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Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

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Biology/Additional Science

Unit B2: The Components of Life

Higher Tier

Friday 9 June 2017 – Morning
Time: 1 hour

Paper Reference
5BI2H/01

You must have:
Calculator, ruler

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 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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

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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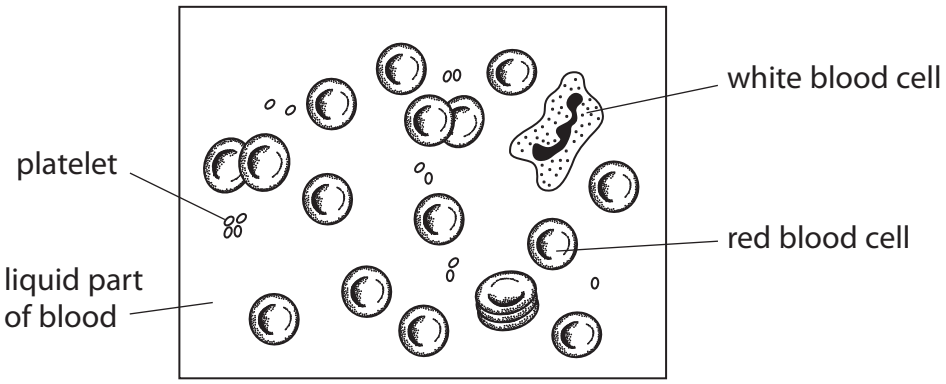
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Answer ALL questions

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 ☒.

Blood

1 The diagram shows a sample of human blood.



(a) The table shows the minimum and maximum numbers of each type of cell in 1mm^3 of human blood.

human blood cells	number of cells / mm^3 of human blood	
	minimum	maximum
white blood cells	5.0×10^3	1.1×10^4
red blood cells	4.4×10^6	4.9×10^6
platelets	1.4×10^5	4.0×10^5

State the most common type of cell in human blood.

(1)

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(b) (i) Explain why the number of blood cells will change if a person has a bacterial infection.

(2)

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

People with low numbers of platelets are more likely to have

☒ **A** problems clotting blood if they are cut

☒ **B** problems removing carbon dioxide from muscles

☒ **C** blood clots causing heart attacks

☒ **D** a higher oxygen debt during exercise

(iii) Describe the function of the liquid part of the blood.

(2)

(c) Adult stem cells make red blood cells.

(i) State one similarity between adult stem cells and embryonic stem cells.

(1)

(ii) State one difference between adult stem cells and embryonic stem cells.

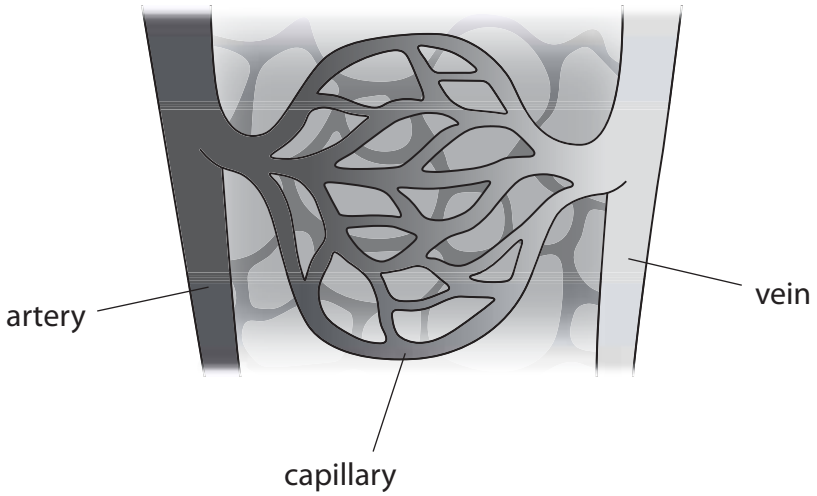
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(Total for Question 1 = 8 marks)

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Cells and respiration

2 The diagram shows capillaries carrying blood through muscle.



(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

The blood vessel that transports oxygenated blood from the heart is the

☒ **A** aorta

☒ **B** pulmonary artery

☒ **C** pulmonary vein

☒ **D** vena cava

(b) (i) Oxygen diffuses down a concentration gradient.

Explain how the concentration gradient is maintained between the blood and muscles.

(2)

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(ii) Complete the word equation for aerobic respiration.

(1)

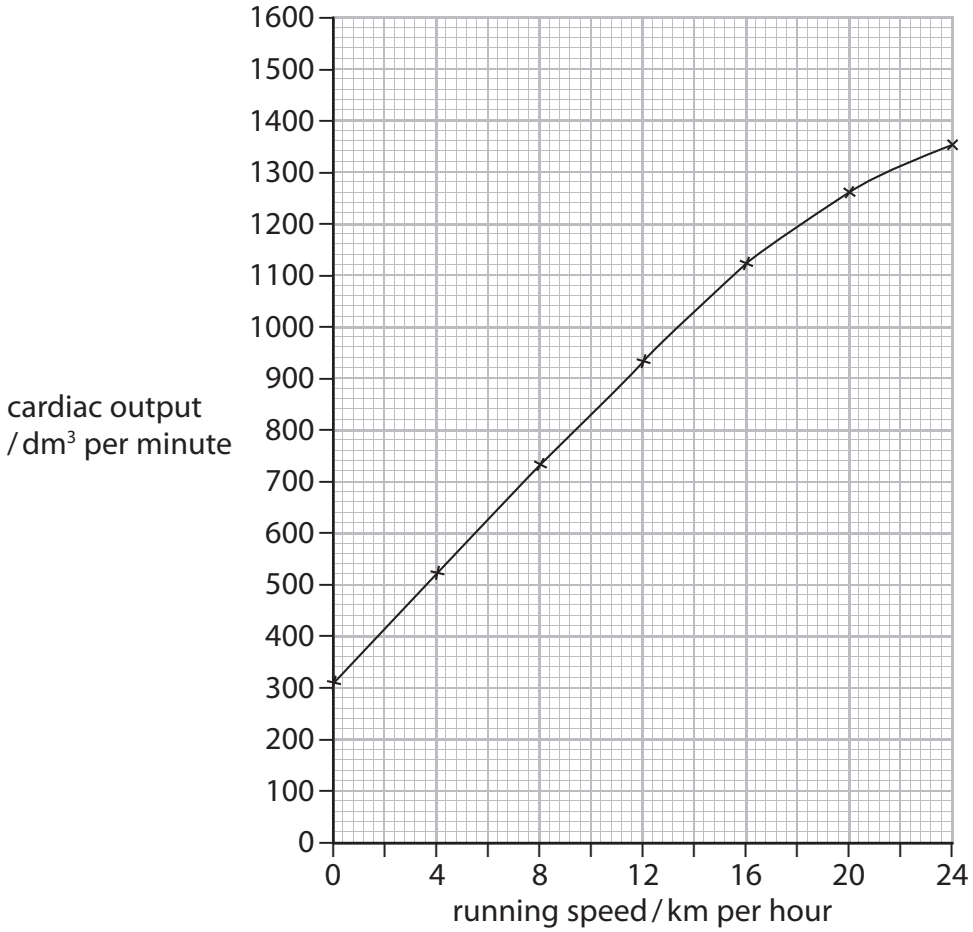
..... + oxygen ⟶ carbon dioxide + ...

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(c) The graph shows cardiac output for a person running at different speeds.



(i) Describe the relationship between cardiac output and running speed.

(2)

(ii) Explain why this runner gets muscle cramp when he runs at speeds over 24 km per hour.

(2)

(Total for Question 2 = 8 marks)

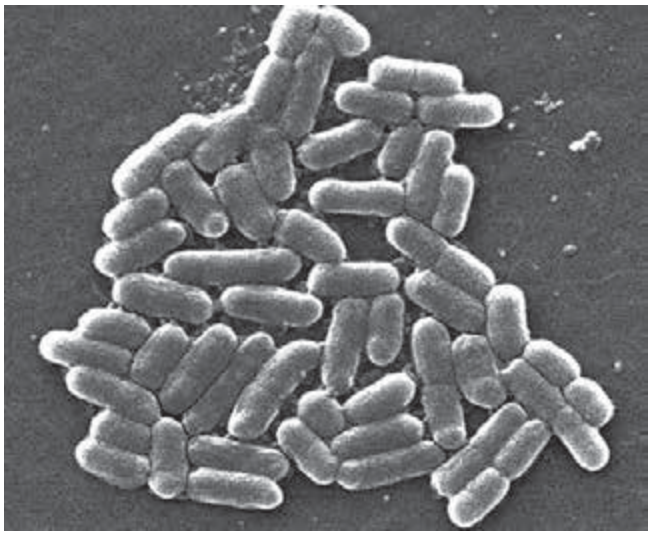
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Bacteria

3 The photograph shows a magnified image of bacterial cells from a human intestine.



(a) Which of the statements about cells are true?

1. Bacterial cells and plant cells have a cell wall.
2. Bacterial cells and animal cells have a nucleus.

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** statement 1 only

☒ **B** statement 2 only

☒ **C** both statement 1 and 2

☒ **D** neither statement 1 nor 2

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(b) Foods containing prebiotic chemicals increase the number of beneficial bacteria living in human intestines.

A scientist measured the mass of two prebiotic chemicals in 100 g of four different foods.

The results are shown in the table.

food	mass / g per 100 g of food	
	prebiotic chemical A	prebiotic chemical B
onions	17.3	16.9
dandelion leaves	15.8	11.8
garlic	12.5	5.0
artichokes	18.0	11.5

(i) Compare the mass of prebiotic chemical A with that of prebiotic chemical B in these foods.

(2)

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(ii) Which food shown in the table would cause the greatest increase in the number of beneficial bacteria in the intestines?

(1)

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(iii) Prebiotic chemicals allow beneficial bacteria to double every hour.

How much time will it take for 10 g of beneficial bacteria to increase to 80 g if a person has enough prebiotic chemicals in their diet?

(2)

..... hours

(iv) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

Prebiotic chemicals are

☒ **A** hormones

☒ **B** beta carotenes

☒ **C** oligosaccharides

☒ **D** stanol esters

(c) Probiotic yoghurt contains living bacteria.
Probiotic yoghurt is claimed to have positive effects on health.

Describe how scientists would investigate this claim.

(3)

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(Total for Question 3 = 10 marks)

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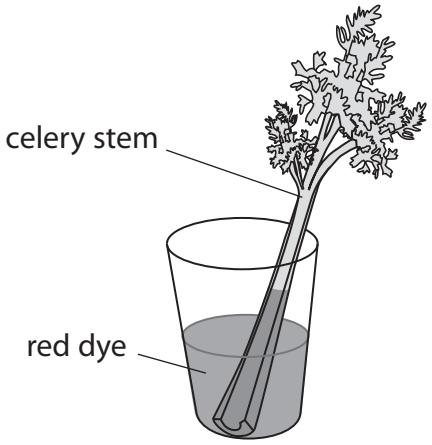
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Transpiration

4 (a) The diagram shows a celery stem in some red dye.

The red dye moves up the celery stem.



A student used five sets of this apparatus to study the rate of transpiration.

Suggest how these five sets of apparatus could be used to measure the effect of light intensity on the rate of transpiration.

(3)

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(b) The table shows the effect of air temperature on the rate of transpiration in a plant.

air temperature / °C	rate of transpiration / arbitrary units
5	2
10	4
15	8
20	11
25	11
30	5

(i) Explain why the rate of transpiration decreases between 25 °C and 30 °C .

(2)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

The percentage increase in the rate of transpiration between 10 °C and 15 °C in this plant is

☒ **A** 25%

☒ **B** 50%

☒ **C** 100%

☒ **D** 200%

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(c) Explain one way in which root hair cells absorb mineral ions from the soil.

(2)

(d) Explain how water moves from root hair cells, across the root and into the stem.

(2)

(Total for Question 4 = 10 marks)

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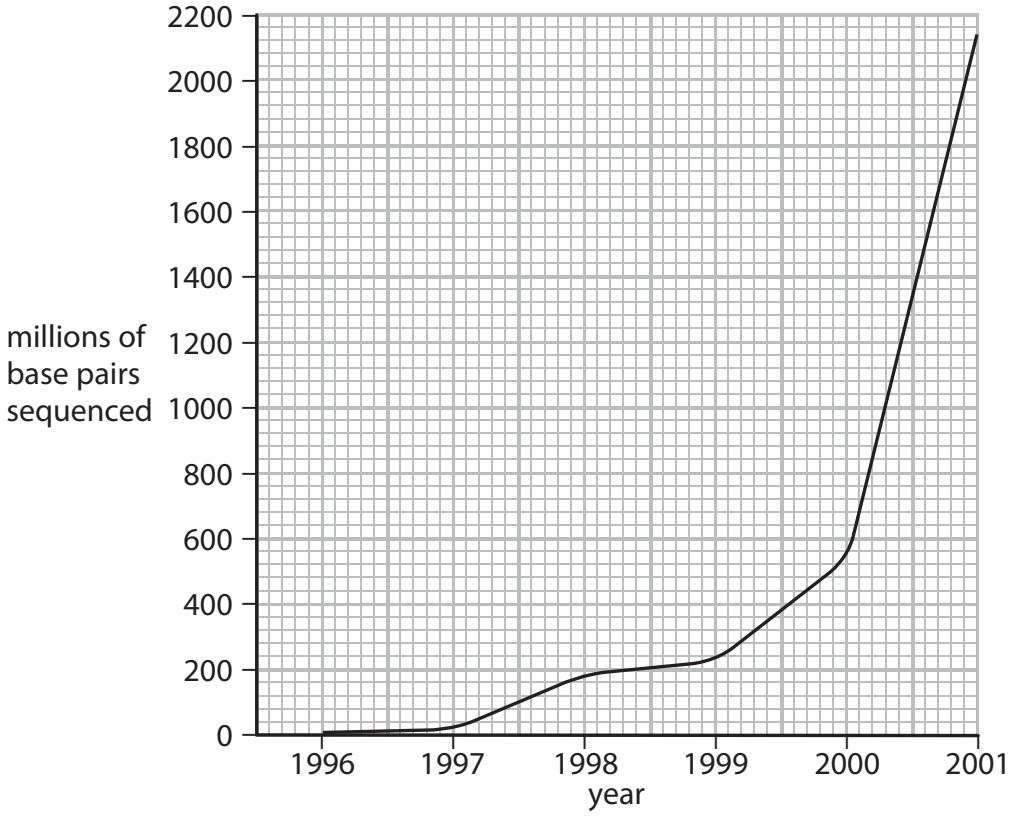
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The Human Genome Project

5 Scientists completed the Human Genome Project in 2003.

(a) The graph shows the number of DNA base pairs sequenced from 1996 to the beginning of 2001.



(i) Complete the table to show the number of base pairs sequenced by the beginning of 2001.

(1)

year	number of base pairs sequenced by the start of each year (millions)
1996	5
1997	9
1998	176
1999	240
2000	550
2001	

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(ii) Suggest why the number of base pairs sequenced each year increased.

(1)

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(iii) State **two** ways that the Human Genome Project has been used to improve medical science.

(2)

1 .....

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2 .....

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*(b) Describe how a gene is transcribed for use in the cytoplasm.

(6)

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(c) The diagram shows an enzyme and three amino acids.



This enzyme catalyses the reaction that joins amino acids to form proteins.

Explain how a gene mutation could reduce the rate of activity of this enzyme.

(2)

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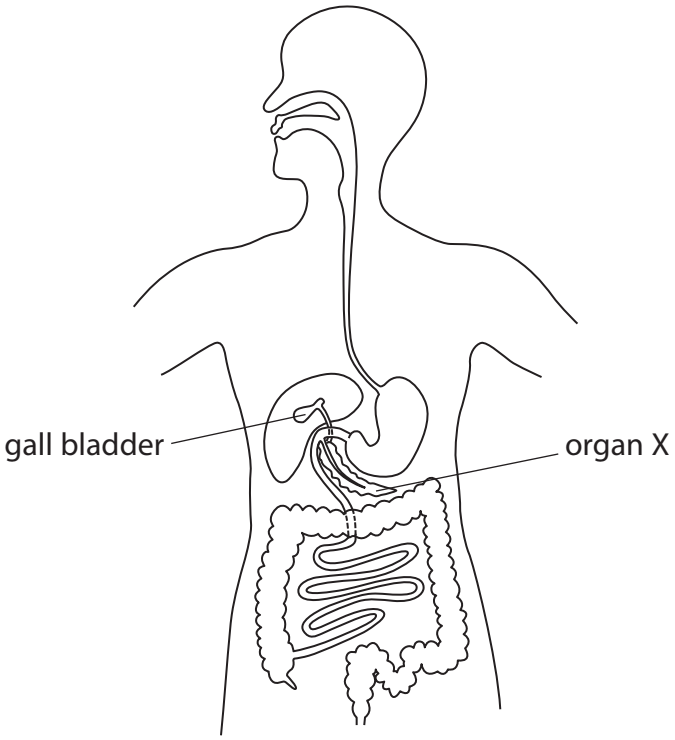
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(Total for Question 5 = 12 marks)

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The digestive system

6 The diagram shows the digestive system.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

Organ X secretes enzymes into the

☒ **A** stomach

☒ **B** small intestine

☒ **C** large intestine

☒ **D** liver

(ii) Describe the action of amylase in digestion.

(2)

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(b) Every year in Britain, over 60 000 people have their gall bladder removed.

Suggest how living without a gall bladder may affect these people.

(3)

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Question 6 continues on the next page

*(c) Explain how the structure of the small intestine allows the products of digestion to be absorbed effectively.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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