes smoked per day	Incidence of cancer per 100 000 men
10	50
20	120
30	230
40	420

- 7.2 Complete **Figure 5** using the data from **Table 2**.

- Complete the y-axis. Include a label and use a suitable scale.
- Plot the incidence of cancer per 100 000 men.
- Draw a curve of best fit.

Figure 5



[3 marks]

7.3 A scientific magazine used the data in **Table 2** to report that people who smoke are more likely to die from cancer than people who don't smoke.
Does the data support this conclusion? Give reasons for your answer.

*Leave
blank*

.....

.....

.....

.....

[3 marks]

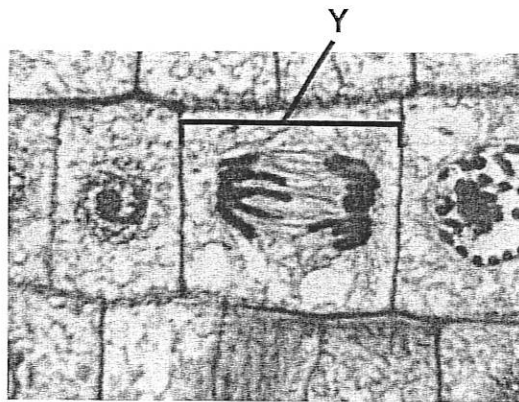
Turn over for the next question

Turn over ►

8 Figure 6 shows a cell, labelled Y, in one of the stages of mitosis.

Leave
blank

Figure 6



8.1 Describe what needs to happen to a cell before mitosis can begin.

.....
.....
.....

[2 marks]

8.2 Describe what will happen next to the cell labelled Y in Figure 6.

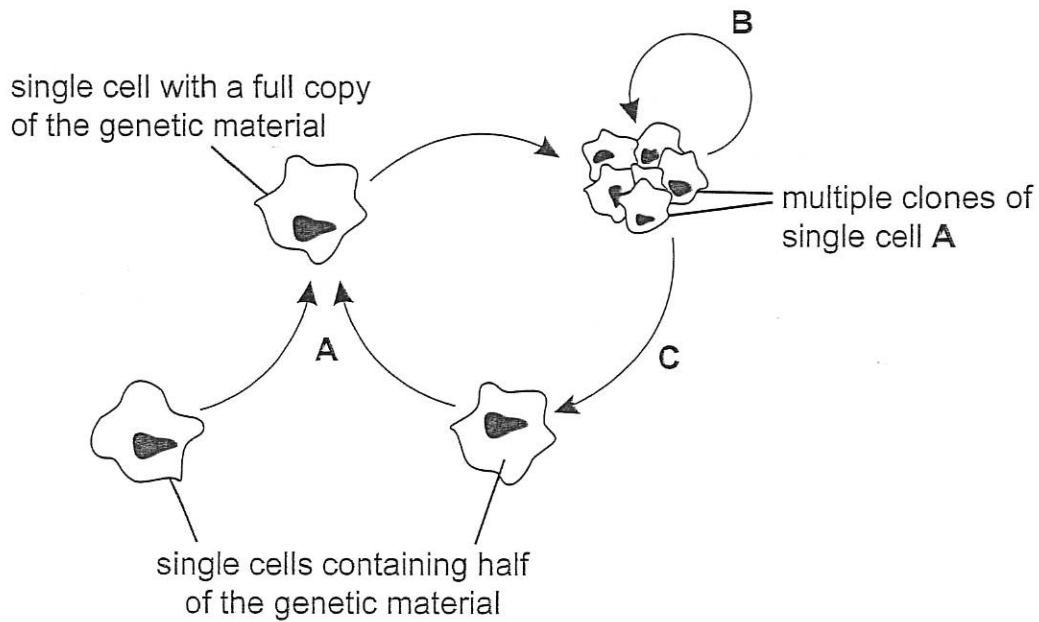
.....
.....
.....

[2 marks]

Figure 7 shows part of a eukaryotic organism's life cycle.

Leave
blank

Figure 7



- 8.3 Which of the stages, **A**, **B** or **C**, shown in **Figure 7** involves mitosis?
Give a reason for your answer.

Stage:

Reason:

.....
[2 marks]

Turn over for the next question

Turn over ►

9 Read the following information about myeloma.

1. Myeloma is a cancer of the plasma cells — a type of white blood cell.
2. Plasma cells are produced in the bone marrow.
3. Chemotherapy can be used to kill cancerous plasma cells. Chemotherapy is also likely to kill or damage healthy cells in the patient's bone marrow.
4. A bone marrow transplant can be used following chemotherapy to treat myeloma.

9.1 An individual with myeloma is treated with chemotherapy to kill their cancerous plasma cells. Suggest how a bone marrow transplant from a donor may then be used to treat the individual.

.....
.....
.....
.....

[2 marks]

Both adult and embryonic stem cells have the potential to be used for medical treatments.

9.2 Evaluate the potential use of adult and embryonic stem cells as medical treatments. Your answer should include a justified conclusion.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

[4 marks]

END OF QUESTIONS