Paper Reference(s) 4BI1/2B
Pearson Edexcel International GCSE (9–1)

Biology

Unit: 4BI1

PAPER: 2B

Total Marks

Time: 1 hour 15 minutes plus your additional time allowance

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

Surname						
Other names						
Centre Number						
Candidate Number						

Q66431RA

Pearson

YOU MUST HAVE

Calculator

YOU WILL BE GIVEN

Diagram Booklet
Text Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided – there may be more space than you need.

Show all the steps in any calculations and state the units.

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 ☒.

INFORMATION

The total mark for this paper is 70.

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

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.

1 Read the passage in the Text Booklet. Use the information in the passage and your own knowledge to answer the questions that follow.

(a) Suggest why cardiomyopathy can cause heart failure (lines 9 to 10).
(1 mark)

(continued on the next page)

1 continued.

(b) During the transplant procedure the patient's heart is removed, leaving behind a section of the right and left atria.

Describe the functions of the atria in the body.
(3 marks)

(continued on the next page)

1 continued.

(c) Describe how the blood in the pulmonary artery differs from the blood in the aorta.
(2 marks)

(continued on the next page)

1 continued.

(d) Explain the function of the heart-lung bypass machine (lines 16 to 18).
(3 marks)

(continued on the next page)

1 continued.

(e) Explain why the patient needs to be given immunosuppressants (lines 27 to 29).
(2 marks)

(continued on the next page)

1 continued.

(f) Explain why patients should not smoke after their heart transplant (lines 41 to 42).
(2 marks)

(g) State what is meant by the term BALANCED DIET.
(1 mark)

(continued on the next page)

1 continued.

(h) Calculate the number of patients in the United Kingdom who have a heart transplant in one year that are still alive five years later (line 4 and lines 50 to 52).
(2 marks)

number of patients = _____

(i) Suggest why patients are advised to avoid strenuous activities after their heart transplant (lines 34 to 35).
(1 mark)

(continued on the next page)

1 continued.

(j) Suggest why patients are more likely to be at risk of food poisoning after their heart transplant (lines 46 to 47).
(1 mark)

(Total for Question 1 = 18 marks)

2 Flowers are involved in plant reproduction.

Look at the diagram for Question 2(a) in the Diagram Booklet. It shows a section through a flower with parts labelled A, B, C and D.

(a) (i) Which part of the flower makes pollen grains?
(1 mark)

☐ A

☐ B

☐ C

☐ D

(ii) What part of the flower is the stigma?
(1 mark)

☐ A

☐ B

☐ C

☐ D

(continued on the next page)

2 continued.

(b) After a pollen grain lands on the stigma of a flower, a pollen tube grows.

Explain the role of the pollen tube.
(3 marks)

(continued on the next page)

2 continued.

(c) Look at the diagram for Question 2(c) in the Diagram Booklet. A scientist investigates the effect of three different solutions on the growth of pollen tubes using this apparatus.

This is the scientist's method.

- place a different solution in three different flasks
- add pollen grains to the solution in each flask
- leave the grains in each solution for three hours
- take a sample of pollen grains from each solution
- measure the length of the pollen tubes in each sample

Look at the graph for Question 2(c) in the Diagram Booklet. It shows the scientist's results.

(continued on the next page)

2 continued.

(i) Calculate the difference between the mean rate of pollen tube growth in the control solution and the mean rate of pollen tube growth in the actinomycin D solution.

Give your answer in μm per hour.
(2 marks)

difference = _____ μm per hour

(continued on the next page)

2 continued.

(ii) Actinomycin D prevents transcription and cycloheximide prevents translation.

Use this information and your own knowledge to explain the results of this investigation. (4 marks)

(continued on the next page)

2 continued.

(continued on the next page)

2 continued.

(d) Describe a method the scientist could use to observe pollen grains.
(3 marks)

(Total for Question 2 = 14 marks)

3 The kidney contains nephrons involved in osmoregulation and excretion.

Look at the diagram for Question 3(a) in the Diagram Booklet. It shows a nephron.

(a) Which part is the Bowman's capsule?
(1 mark)

☐ A

☐ B

☐ C

☐ D

(continued on the next page)

3 continued.

(b) Look at the table for Question 3(b) in the Diagram Booklet. It gives the mass of three substances transported in part A and in part D for all kidney nephrons during one day.

(i) Explain the change in the mass of glucose from part A to part D.
(3 marks)

(continued on the next page)

3 continued.

(ii) Calculate the percentage reabsorption of water by kidney nephrons.
(2 marks)

percentage = _____%

(continued on the next page)

3 continued.

(iii) A substance containing nitrogen is broken down in the liver to produce urea.

Which substance is broken down to produce urea?
(1 mark)

☐ A fat

☐ B glucose

☐ C protein

☐ D water

(continued on the next page)

3 continued.

(c) A drug called MDMA increases the secretion of ADH.

Explain how this increase affects urine production. (4 marks)

(continued on the next page)

3 continued.

(Total for Question 3 = 11 marks)

4 Scientists have produced cloned monkeys.

Look at the diagram for Question 4(a) in the Diagram Booklet. It shows the procedure used to produce cloned monkeys.

(a) (i) State the meaning of the term ENUCLEATED. (1 mark)

(continued on the next page)

4 continued.

(ii) Describe how the single cell develops into an embryo.
(2 marks)

(continued on the next page)

4 continued.

(b) Scientists can use adult body cells or fetal body cells to clone monkeys.

Look at the table for Question 4(b) in the Diagram Booklet. It gives information about cloning using body cells from different sources.

Evaluate this data to decide which source of body cells is more successful in cloning monkeys.
(4 marks)

(continued on the next page)

4 continued.

(Total for Question 4 = 7 marks)

5 Obesity is caused when energy input is greater than energy output.

A student likes to eat potato crisps but is concerned about obesity.

The student has a choice of two different types of crisp to eat.

Describe an experiment the student could use to determine which type of crisp contains the least energy. (6 marks)

(continued on the next page)

5 continued.

(Total for Question 5 = 6 marks)

6 A group of students compares the distribution of plant species in two fields using this method.

- use random sampling
- use a 0·5 m × 0·5 m quadrat
- count the number of each species in a quadrat

Repeat this method for five quadrats in each field.

Look at the tables for Question 6 in the Diagram Booklet. They show the students' results.

(a) Describe how the students would obtain random samples from each field.
(2 marks)

(continued on the next page)

6 continued.

(b) (i) Calculate the mean number of dandelions per quadrat in field B.
(1 mark)

mean number = _____

(ii) Calculate the number of dandelions per m^2 in field B.
(1 mark)

number of dandelions per m^2 = _____

(continued on the next page)

6 continued.

(c) Describe the differences in species distribution in field A and field B.
(2 marks)

(continued on the next page)

6 continued.

(d) A teacher suggests that there are no buttercups in field B because of poor water drainage from the field.

Describe what further experiment the students could do to investigate this suggestion.
(3 marks)

(continued on the next page)

6 continued.

(Total for Question 6 = 9 marks)

7 As an embryo develops, its cells differentiate.

(a) Explain the importance of cell differentiation in the development of the growing embryo.
(2 marks)

(continued on the next page)

7 continued.

(b) (i) Which of these is a feature of adult stem cells? (1 mark)

☐ A they do not divide

☐ B they divide by meiosis

☐ C they can become all cell types

☐ D they are found in some tissues and organs

(continued on the next page)

7 continued.

(ii) Adult stem cells or embryonic stem cells can be used in medical treatments.

Explain why the choice between these two types of stem cells can cause issues for doctors.
(2 marks)

(Total for Question 7 = 5 marks)

TOTAL FOR PAPER = 70 MARKS

END OF PAPER