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 7 June 2024

Afternoon (Time: 1 hour 45 minutes)

Paper reference **1BI0/2H**

Biology

PAPER 2

Higher 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 ▶

P75505A

F:1/1/1/1/1/1/1/

P 7 5 5 0 5 A 0 1 2 8

Pearson

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) Banting and Best were the first scientists to use the hormone insulin for the treatment of diabetes.

They extracted insulin from the body organs of animals.

(i) Which body organ produces insulin?

(1)

☒ **A** liver

☒ **B** heart

☒ **C** kidney

☒ **D** pancreas

(ii) How does insulin travel to its target organ?

(1)

☒ **A** by diffusion along neurones

☒ **B** dissolved in blood plasma

☒ **C** attached to red blood cells

☒ **D** by osmosis in white blood cells

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) Tasting urine was one of the first ways doctors tested for diabetes.

If the urine tasted sweet, the patient may have diabetes.

Describe the chemical test we now use to test for glucose in urine.

(3)

(c) A scientist wanted to compare the glucose concentration in two urine samples.

State **two** variables that need to be controlled for the comparison to be valid.

(2)

1 .....

.....

2 .....

.....

(Total for Question 1 = 7 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

2 A centrifuge can be used to separate the different parts of human blood.

Figure 1 shows blood separated into different parts.

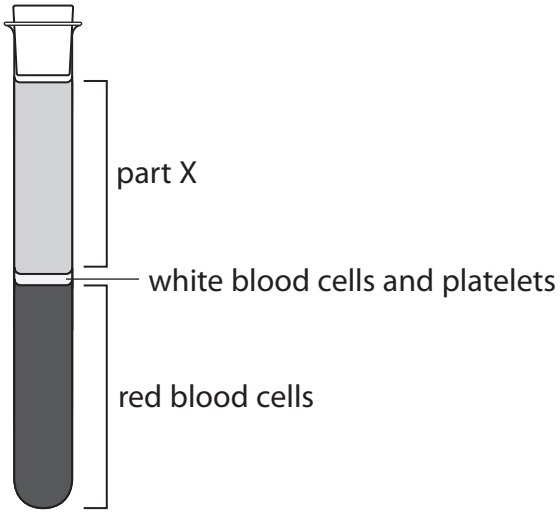


Figure 1

(a) (i) Name part X.

(1)

.....

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

(1)

- ☒ **A** carbon dioxide
- ☒ **B** urea
- ☒ **C** amino acids
- ☒ **D** oxygen

(iii) Name **two** types of white blood cell.

(2)

1 .....

2 .....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) (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)

..... cm^3

(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)

1 .....

.....

2 .....

.....

(Total for Question 2 = 9 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

3 (a) Figure 2 shows a root hair cell from a plant.

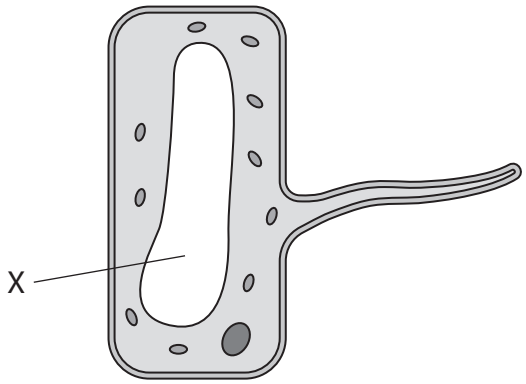


Figure 2

(i) Name the part labelled X.

(1)

.....

(ii) State **one** way that the structure of the root hair cell increases the volume of substances it absorbs.

(1)

.....

.....

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

(3)

.....

.....

.....

.....

.....

.....

(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.

Figure 3 shows *Elodea* cells in tap water and in a 10% salt solution.

Elodea cells in tap water

Elodea cells in 10% salt solution

Figure 3

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

(2)

1 .....

.....

2 .....

.....

(ii) Explain why placing the *Elodea* cells in the 10% salt solution causes the changes seen in Figure 3.

(3)

.....

.....

.....

.....

.....

.....

(Total for Question 3 = 10 marks)

4 A student investigated the decomposition of two different types of leaf.

The student placed 200 grams of holly leaves in a net bag.

The student placed 200 grams of oak leaves in another net bag.

The bags were left in a classroom.

The mass of the leaves in each bag was recorded every 10 days for 50 days.

(a) State **two** variables that would need to be controlled in this investigation.

(2)

1 .....

.....

2 .....

.....

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

(b) The results of this investigation are shown in Figure 4.

time in days	mass of leaves in grams	
	holly	oak
0	200	200
10	191	181
20	176	154
30	159	122
40	147	96
50	120	70

Figure 4

(i) Calculate the rate of decomposition of holly leaves from 0 to 50 days.

(2)

..... grams per day

(ii) Compare the trends shown in the data for holly leaves and oak leaves.

(2)

.....

.....

.....

.....

.....

(c) Explain why it is important for the environment that dead leaves are decomposed.

(2)

(d) Name **one** type of organism that decomposes leaves.

(1)

(e) Leaves are eaten by snails.

1 600 grams of leaves and 10 snails were kept in a container for one month.

A scientist measured the mass of the leaves and the mass of the snails at the start and end of one month.

Figure 5 shows the results.

	mass in grams	
	at start of month	**at end of month**
leaves	1 600	400
snails	200	320

Figure 5

Explain why the change in mass of the leaves is not the same as the change in mass of the snails.

(2)

(Total for Question 4 = 11 marks)

5 (a) A scientist decided to study the variety of living organisms in a garden.

(i) The scientist wanted to use a random sampling technique.

Devise a plan the scientist could use to randomly sample the number of plant species in the garden.

(3)

(ii) The scientist also measured abiotic factors in the garden.

The pH of the soil was measured using a pH meter.

Describe how **three** other abiotic factors could be measured in the garden.

(3)

1

2

3

(iii) Mistletoe is a parasite that grows on some trees.

Figure 6 shows a tree with mistletoe growing on it.

(Source: © NagyDodo/Shutterstock)

Figure 6

Describe the feeding relationship between the mistletoe and the tree.

(2)

.....

.....

.....

.....

(b) Nitrate fertilisers are used in the garden.

Explain why nitrate fertilisers are used in gardens.

(2)

.....

.....

.....

.....

(Total for Question 5 = 10 marks)

6 A student investigated the effect of glucose concentration on the rate of anaerobic respiration in yeast.

(a) The student used five concentrations of glucose: 5 %, 10 %, 15 %, 20 % and 25 %.

A teaspoon of dried yeast was added to 20 cm^3 of the 5 % glucose concentration in a measuring cylinder.

A drop of washing up liquid was added and the mixture was stirred.

A reaction occurred and bubbles collected as foam on the surface of the mixture.

The height of the foam was measured after five minutes.

This method was repeated for each concentration of glucose.

(i) Describe how to set up a control for this investigation.

(2)

.....

.....

.....

.....

(ii) State how the scientist could improve this investigation to increase the rate of the reaction.

(1)

.....

.....

(b) The results of this investigation are shown in Figure 7.

glucose concentration (%)	height of foam after 5 mins in mm
5	2
10	5
15	3
20	9
25	11

Figure 7

(i) The student thought one of the results was anomalous.

Explain which of these results is anomalous.

(2)

(ii) Explain why the height of the foam was greatest for the 25 % glucose concentration.

(3)

(Total for Question 6 = 8 marks)

7 A farmer wants to make sunflower seeds germinate faster.

(a) Which is the best hormone for the farmer to use?

(1)

- ☒ **A** adrenalin
- ☒ **B** auxin
- ☒ **C** thyroxine
- ☒ **D** gibberellin

(b) The sunflower plants grew and flowered.

The farmer noticed that the flowers faced a different direction at different times of the day.

Figure 8 shows a sunflower at different times of the day.

This movement is an example of phototropism.

(Source: © yevgeniy11/Shutterstock)

Figure 8

(i) This movement of the flower was in response to the light.

Explain how the sunflower changed direction throughout the day.

(4)

.....

.....

.....

.....

.....

(ii) Explain how water moves through the stem of the sunflower plant to the leaves.

(3)

(iii) Sunflower leaves are large.

Explain why large leaves are an advantage to the plant.

(3)

(Total for Question 7 = 11 marks)

8 (a) Figure 9 shows a human heart.

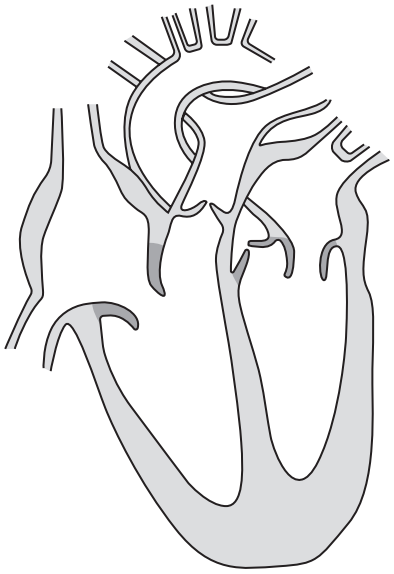


Figure 9

(i) Draw arrows on Figure 9 to show the direction of blood flow through the left side of the heart.

(2)

(ii) Name the main blood vessel that carries deoxygenated blood into the heart.

(1)

(b) Figure 10 shows the heart rate and stroke volume of a person when at rest and when doing exercise.

level of activity	heart rate in beats per minute	stroke volume in cm^3
at rest	68	72
during exercise	112	124

Figure 10

(i) Calculate the difference in cardiac output when at rest and when doing exercise.

Give your answer to 3 significant figures and include units in your answer.

(4)

answer .....

(ii) Explain why the cardiac output needs to increase during exercise.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 8 = 11 marks)

9 (a) The female contraceptive pill contains hormones to prevent pregnancy.

(i) Which hormones are in the female combined contraceptive pill?

(1)

- ☒ **A** FSH and oestrogen
- ☒ **B** oestrogen and progesterone
- ☒ **C** progesterone and LH
- ☒ **D** LH and FSH

(ii) Explain how the hormones in contraceptive pills prevent ovulation.

(3)

(iii) Explain how a barrier method of contraception prevents pregnancy.

(2)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

*(b) Hormones can be used as part of assisted reproductive technology.

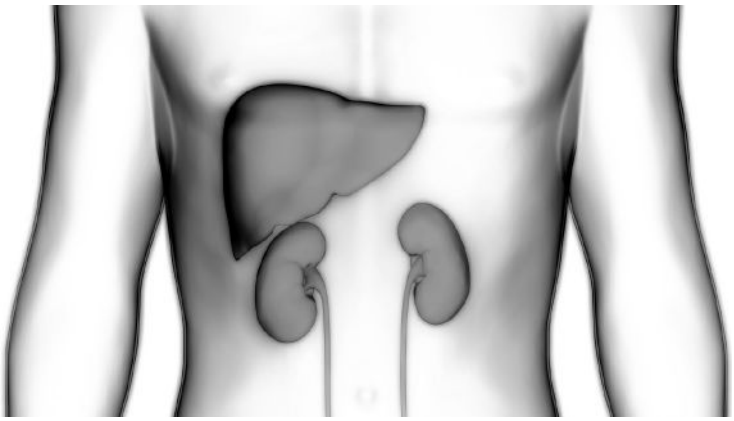
Explain how assisted reproductive technology (ART) can be used to increase the chances of a woman becoming pregnant.

(6)

(Total for Question 9 = 12 marks)

BLANK PAGE

10 (a) Figure 11 shows the location of the liver and kidneys in the human body.



(Source: © Magic mine/Shutterstock)

Figure 11

(i) The liver breaks down substances in the body to form waste products.

Which row of the table is correct?

(1)

		substances broken down	waste products
☒	**A**	amino acids	urea
☒	**B**	amino acids	enzymes
☒	**C**	urea	enzymes
☒	**D**	urea	amino acids

(ii) State how the waste products travel from the liver to the kidneys.

(1)

.....

(b) A scientist investigated the effect of a high-protein, low-carbohydrate diet on a person's body.

The scientist measured the concentration of substances found in the urine of a person on this diet (person A) and in the urine of a person not on this diet (person B).

The results are shown in Figure 12.

substance	concentration of substances in urine	
	person A	person B
protein	0 g per dm^3	0 g per dm^3
glucose	0 mmol per l	0.2 mmol per l
urea	28 g per dm^3	12 g per dm^3

Figure 12

(i) Evaluate the results shown in Figure 12.

(3)

*(ii) Explain how a nephron ensures that there is no protein and no glucose in the urine of person A.

(6)

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

BLANK PAGE

BLANK PAGE

BLANK PAGE