Paper Reference(s) 1SC0/2BF
Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Combined Science
PAPER 4
Foundation Tier

Total Marks

Time: 1 hour 10 minutes

In the boxes below, write your name, centre number and candidate number.

Surname						
Other names						
Centre Number						
Candidate Number						

Q69477A

Pearson

YOU MUST HAVE

Calculator, ruler

YOU WILL BE GIVEN

Diagram Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – there may be more space than you need.

Calculators may be used.

Any diagrams may NOT be accurately drawn, unless otherwise indicated.

You must show all your working out with your answer clearly identified at the end of your solution.

INFORMATION

The total mark for this paper is 60.

The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.

In questions marked with an ASTERISK (*), marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.

There may be spare copies of some diagrams.

ADVICE

Read each question carefully before you start to answer it.

Try to answer every question.

Check your answers if you have time at the end.

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 (a) Look at Figure 1 for Question 1(a) in the Diagram Booklet. It shows part of the carbon cycle.

(i) Name the process that transfers carbon from plants to animals.
(1 mark)

(continued on the next page)

1 continued.

(ii) Use words from the list below to complete the sentences.
(2 marks)

digestion

translocation

osmosis

photosynthesis

respiration

transpiration

Plants use carbon dioxide from the atmosphere for _____

Animals release carbon dioxide and energy during _____

(continued on the next page)

1 continued.

(iii) Which of these can be a decomposer?
(1 mark)

☐ A mammal

☐ B producer

☐ C microorganism

☐ D tree

(b) The water cycle is the movement of water through an ecosystem.

Which process is used to obtain freshwater from seawater?
(1 mark)

☐ A excretion

☐ B precipitation

☐ C sterilisation

☐ D desalination

(continued on the next page)

1 continued.

(c) Water from rivers can be filtered and then treated with chemicals to make it suitable for drinking.

(i) Give ONE reason why water is filtered.
(1 mark)

(ii) Give ONE reason why water is treated with chemicals.
(1 mark)

(Total for Question 1 = 7 marks)

2 (a) Blood contains red blood cells, white blood cells, plasma and platelets.

(i) Look at the diagram for Question 2(a)(i) in the Diagram Booklet. Draw ONE straight line from each part of the blood to its function.
(2 marks)

(ii) Look at Figure 2 for Question 2(a)(ii) in the Diagram Booklet. It is a diagram of a red blood cell shown from the top and from the side.

State TWO features that can be seen in the red blood cell in Figure 2.
(2 marks)

1 _____

_____

2 _____

_____

_____

(continued on the next page)

2 continued.

(b) Lymphocytes are white blood cells that produce large amounts of protein.

(i) Which organelle is needed to produce large amounts of protein?
(1 mark)

☐ A ribosome

☐ B vacuole

☐ C chloroplast

☐ D flagellum

(continued on the next page)

2 continued.

A small lymphocyte has a diameter of 10 μm (micrometres).

A microscope magnifies this lymphocyte 400 times.

(ii) Calculate the diameter of the image of the lymphocyte seen using this microscope.
(2 marks)

image size _____ μm

(continued on the next page)

2 continued.

(iii) How many micrometres are in 1 mm (millimetre)?
(1 mark)

☐ A 10

☐ B 100

☐ C 1 000

☐ D 10 000

(Total for Question 2 = 8 marks)

3 (a) Look at Figure 3 for Question 3(a) in the Diagram Booklet. It shows some onion cells that have been soaked in a concentrated salt solution.

(i) The cells in Figure 3 have been stained.

Give ONE reason why the cells have been stained.
(1 mark)

(ii) Which is the name of the structure labelled V?
(1 mark)

☐ A chloroplast

☐ B vacuole

☐ C nucleus

☐ D cell wall

(continued on the next page)

3 continued.

(iii) The salt solution outside the cell has a higher concentration than the solution inside the cell.

Explain why the cytoplasm shrinks away from the sides of the cell when the cells are in salt solution.
(2 marks)

(continued on the next page)

3 continued.

(b) Look at Figure 4 for Question 3(b) in the Diagram Booklet. It shows the equipment used to prepare a microscope slide of onion cells.

Describe how this equipment could be used to prepare a slide of onion cells to view under a microscope.

(3 marks)

(continued on the next page)

3 continued.

(c) A student investigated the percentage change in mass of potato cylinders placed in sucrose solutions of different concentrations.

Look at Figure 5 for Question 3(c) in the Diagram Booklet. It shows the results of the student's investigation.

State TWO conclusions that can be made from these results.
(2 marks)

1 _____

_____

_____

2 _____

_____

_____

(Total for Question 3 = 9 marks)

4 (a) Look at Figure 6 for Question 4(a) in the Diagram Booklet. It shows a method of investigating the rate of photosynthesis in a water plant.

(i) What are the products of photosynthesis? (1 mark)

☐ A carbon dioxide and water

☐ B water and glucose

☐ C glucose and oxygen

☐ D oxygen and carbon dioxide

(continued on the next page)

4 continued.

(ii) The rate of photosynthesis can be measured by counting the number of bubbles of gas produced in one minute.

Look at Figure 7 for Question 4(a)(ii) in the Diagram Booklet. It shows some results from this investigation in different light intensities.

Light intensity was changed by moving the lamp towards or away from the water plant.

Describe the effect of light intensity on the rate of photosynthesis.
Use information from Figure 7 to help you.
(2 marks)

(continued on the next page)

4 continued.

(iii) The bubbles are different sizes and can be difficult to count.

Describe how the quality of the results from this investigation could be improved.
(2 marks)

(continued on the next page)

4 continued.

(iv) Describe how this investigation could be changed to find the effect of temperature on the rate of photosynthesis.
(3 marks)

(continued on the next page)

4 continued.

(b) Increased nitrates can cause eutrophication in lakes.

Explain how eutrophication will affect the fish living in the lakes.
(3 marks)

(continued on the next page)

4 continued.

(Total for Question 4 = 11 marks)

5 (a) Look at Figure 8 for Question 5(a) in the Diagram Booklet. It shows a diagram of a plant root hair cell.

(i) Name the part labelled R.
(1 mark)

(ii) Explain ONE adaptation of a root hair cell that increases the absorption of water and mineral ions.
(2 marks)

(continued on the next page)

5 continued.

(b) Look at Figure 9 for Question 5(b) in the Diagram Booklet. It shows the stem of a plant which connects the roots to the leaves and flowers. Inside the stem are xylem and phloem.

(i) Living cells in phloem use energy to transport sucrose.

Which organelles release energy in living cells? (1 mark)

☐ A vacuoles

☐ B mitochondria

☐ C nuclei

☐ D ribosomes

(continued on the next page)

5 continued.

(ii) Describe TWO features of the structure of xylem vessels that can be seen in Figure 9. (2 marks)

1 _____

_____

2 _____

_____

_____

(continued on the next page)

5 continued.

(c) A scientist investigated how the flow of air affected the rate of transpiration in a plant.

A fan was used to change the flow of air.

The volume of water taken up by the plant was measured.

Look at Figure 10 for Question 5(c) in the Diagram Booklet. It shows the results of this investigation.

(i) Explain why switching on the fan caused a change in the volume of water taken up by the plant.
(3 marks)

(continued on the next page)

5 continued.

(ii) Give ONE reason why the volume of water taken up by the plant was also measured when the fan was not switched on.
(1 mark)

(continued on the next page)

5 continued.

(iii) Calculate the rate of water uptake from 8 minutes to 10 minutes when the fan was switched on.
(2 marks)

Use the equation

$$\text{rate of water uptake} = \frac{\text{volume of water taken up}}{\text{time taken}}$$

_____ mm^3 per minute

(Total for Question 5 = 12 marks)

6 (a) Look at Figure 11 for Question 6(a) in the Diagram Booklet. It shows a cross-section of an artery and a vein.

(i) Explain ONE difference between the artery wall and the vein wall shown in Figure 11. (2 marks)

(continued on the next page)

6 continued.

(ii) Name ONE structure that is found in veins but not found in arteries.
(1 mark)

(continued on the next page)

6 continued.

(b) A human body has 5 dm^3 of blood.

At rest 20% of the blood travels to the muscles.

During exercise 60% of the blood travels to the muscles.

(i) Calculate the volume of blood travelling to the muscles during exercise.
(2 marks)

_____ dm^3

(continued on the next page)

6 continued.

(ii) Explain ONE reason why there is an increase in blood flow to muscles during exercise.
(2 marks)

(continued on the next page)

6 continued.

*(c) Look at Figure 12 for Question 6(c) in the Diagram Booklet. It shows the structure of the human heart.

Explain how the structure of the heart is related to its function.
(6 marks)

(continued on the next page)

6 continued.

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

END OF PAPER