Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Friday 9 June 2023

Afternoon (Time: 1 hour 45 minutes)

Paper reference **1BI0/2F**

Biology
PAPER 2

Foundation Tier

You must have:
Ruler, calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

Information

- The total mark for this paper is 100.
- 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.

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.

Turn over ▶

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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 Figure 1 shows a bird called an egret on the back of a buffalo.



(Source: © Jaromir Chalabala/Shutterstock)

Figure 1

(a) (i) The egret eats parasites that live on the skin of the buffalo.

Which term describes this relationship, where the buffalo and the egret both benefit?

(1)

☒ **A** eutrophication

☒ **B** mutualism

☒ **C** indigenous

☒ **D** biodiverse

(ii) The buffalo is part of the carbon cycle.

Use words from the box to complete the sentences.

clean	decompose	energy
fertilise	glucose	water

(2)

The buffalo gains carbon from the ..... in the plants that it eats.

Bacteria will ..... the waste from the buffalo.

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(iii) Figure 2 shows part of the carbon cycle.

Draw and label an arrow on Figure 2 to show the process plants use to make glucose from carbon dioxide.

(2)

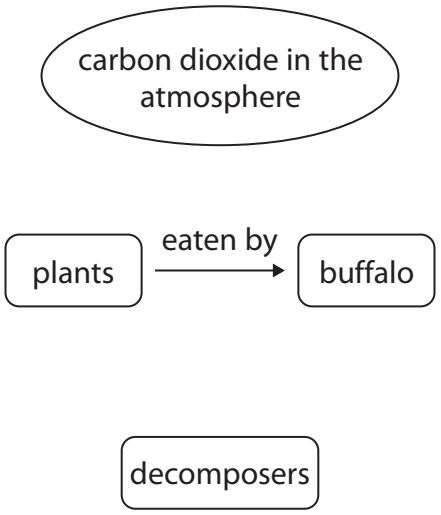


Figure 2

(b) Enzymes are used to digest proteins.

Figure 3 shows an enzyme and a protein.

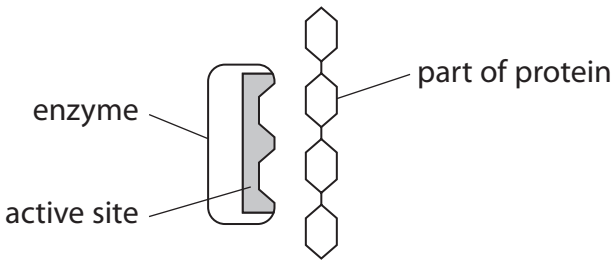


Figure 3

Explain how boiling the enzyme stops the protein being digested.

(2)

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(Total for Question 1 = 7 marks)

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2 In 2022, temperatures in England were higher than average.

The increase in temperature is linked to global warming.

(a) Which human activity is most likely to cause an increase in global warming?

(1)

- ☒ **A** burning fossil fuels
- ☒ **B** insulating houses
- ☒ **C** using more solar panels
- ☒ **D** using nuclear power stations

(b) Figure 4 shows the rainfall for one area in England for part of 2022.

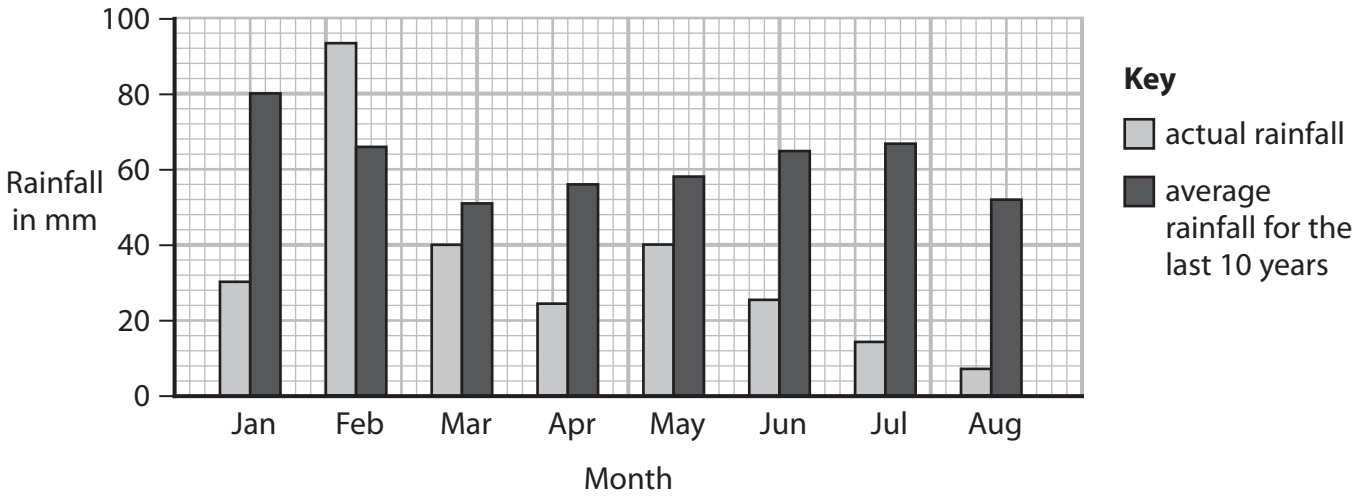


Figure 4

(i) State **two** conclusions about the actual rainfall compared with the average rainfall shown in Figure 4.

(2)

1 .....

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2 .....

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(ii) The average potato yield for a field is 44 tonnes.

The weather in 2022 meant that the actual yield for this field was one quarter lower than this average.

Calculate the actual yield of potatoes for this field in 2022.

(2)

..... tonnes

(iii) Food security occurs when all people are able to access enough safe and nutritious food to meet their requirements for a healthy life.

Explain how lower yields of potatoes and other crops could affect food security.

(3)

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(Total for Question 2 = 8 marks)

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3 Figure 5 shows a diagram of the human blood system.

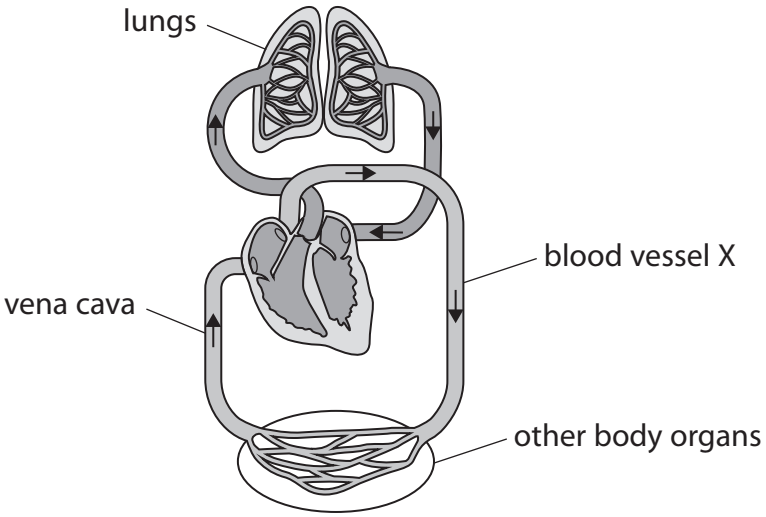


Figure 5

(a) (i) Name blood vessel X.

(1)

.....

(ii) Which row of the table shows the width of the wall and blood pressure in blood vessel X?

(1)

		width of wall	blood pressure
☒	**A**	thick	high
☒	**B**	thick	low
☒	**C**	thin	high
☒	**D**	thin	low

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(b) Figure 6 shows the pressure of blood flowing through the arteries, capillaries and veins of a person.

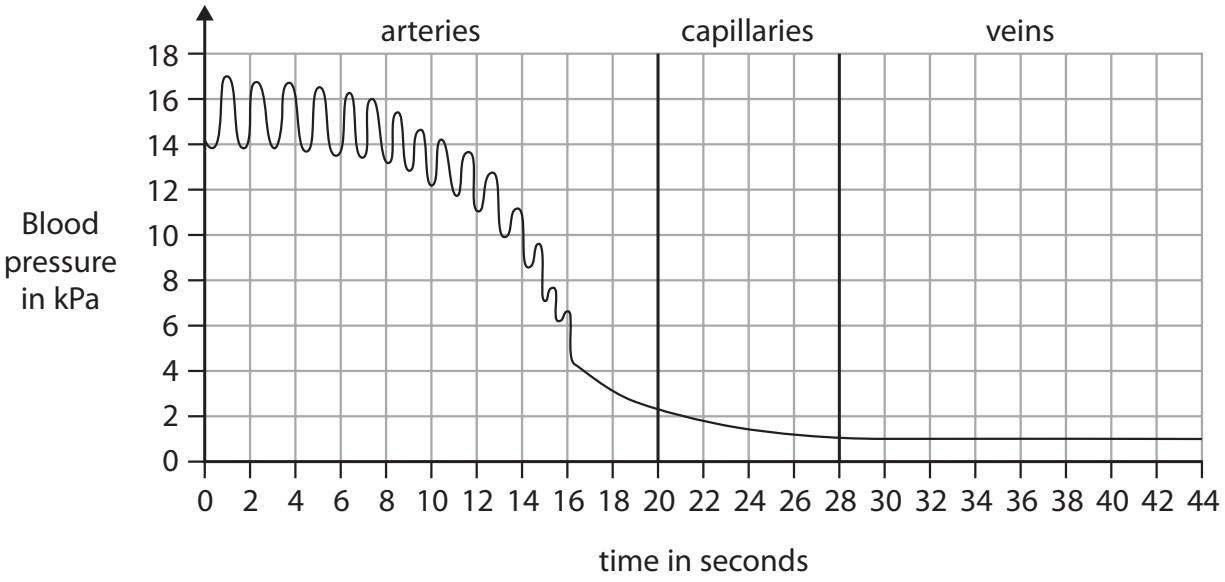


Figure 6

Calculate the difference in blood pressure from the maximum in the arteries to the minimum in the veins.

(2)

..... kPa

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(c) Figure 7 shows a diagram of a vein with blood cells.

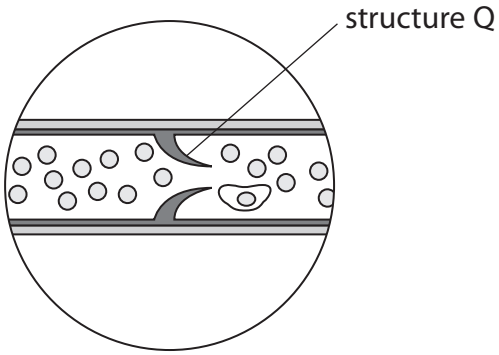


Figure 7

(i) Identify structure Q.

(1)

.....

(ii) State the function of structure Q.

(1)

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(d) Describe how the heart causes blood to move to the lungs.

(3)

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(Total for Question 3 = 9 marks)

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4 Hormones are chemicals produced in endocrine glands.

(a) Draw **one** straight line from each hormone to the endocrine gland that produces it.

(2)

hormone	endocrine gland
thyroxine	thyroid gland
	pituitary gland
	pancreas
adrenalin	adrenal glands
	ovaries

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(b) Figure 8 shows some of the changes that occur during the menstrual cycle.

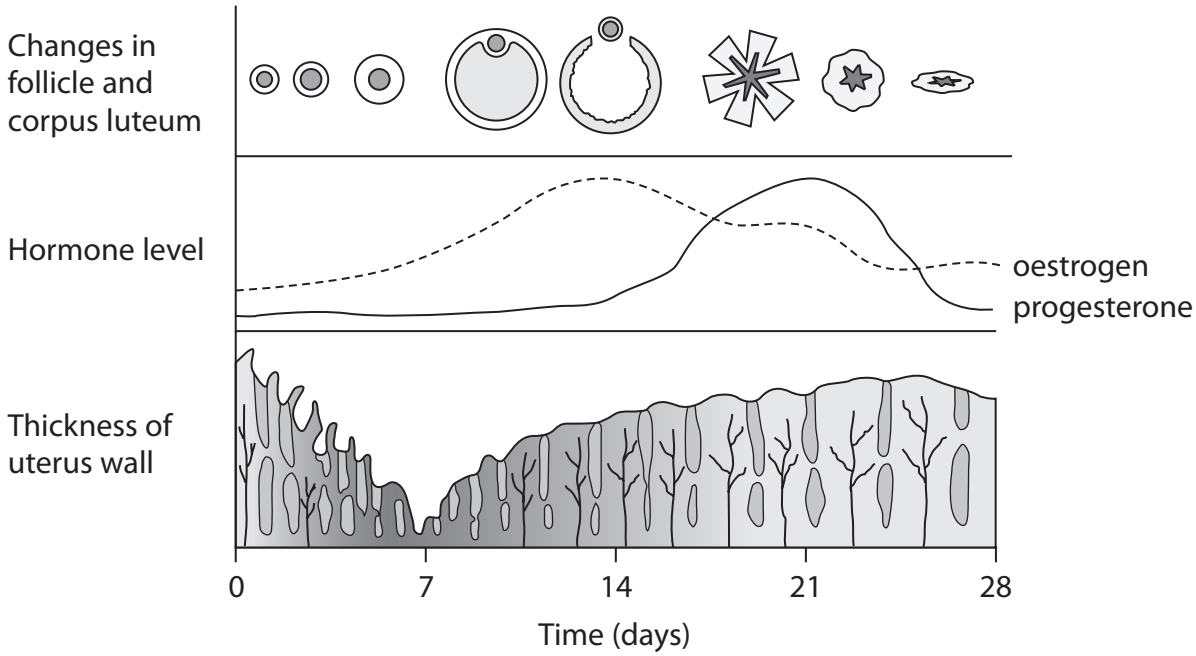


Figure 8

(i) The level of oestrogen peaks on day 13.

State the effect on the follicle caused by the peak in oestrogen.

(1)

.....

(ii) Describe the effect of progesterone on the uterus lining from day 13 to day 21.

(2)

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(c) The condom is an example of a barrier contraceptive.

State **one** advantage and **one** disadvantage of using this barrier method of contraception.

(2)

Advantage

.....

.....

Disadvantage

.....

.....

(d) The contraceptive pill is an example of a hormonal method of contraception.

Explain **one** way that the contraceptive pill stops a woman from becoming pregnant.

(2)

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(Total for Question 4 = 9 marks)

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5 Figure 9 shows a nephron from a kidney.

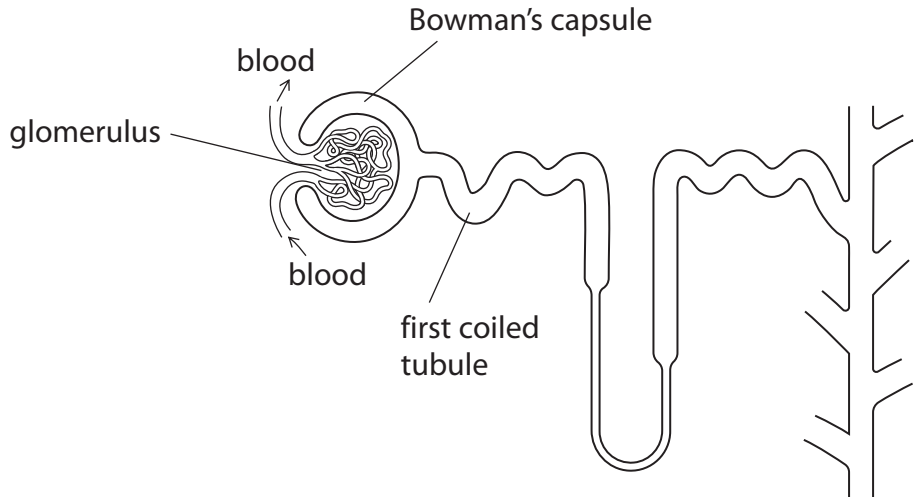


Figure 9

(a) The pressure of the liquid in the Bowman's capsule is 1.3 kPa.

The pressure of the liquid in the glomerulus is 5.6 times greater than the pressure in the Bowman's capsule.

(i) Calculate the pressure in the glomerulus.

Give your answer to one decimal place.

(2)

..... kPa

(ii) The higher pressure in the glomerulus forces some parts of the blood into the Bowman's capsule.

Which row of the table shows the parts of the blood that move into the Bowman's capsule?

(1)

		blood cells	urea	water
☒	**A**	✓	✓	✗
☒	**B**	✗	✓	✓
☒	**C**	✓	✗	✗
☒	**D**	✗	✗	✓

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(b) A scientist investigated the concentration of glucose in liquids from three different parts of the nephron.

(i) Describe how the equipment shown in Figure 10 can be used to see if these liquids contain different concentrations of glucose.

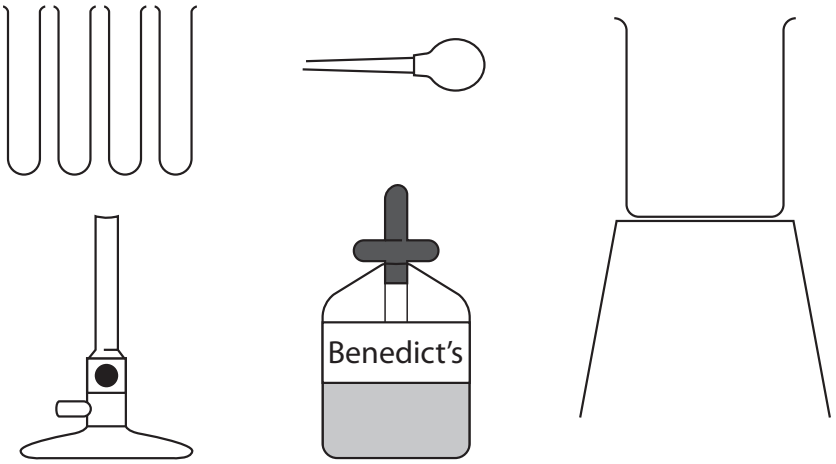


Figure 10

(4)

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(ii) Figure 11 shows the concentration of glucose in the three different parts of the nephron.

	part of nephron		
	Bowman's capsule	**start of first coiled tubule**	**end of first coiled tubule**
concentration of glucose in millimoles per dm^3	8	8	0

Figure 11

Explain **one** conclusion that can be made from the data in Figure 11.

(2)

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(Total for Question 5 = 9 marks)

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6 In 2000, a council planted indigenous trees as part of a reforestation programme.

(a) Why were indigenous trees used instead of non-indigenous trees?

(1)

- ☒ **A** indigenous trees will bring in more pests
- ☒ **B** indigenous trees are less likely to survive
- ☒ **C** indigenous trees will support more native wildlife
- ☒ **D** indigenous trees will cause more damage to the soil

(b) The animal biodiversity in this reforested area was measured from 2004 to 2017.

Biodiversity is measured on a scale from 0 to 1.

0 = low biodiversity

1 = maximum biodiversity

Figure 12 shows the results.

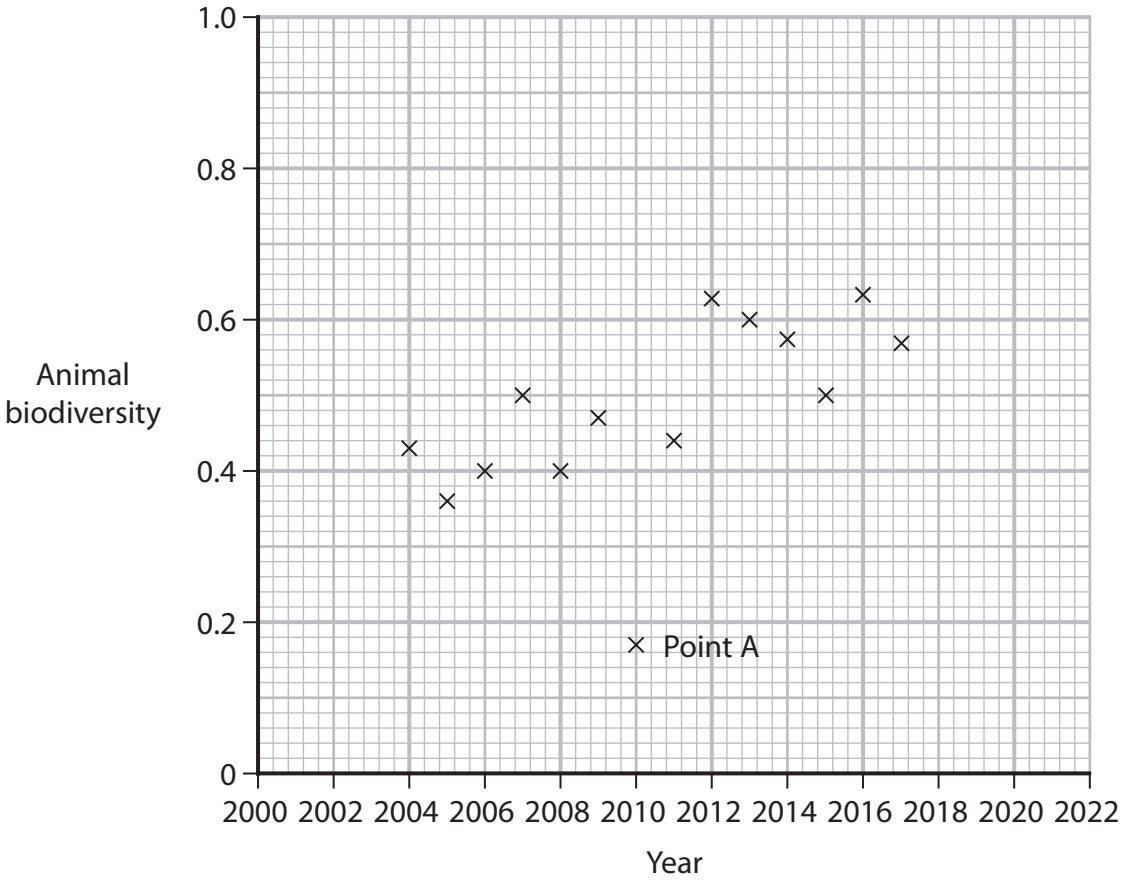


Figure 12

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(i) Draw a straight line of best fit on Figure 12 to show the main trend in this data.

(1)

(ii) Estimate the animal biodiversity of the reforested area in 2022.

(1)

.....

(c) (i) The data to calculate animal biodiversity was collected using the following method.

- a 100 m^2 area was chosen
- three 1 m^2 quadrats were placed randomly on the ground
- animals inside the quadrat were counted
- the number of each species of animal was recorded

State **two** ways that the quality of the results from this method could be improved.

(2)

1 .....

.....

2 .....

.....

(ii) State why point A on Figure 12 was ignored when considering the trend in animal biodiversity.

(1)

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.....

(iii) The data shown in Figure 12 was collected during the summer.

Explain why animal biodiversity would be different if the data had been collected in the winter.

(2)

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(d) A scientist observes that trees at the edge of a forest shade part of a field.

Describe how a belt transect could be used to see how light intensity affects the biodiversity of plants growing in the field.

(3)

(Total for Question 6 = 11 marks)

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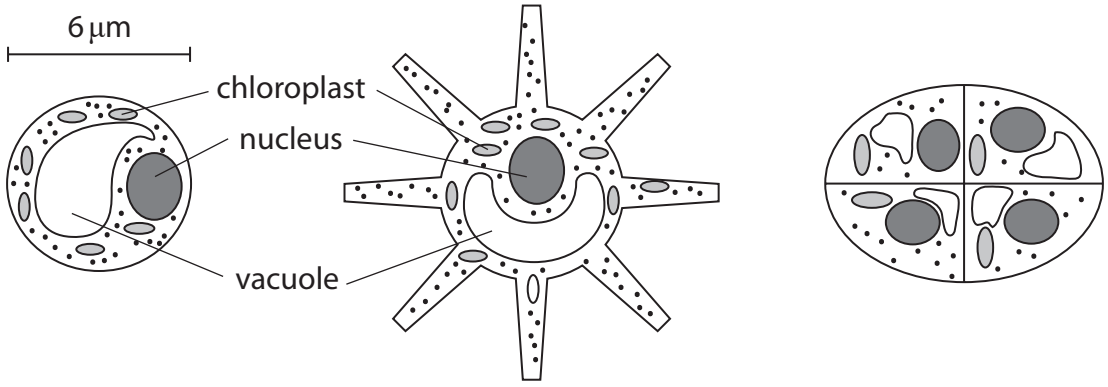
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7 (a) Figure 13 shows three organisms that live in pond water.

Oxygen diffuses across the cell membranes of these organisms.



species A species B species C

Figure 13

(i) Which row of the table shows the conditions needed for oxygen to diffuse from species A into the pond water?

(1)

		concentration of oxygen in species A in parts per million	concentration of oxygen in pond water in parts per million
☒	**A**	10	10
☒	**B**	12	10
☒	**C**	10	12
☒	**D**	12	12

(ii) Species B has a surface area of 9 000 μm^2 and a volume of 6 000 μm^3.

Calculate surface area to volume ratio for species B.

(2)

ratio .....

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(iii) The surface area to volume ratio for a cell of species A is 1 : 1.

The surface area to volume ratio for each cell in species C is 1 : 4.

Explain how the different surface areas will affect the diffusion of oxygen out of the cells of species A and species C.

(2)

(b) Some species of algae that photosynthesise have vacuoles that are filled with gas.

These vacuoles help the algae to float in water.

State how these vacuoles help the algae survive.

(1)

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*(c) Figure 14 shows leaves on a branch of a tree.



(Source: © Butus/Shutterstock)

Figure 14

Explain how leaves are adapted for photosynthesis.

(6)

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(Total for Question 7 = 12 marks)

8 People with diabetes cannot always control the concentration of glucose in their blood.

(a) Two people eat identical meals.

One person has diabetes, the other person does not have diabetes.

Figure 15 shows the concentration of glucose in the blood of these two people after eating the meals.

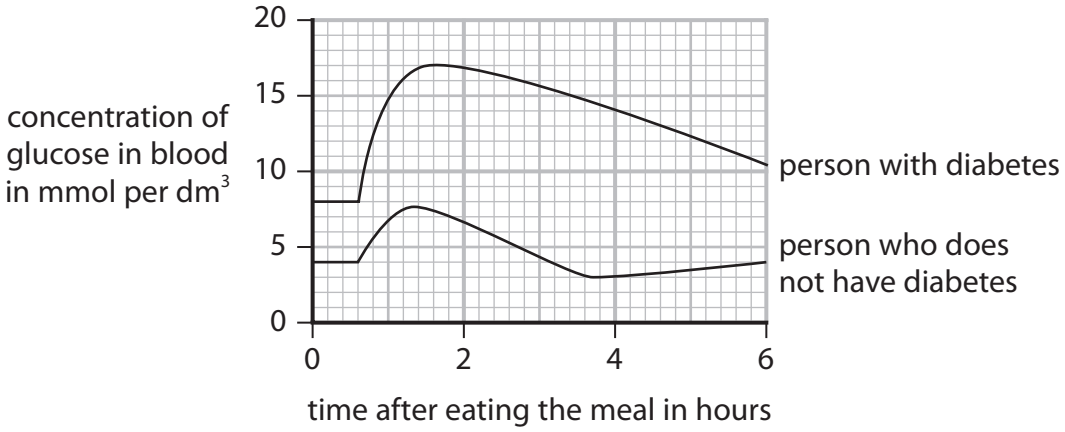


Figure 15

(i) Describe **two** differences in the concentration of glucose in the blood of the two people shown in Figure 15.

(2)

1 .....

.....

2 .....

.....

(ii) Calculate the maximum increase in the concentration of glucose in the blood of the person with diabetes.

(1)

..... mmol per dm^3

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(iii) Water moved out of the red blood cells of the person with diabetes when the concentration of glucose in the blood was above 15 mmol per dm^3.

Explain why water moved out of the red blood cells of the person with diabetes.

(2)

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.....

(b) The pancreas produces a hormone that causes the concentration of glucose in the blood to decrease.

(i) Name this hormone.

(1)

.....

(ii) State how this hormone is transported from the pancreas to its target organs.

(1)

.....

(iii) Which is the target organ for the hormone that controls the concentration of glucose in the blood?

(1)

☒ **A** kidney

☒ **B** pancreas

☒ **C** liver

☒ **D** lung

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(c) Explain how type 2 diabetes can be controlled.

(3)

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(Total for Question 8 = 11 marks)

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9 Respiration occurs in cells.

(a) Why do cells respire?

(1)

- ☒ **A** to produce nitrogen
- ☒ **B** to release oxygen
- ☒ **C** to produce glucose
- ☒ **D** to release energy

(b) An athlete runs every day as part of their training.

(i) Explain why the breathing rate of the athlete increases when running.

(2)

(ii) When the athlete is running, their muscle cells use both aerobic respiration and anaerobic respiration.

State **two** differences between aerobic respiration and anaerobic respiration.

(2)

1 .....

2 .....

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(c) Bromothymol blue (BTB) solution is an indicator of pH.

Figure 16 shows the colour of BTB at different pH levels.

pH	4	5	6	7 (neutral)	8
colour	yellow	yellowy green	light green	green	blue

Figure 16

When air is passed through green BTB, for one minute, the solution stays green.

When a person breathes out through a straw into BTB for one minute the solution turns yellow.

(i) Explain why the air breathed out turns the BTB solution yellow.

(2)

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*(ii) Devise a plan, using green BTB solution, to investigate the amount of carbon dioxide in the air athletes breathe out after they have been running at different speeds.

Include:

- how you would use green BTB solution.
- how you would control at least two variables.

(6)

(Total for Question 9 = 13 marks)

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10 (a) A student wanted to make a jacket to wear in cold weather.

The student compared the insulation properties of wool as a natural material with polyester as a synthetic material.

Each material was wrapped around a beaker containing hot water as shown in Figure 17.

The temperature was recorded every 2 minutes for 12 minutes.

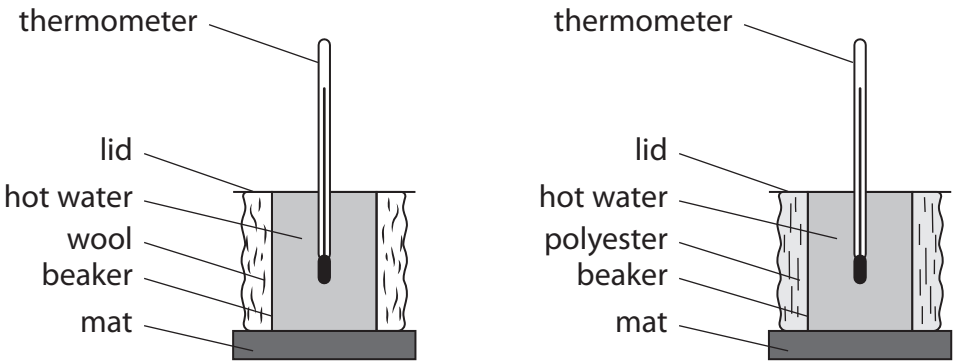


Figure 17

(i) Which part of the body controls the regulation of body temperature?

(1)

- ☒ **A** kidney
- ☒ **B** pituitary gland
- ☒ **C** hypothalamus
- ☒ **D** pancreas

(ii) State **one** variable that should be controlled in this investigation.

(1)

.....

.....

(iii) Describe a control that could be used for this investigation.

(2)

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(b) The results for this investigation are shown in Figure 18.

wool	
time in minutes	temperature in °C
0	64
2	61
4	56
6	53
8	49
10	45
12	42

polyester	
time in minutes	temperature in °C
0	82
2	74
4	68
6	63
8	59
10	53
12	48

Figure 18

(i) Compare and contrast the temperature changes for wool and polyester in this investigation.

(2)

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(ii) State **one** improvement to this investigation that would make the results more comparable.

(1)

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(c) (i) Wearing an insulated jacket may cause a person to sweat.

Explain how sweating helps to regulate temperature in humans.

(2)

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(ii) Sweat contains urea.

State where and how urea is produced in the human body.

(2)

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(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

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