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

Total Marks

Combined Science
PAPER 4
Foundation Tier

Friday 7 June 2024 – Afternoon

Time: 1 hour 10 minutes

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

Surname					
Other names					
Centre Number					
Candidate Number					

Y75514A

Pearson

YOU MUST HAVE

Ruler, calculator

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.

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 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 Scientists use microscopes to study cells.

Look at Figure 1 for Question 1 in the Diagram Booklet. It shows a light microscope.

(a) Look at the list of words for Question 1(a) in the Diagram Booklet.

Draw ONE straight line from each part of the microscope to its function.
(2 marks)

(continued on the next page)

1 continued.

(b) Look at Figure 2 for Question 1(b) in the Diagram Booklet. It shows two images of bacteria.

Image **A** was taken through a light microscope.

Image **B** was taken using an electron microscope.

(i) Draw, in the space below, the bacterial cell labelled **X**.

Label ONE part of the bacterial cell on your diagram.
(3 marks)

(continued on the next page)

1(b) continued.

(ii) State ONE advantage of using a light microscope and ONE advantage of using an electron microscope to study these bacterial cells.
(2 marks)

Answer space continues on the next page.

A light microscope

(continued on the next page)

1(b)(ii) continued.

An electron microscope

(Total for Question 1 = 7 marks)

2 Plants need light for photosynthesis.

(a) Part of the photosynthesis equation is shown below.

reactant **A** + water ⟶ glucose + product **B**

Which row in the table shows reactant **A** and product **B**?
(1 mark)

	reactant A	product B
☐ A	carbon dioxide	light
☐ B	light	oxygen
☐ C	oxygen	carbon dioxide
☐ D	carbon dioxide	oxygen

(continued on the next page)

2 continued.

(b) Name the green chemical in chloroplasts that absorbs light.
(1 mark)

(c) (i) Look at Figure 3 for Question 2(c) in the Diagram Booklet.

Plan an experiment to investigate if plants grow faster when they receive more light.
Use the equipment shown in Figure 3.
(3 marks)

Answer space continues on the next page.

2(c)(i) continued.

(continued on the next page)

2(c) continued.

(ii) State ONE factor that you would keep the same in this experiment. (1 mark)

(continued on the next page)

2(c) continued.

(iii) A plant was kept at a very high temperature of 60 °C

Explain the effect of this temperature on photosynthesis.
(2 marks)

(Total for Question 2 = 8 marks)

3 Endocrine glands produce hormones.

(a) Look at Figure 4 for Question 3(a) in the Diagram Booklet.

Draw TWO crosses on Figure 4 to show the position of the ovaries.
(1 mark)

(b) Progesterone is produced in the ovaries.

State ONE effect of progesterone on the uterus lining.
(1 mark)

_____

_____

_____

(continued on the next page)

3 continued.

(c) Insulin is a hormone that controls blood glucose concentration.

(i) Which endocrine gland produces insulin?
(1 mark)

☐ A thyroid

☐ B pancreas

☐ C adrenal

☐ D pituitary

(ii) State how insulin is transported from its endocrine gland to its target organs.
(1 mark)

(continued on the next page)

3(c) continued.

(iii) Name the main target organ for insulin.
(1 mark)

(continued on the next page)

3 continued.

(d) People with type 1 diabetes cannot produce insulin.

Look at Figure 5 for Question 3(d) in the Diagram Booklet. It shows the blood glucose concentration for a person with type 1 diabetes.

(i) Describe the trend from midday to 1 pm.
(2 marks)

(continued on the next page)

3(d) continued.

(ii) State what a person with type 1 diabetes could have done to cause the change in the blood glucose concentration from 1.05 pm to 1.30 pm.
(1 mark)

(continued on the next page)

3 continued.

(e) People with type 2 diabetes have cells that do not respond to insulin.

State TWO ways that people with type 2 diabetes can control their blood glucose concentration.
(2 marks)

1 _____

_____

_____

2 _____

_____

_____

(Total for Question 3 = 10 marks)

4 In humans, gas exchange occurs in the alveoli of the lungs.

Look at Figure 6 for Question 4 in the Diagram Booklet. It shows the structure of an alveolus and its blood supply.

(a) Which process moves carbon dioxide from the blood into the alveolus? (1 mark)

☐ A diffusion

☐ B osmosis

☐ C active transport

☐ D transpiration

(continued on the next page)

4 continued.

(b) State ONE adaptation of an alveolus that increases the rate of gas exchange.
(1 mark)

(continued on the next page)

4 continued.

(c) Describe how blood is moved from the heart to the lungs.
(2 marks)

(continued on the next page)

4 continued.

(d) Look at Figure 7 for Question 4(d) in the Diagram Booklet. It shows the heart rate of a person before, during and after exercise.

(i) Describe the trend shown in Figure 7.

Use data from Figure 7 to support your answer.
(2 marks)

Answer space continues on the next page.

4(d)(i) continued.

(continued on the next page)

4(d) continued.

(ii) Explain the trend shown in Figure 7 from 5 minutes to 25 minutes.
(2 marks)

(continued on the next page)

4(d) continued.

(iii) The stroke volume is the volume of blood pumped during one beat of the heart.

At 25 minutes the stroke volume was $0{\cdot}13\,dm^3$

Calculate the cardiac output of the heart of this person at 25 minutes. (3 marks)

Use the equation

cardiac output = stroke volume × heart rate

Answer space continues on the next page.

4(d)(iii) continued.

_____ dm^3 per minute

(Total for Question 4 = 11 marks)

5 (a) The heart pumps blood.

Explain why the wall of the left ventricle of the heart is thicker than the wall of the right ventricle of the heart. (2 marks)

(continued on the next page)

5 continued.

(b) A centrifuge can be used to separate the different parts of human blood.

Look at Figure 8 for Question 5(b) in the Diagram Booklet. It shows blood separated into different parts.

(i) Name part **X**.
(1 mark)

_____

_____

(continued on the next page)

5(b) continued.

(ii) Which substance, needed for cellular respiration, is carried by red blood cells?
(1 mark)

☐ A carbon dioxide

☐ B urea

☐ C amino acids

☐ D oxygen

(continued on the next page)

5(b) continued.

(iii) Name TWO types of white blood cell. (2 marks)

1 _____

_____

2 _____

_____

(continued on the next page)

5 continued.

(c) (i) When a person donates blood, $470\,cm^3$ of blood is removed from their body.

Red blood cells make up 44% by volume of the blood.

Calculate the volume of red blood cells in $470\,cm^3$ of donated blood.

Give your answer to the nearest whole number.
(3 marks)

Answer space continues on the next page.

5(c)(i) continued.

_____ cm^3

(continued on the next page)

5(c) continued.

(ii) Before donating blood, a person has a small blood sample taken to check that the blood is healthy.

State TWO precautions a doctor should take when collecting this sample.
(2 marks)

1 _____

_____

_____

2 _____

_____

_____

(Total for Question 5 = 11 marks)

6 (a) Look at Figure 9 for Question 6(a) in the Diagram Booklet. It shows a root hair cell from a plant.

(i) Name the part labelled **X**.
(1 mark)

(ii) State ONE way that the structure of the root hair cell increases the volume of substances it absorbs.
(1 mark)

(continued on the next page)

6(a) continued.

(iii) Explain why root hair cells do not contain chloroplasts.
(3 marks)

(continued on the next page)

6 continued.

(b) A student studied the water plant **Elodea**.

The student used a light microscope to observe the cells of the plant in tap water and in a **10%** salt solution.

Look at Figure 10 for Question 6(b) in the Diagram Booklet. It shows **Elodea** cells in tap water and in a **10%** salt solution.

Describe TWO ways that the **Elodea** cells in the **10%** salt solution are different from the **Elodea** cells in tap water.
(2 marks)

Answer space continues on the next page.

1 _____

_____

_____

6(b) continued.

2 _____

_____

_____

(continued on the next page)

6 continued.

*(c) Look at Figure 11 for Question 6(c) in the Diagram Booklet. It shows the direction of water movement through a tree.

Explain how water is moved from the soil, through the plant and into the air. (6 marks)

Answer space continues on the next 2 pages.

6(c) continued.

6(c) continued.

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS
END OF PAPER