

Please write clearly in block capitals.

Centre number

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Candidate signature

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I declare this is my own work.

GCSE BIOLOGY

Higher Tier Paper 1

8461/1H

Predicted Practice Paper

Time allowed: 1 hour 45 minutes

IMPORTANT — PLEASE READ: PREDICTED PRACTICE PAPER — not an official AQA paper, not a past paper, and not endorsed by or affiliated with AQA. All questions are original. Topics were chosen by analysing previous exam papers, but they are NOT guaranteed to appear in any real examination. Revise the full specification.

Materials

For this paper you must have:

- a ruler
- a scientific calculator

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- 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.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You are expected to use a calculator where appropriate.

Advice

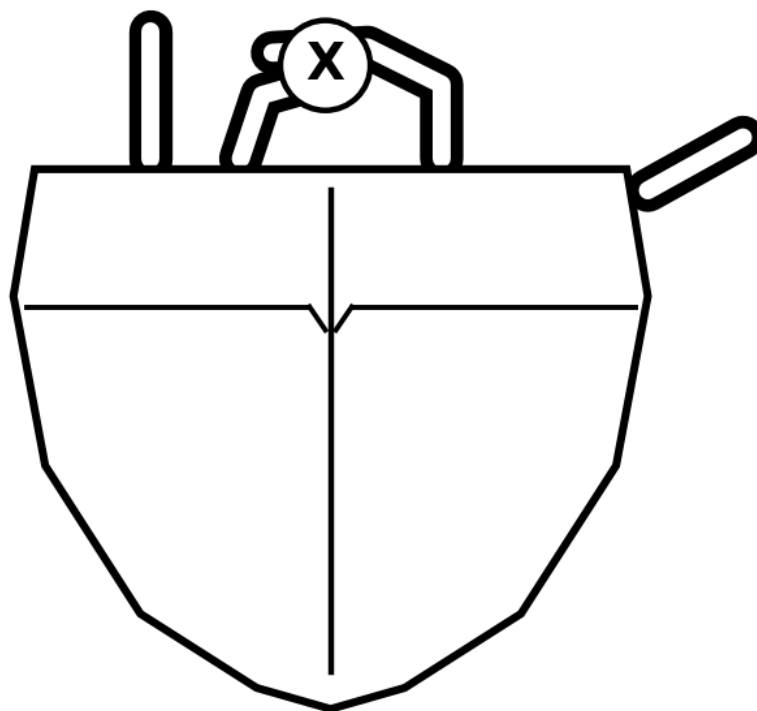
- In all calculations, show clearly how you work out your answer.

Turn over

Answer ALL questions.
Write your answers in the spaces provided.
You must write down all the stages in your working.

- 1** Figure 1 shows the human heart and the main blood vessels connected to it.

Figure 1



- (a) Name the blood vessel labelled X in Figure 1.

----- (1)

- (b) Name one blood vessel that carries oxygenated blood into the heart.

----- (1)

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(c) Describe the double circulatory system in humans.

----- (2)

(d) Suggest one advantage of having a double circulatory system.

----- (1)

(e) Explain why the wall of the left ventricle is thicker than the wall of the right ventricle.

----- (3)

(f) Explain how the structure of an artery is adapted to its function.

----- (3)

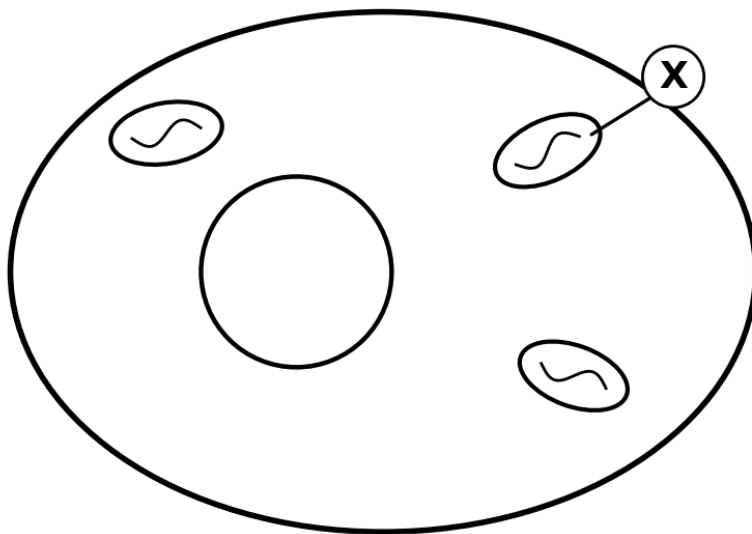
(Total for Question 1 is 11 marks)

Turn over

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- 2 Figure 2 shows an animal cell as seen under a light microscope.

Figure 2



- (a) Name the part of the cell labelled X in Figure 2.

----- (1)

- (b) Give two differences between a plant cell and the animal cell shown in Figure 2.

----- (2)

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(c) The real length of the cell in Figure 2 is 0.025 mm. The image of the cell is 75 mm long.

Calculate the magnification of the image. Give your answer in standard form.

.....
..... (2)

(d) A student wants to see the ribosomes inside a cell. Explain why a light microscope cannot be used.

.....
.....
..... (2)

(e) Bacterial cells are prokaryotes. Give two ways in which the structure of a bacterial cell differs from the animal cell shown in Figure 2.

.....
.....
..... (2)

(f) Explain the difference between magnification and resolution.

.....
.....
..... (2)

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(g) Describe how the student could prepare a slide of cells to view under the microscope.

----- (2)

(Total for Question 2 is 13 marks)

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Turn over

3 A student investigated the effect of sugar solution concentration on osmosis in potato tissue.

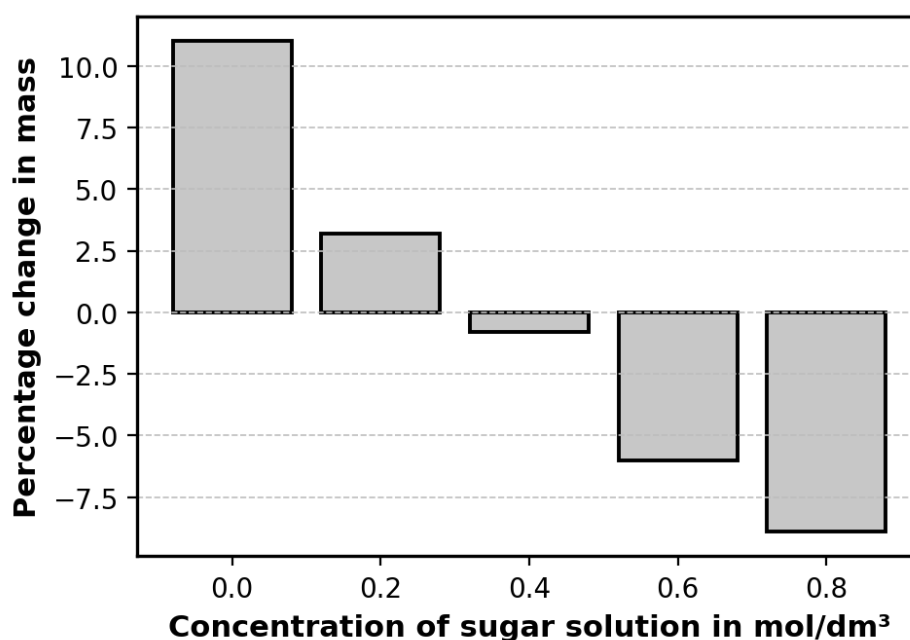
The student cut five potato cylinders to the same length of 40 mm. Each cylinder was weighed, then placed in a different concentration of sugar solution for 24 hours. The cylinders were removed, blotted dry and reweighed. Table 1 shows the student's results.

Table 1

Concentration of sugar solution in mol/dm ³	0.0	0.2	0.4	0.6	0.8
Mass at start in g	2.45	2.50	2.48	2.52	2.46
Mass after 24 hours in g	2.72	2.58	2.46	2.37	2.24

Figure 3 shows the percentage change in mass for each concentration.

Figure 3



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(a) Calculate the percentage change in mass for the potato cylinder in the 0.0 mol/dm³ sugar solution.

----- (2)

(b) Describe the pattern shown in Figure 3 and explain it in terms of osmosis.

----- (3)

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(c) Evaluate the student's method.

(6)

(d) Give one variable the student kept the same in this investigation.

(1)

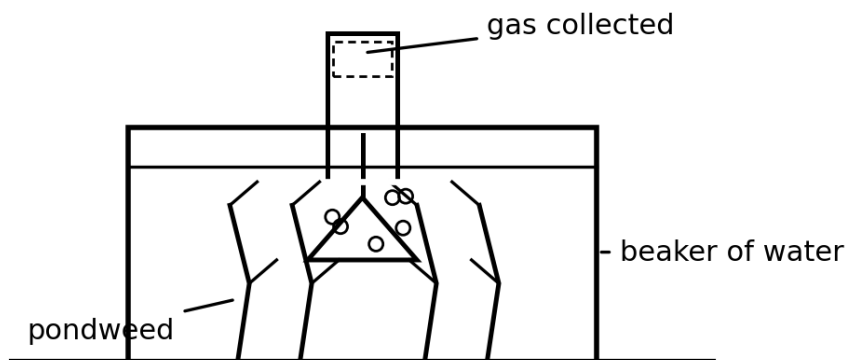
(Total for Question 3 is 12 marks)

Turn over

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- 4 A student investigated the effect of light intensity on the rate of photosynthesis in pondweed. Figure 4 shows the apparatus the student used.

Figure 4



The student counted the number of oxygen bubbles released per minute at six different light intensities. Table 2 shows the student's results.

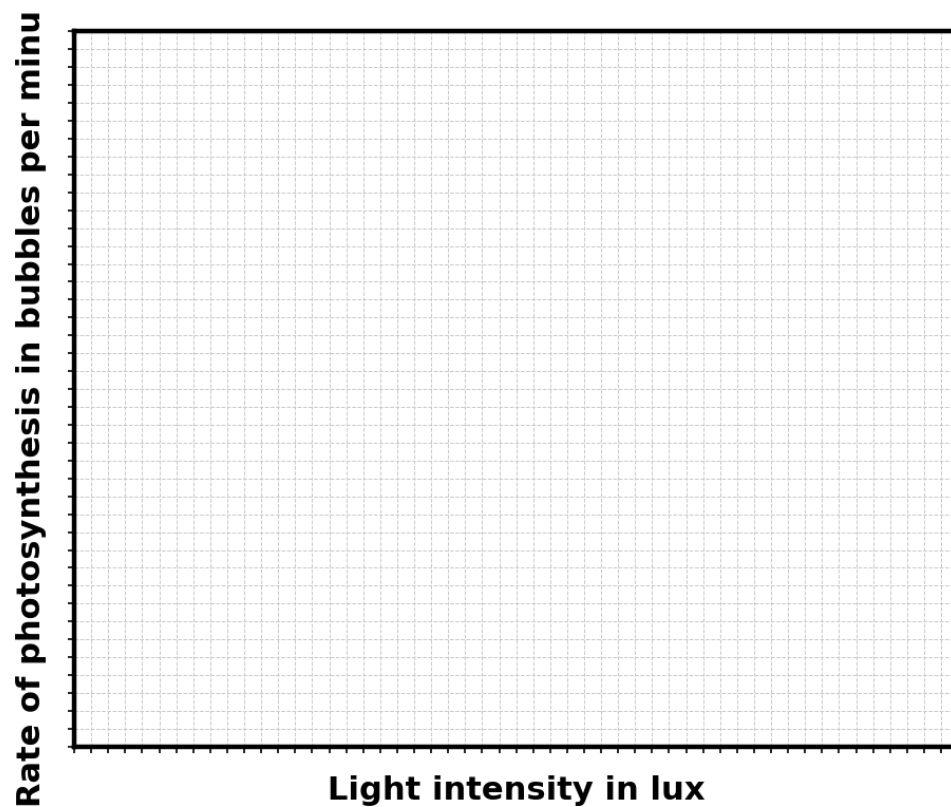
Table 2

Light intensity in lux	100	200	300	400	500	600
Rate of photosynthesis in bubbles per minute	6	14	21	26	28	28

Figure 5 shows a grid for plotting the results.

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Figure 5



(a) Plot the data from Table 2 on the grid in Figure 5. Draw a line of best fit.

----- (4)

(b) Describe the pattern shown by your graph.

----- (2)

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(c) Explain why the rate of photosynthesis levels off between 500 lux and 600 lux.

----- (2)

(d) Light intensity is inversely proportional to the square of the distance from the lamp.

The lamp was moved from 20 cm to 40 cm from the pondweed. At 20 cm the rate of photosynthesis was 26 bubbles per minute.

Predict the rate of photosynthesis at 40 cm.

----- (2)

(e) The student kept the temperature at 20 °C and used the same piece of pondweed throughout the investigation. Explain why.

----- (2)

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(f) Suggest one improvement to the student's method and explain how it would improve the results.

----- (2)

(Total for Question 4 is 14 marks)

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Turn over

5 Food is digested in the human digestive system so that small, soluble molecules can be absorbed into the blood.

(a) Explain how food is digested and absorbed in the human digestive system.

(6)

A student investigated the effect of pH on the rate of reaction of the enzyme amylase. Starch solution and amylase solution were mixed at four different pH values. The student tested samples with iodine solution until the iodine stopped turning blue-black. Table 3 shows the student's results.

Table 3

pH	5	6	7	8
Time taken for the starch to disappear in s	240	120	60	180

(b) Give the independent variable and one control variable in this investigation.

(2)

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(c) The rate of reaction can be calculated using:

rate of reaction = $1 \div \text{time taken}$

Calculate the rate of reaction at pH 7. Give your answer to 3 significant figures.

----- (2)

(d) Explain why the rate of reaction is lower at pH 8 than at pH 7.

----- (3)

(Total for Question 5 is 13 marks)

Turn over

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6 In 2026 a school reported an outbreak of measles. Measles is a communicable disease.

(a) Measles is caused by a virus. Cholera is caused by a different type of pathogen.

Name the type of pathogen that causes cholera.

----- (1)

(b) Describe how measles spreads from person to person.

----- (2)

(c) Describe how the human body defends itself against pathogens that enter through a cut in the skin.

----- (3)

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(d) Explain how vaccination protects a person against measles.

----- (3)

(e) Explain why doctors do not prescribe antibiotics for measles.

----- (1)

(Total for Question 6 is 10 marks)

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Turn over

- 7 An athlete ran a 400 m sprint. Table 4 shows the athlete's breathing rate before, during and after the sprint.

Table 4

	At rest	During exercise	5 minutes after exercise	15 minutes after exercise
Breathing rate in breaths per minute	14	45	22	15

- (a) (i) Write the word equation for aerobic respiration.
(ii) Write the balanced symbol equation for aerobic respiration.

----- (2)

- (b) Describe the pattern shown in Table 4. Use data from the table in your answer.

----- (2)

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(c) Explain the changes in the athlete's body during and after the sprint, in terms of respiration.

(6)

(d) Before the race the athlete drank a sports drink. A sample of the drink was tested for reducing sugars and for protein.
Describe the tests the student would carry out, and give the expected results if both nutrients are present.

(4)

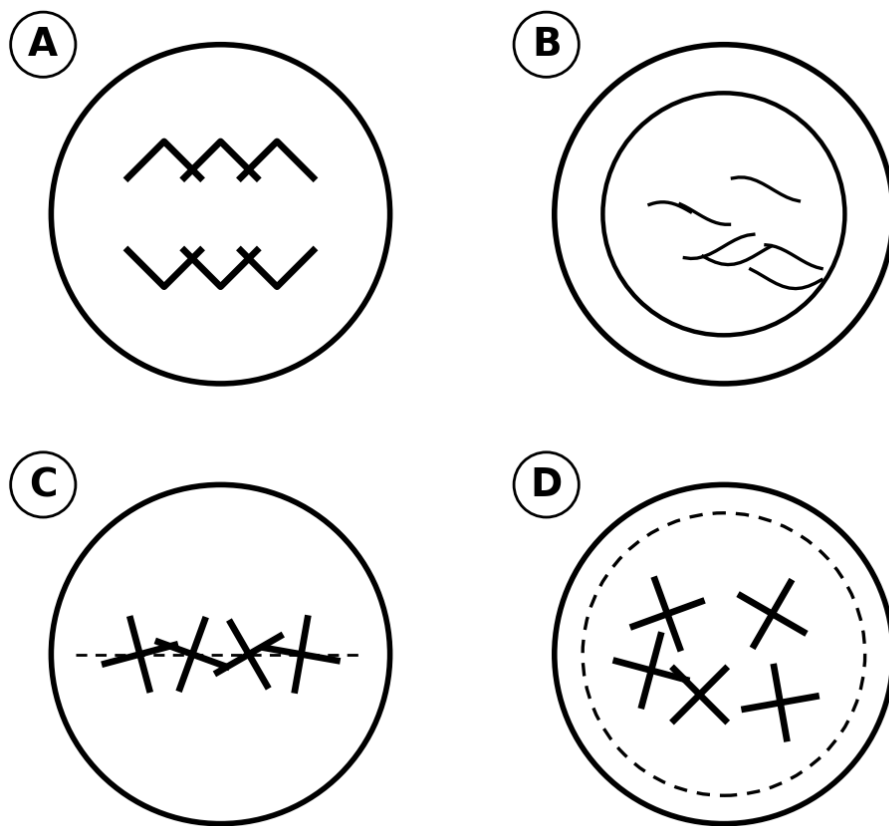
(Total for Question 7 is 14 marks)

Turn over

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- 8** Figure 6 shows four cells from a plant root tip at different stages of the cell cycle.

Figure 6



- (a) Cell B is in the growth stage of the cell cycle. Put cells A, C and D in the correct order, starting after cell B.

 ----- (1)

- (b) Explain why mitosis is important for the growth of a plant root.

 ----- (2)

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(c) A student counted 400 cells in a root tip. 28 of the cells were undergoing mitosis.

Calculate the percentage of cells undergoing mitosis.

----- (2)

(d) Stem cells from human embryos can be used to treat medical conditions such as paralysis.

Describe how embryonic stem cells could be used to treat a patient, and suggest one risk of this treatment.

----- (3)

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(e) Describe how monoclonal antibodies are produced.

(5)

(Total for Question 8 is 13 marks)

END OF QUESTIONS

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