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Pearson Edexcel GCSE

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Biology/Additional Science

Unit B2: The Components of Life

Higher Tier

Wednesday 17 January 2018 – 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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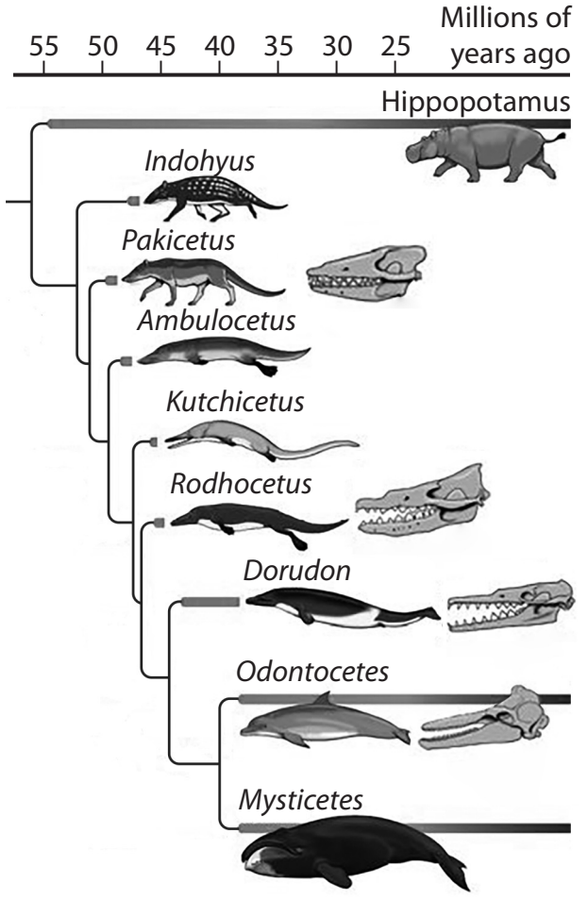
Answer ALL questions.

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 ☒.

Fossils

1 (a) The diagram shows an evolutionary tree for the whale genus *Mysticetes*.

The bar next to each genus indicates how much time that genus inhabited the Earth.



(i) Name each genus shown in the diagram that is not extinct.

(1)

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2 .....

3 .....

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(ii) Use the diagram to estimate the number of years that *Dorudon* inhabited the Earth.

(1)

number of years = ...

(iii) Suggest how **one** feature of the skulls in the diagram shows that *Dorudon* was more suited to living in the sea than *Rodhocetus*.

(2)

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(b) Some of the earliest known organisms are bacteria.

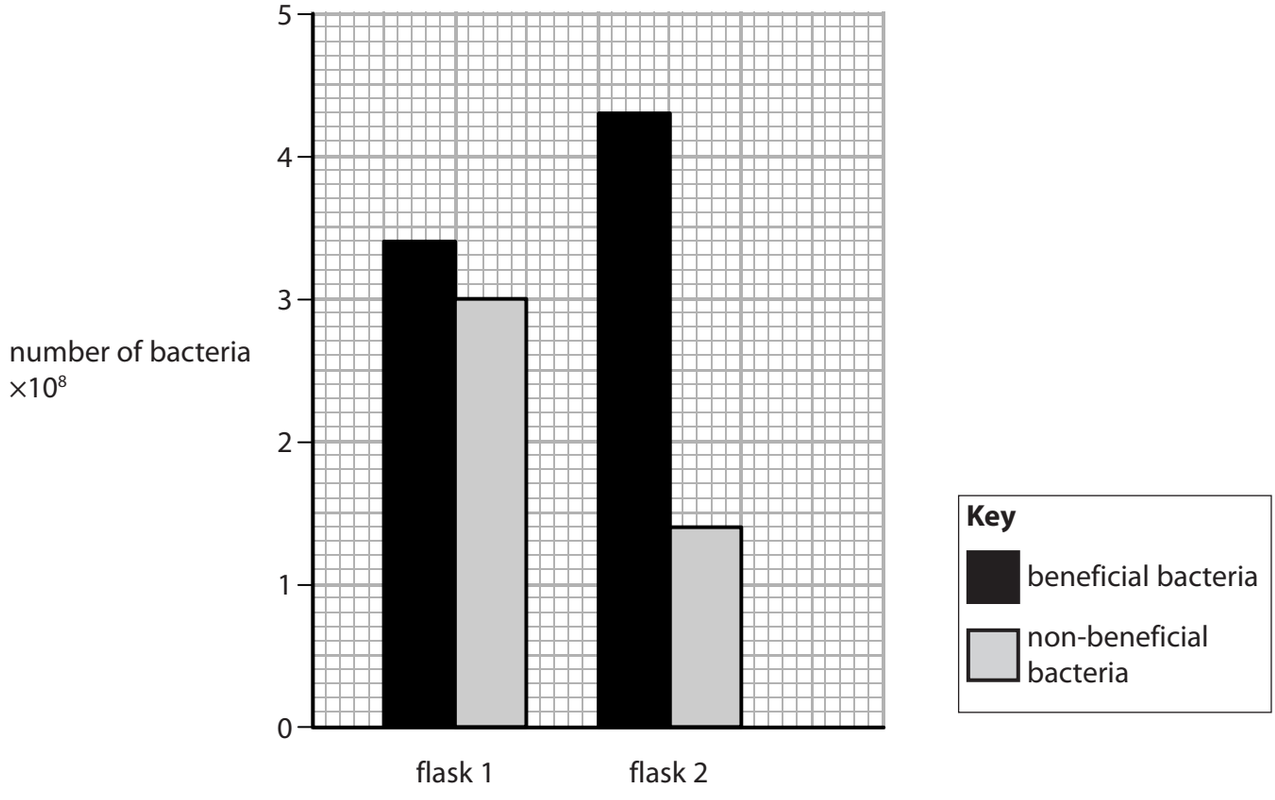
Some bacteria that live in human intestines are beneficial to human health, whilst others are non-beneficial to human health.

A mixture of these types of bacteria was grown in two flasks.

Flask 1 contained the two types of bacteria and a food source.

Flask 2 contained the two types of bacteria, the food source and prebiotics.

The graph shows the results.



(i) Explain the effect of prebiotics on the population of beneficial bacteria.

(2)

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(ii) Explain why the population of non-beneficial bacteria was lower than the population of beneficial bacteria in flask 2.

(2)

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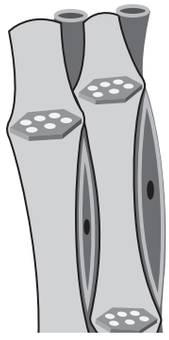
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(Total for Question 1 = 8 marks)

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Plants

2 The diagram shows plant cells that transport sugars.



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

These plant cells are

(1)

☒ **A** xylem

☒ **B** phloem

☒ **C** root hair cells

☒ **D** leaf palisade cells

(b) Explain how sugars are made in a leaf.

(2)

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(c) The photograph shows some grassland on the north side of a building.



The distribution of plant species, X and Y, growing at different distances from the building was investigated.

(i) Which pieces of equipment would be used to measure the distribution of plants in this investigation?

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

(1)

☒ **A** a pooter and a quadrat

☒ **B** a pooter and a sweep net

☒ **C** a tape measure and sweep net

☒ **D** a tape measure and a quadrat

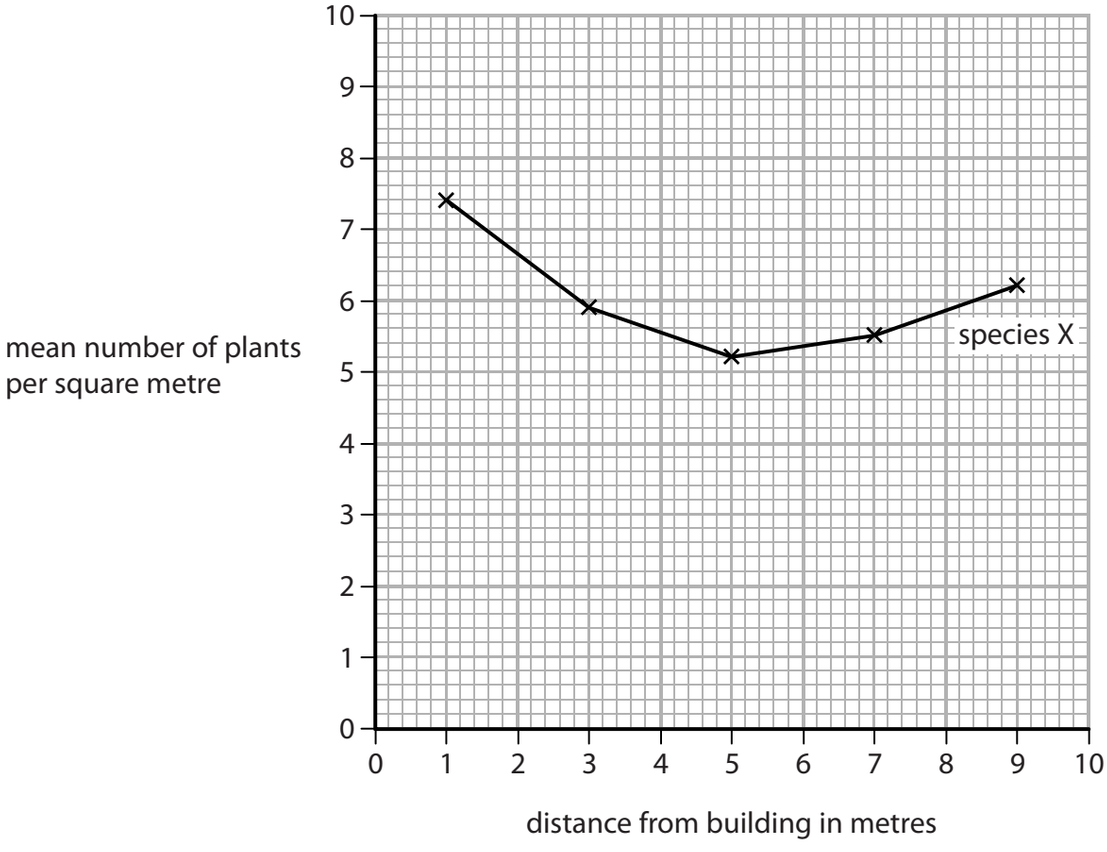
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(ii) The results of the investigation are shown in the table.

distance from building in metres	mean number of plants per square metre	
	species X	species Y
1	7.4	1.3
3	5.9	4.3
5	5.2	8.1
7	5.5	8.0
9	6.2	7.5

Complete the graph to show the distribution of species Y.

(2)



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(iii) Suggest reasons for the difference in the distribution of species X and species Y at 1 metre and 5 metres from the north side of the building.

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(Total for Question 2 = 8 marks)

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Growth

3 (a) The table shows the masses of two children, R and S, from birth to 18 months.

	mass in kilograms	
age in months	**child R**	**child S**
birth	3.3	2.7
6	7.1	6.5
12	8.2	7.9
18	9.1	8.8

(i) Compare the growth of child R and child S from birth to 6 months.

(2)

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(ii) The percentage increase in mass for child R from 6 to 18 months is 28.2%.

Calculate the percentage increase in mass for child S from 6 to 18 months.

(2)

% increase in mass = ... %

(iii) Suggest a reason for the difference in the percentage increase in mass of child R and child S from 6 to 18 months.

(1)

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(b) (i) Humans produce enzymes to digest proteins.

Which organs release enzymes for protein digestion?

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

(1)

☒ **A** mouth, stomach and small intestine

☒ **B** pancreas, liver and large intestine

☒ **C** stomach, pancreas and small intestine

☒ **D** mouth, liver and large intestine

(ii) Explain why proteins in food need to be digested.

(2)

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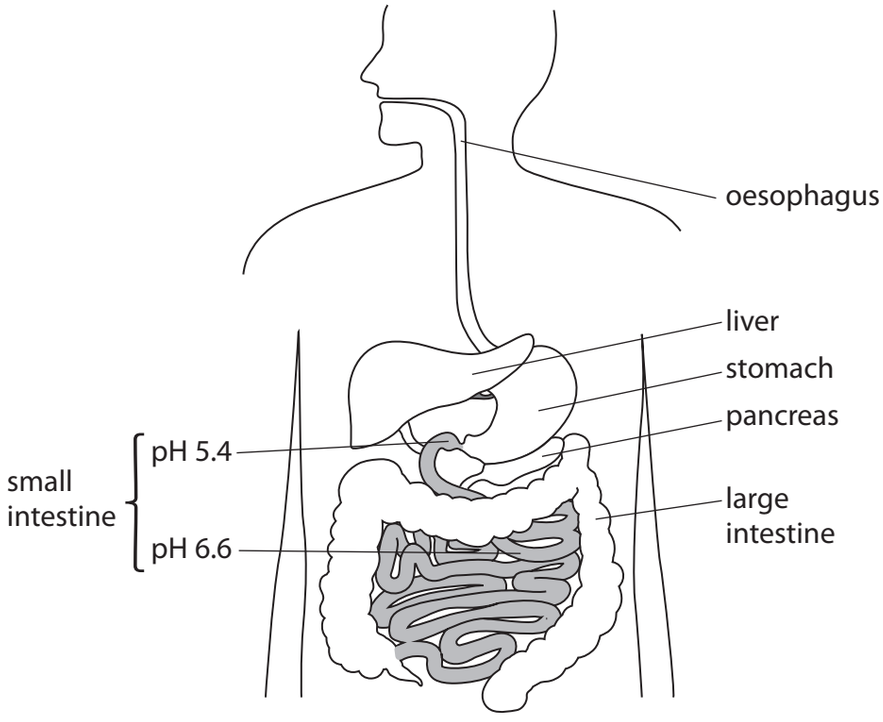
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(c) The diagram shows the pH in two parts of the small intestine 3 hours after a meal.



Explain why there are differences in the pH in the small intestine.

(2)

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(Total for Question 3 = 10 marks)

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Exercise and the circulatory system

4 (a) Most of the energy used during exercise comes from aerobic respiration.

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

The products of aerobic respiration are

(1)

☒ **A** glucose and water

☒ **B** glucose and oxygen

☒ **C** carbon dioxide and lactic acid

☒ **D** carbon dioxide and water

(b) The volume of blood that the heart pumps during each beat is known as the stroke volume.

The table shows the stroke volume, heart rate and cardiac output of an athlete at rest, during gentle exercise and during strenuous exercise.

	stroke volume in dm^3	heart rate in beats per minute	cardiac output in dm^3 per minute
at rest	0.10	68	6.8
during gentle exercise	0.13	?	15.6
during strenuous exercise	0.16	182	29.1

(i) Calculate the heart rate of the athlete during gentle exercise.

(2)

heart rate = ... beats per minute

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(ii) Explain why athletes need to increase their cardiac output during exercise.

(3)

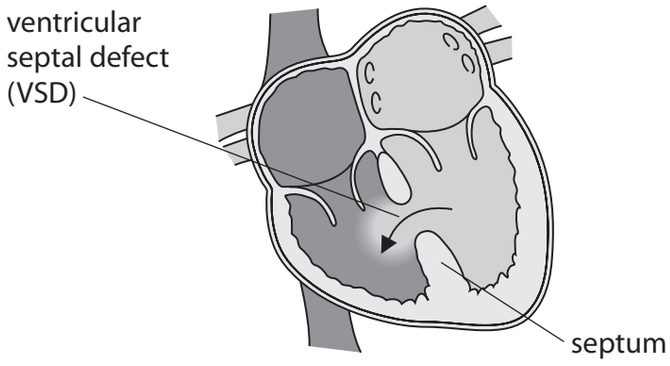
(c) Describe how oxygen is transported around the body.

(2)

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(d) Some people are born with a condition known as ventricular septal defect (VSD).

The diagram shows a heart with VSD.



Explain the effect of VSD on blood travelling through the heart.

(2)

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(Total for Question 4 = 10 marks)

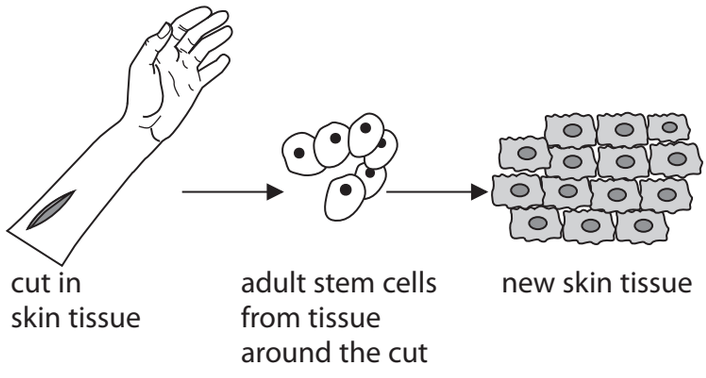
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Cells

5 (a) The diagram shows new skin tissue produced from stem cells in the skin.



(i) Which part of the blood starts the process of clotting?

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

(1)

☒ **A** plasma

☒ **B** red blood cells

☒ **C** platelets

☒ **D** white blood cells

(ii) State **two** differences between adult stem cells and skin cells.

(2)

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(b) State **one** advantage and **one** disadvantage of using embryonic stem cells in medical research.

(2)

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*(c) The red panda shown in the photograph is an endangered species.



(Source: india.com)

Describe how this red panda could be cloned to stop this species from becoming extinct.

(6)

(Total for Question 5 = 11 marks)

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DNA and gametes

6 (a) DNA is transcribed and translated during protein synthesis.

Describe how DNA is transcribed.

(3)

(b) (i) Which of the statements about gene mutations are true?

1. Gene mutations only affect one strand of a DNA molecule.

2. Gene mutations are always harmful.

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

(1)

☒ **A** only statement 1

☒ **B** only statement 2

☒ **C** both statement 1 and 2

☒ **D** neither statement 1 nor 2

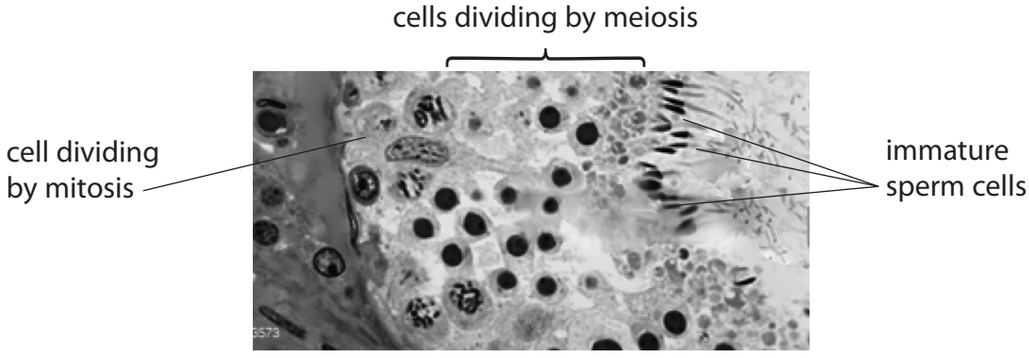
(ii) Explain how a gene mutation can change the function of a protein.

(3)

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*(c) The image shows a section through a tubule producing sperm cells.



(Source: getty images)

Compare mitosis and meiosis in humans.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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