Write your name here

Surname	Other names

Pearson
Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology/Additional Science

Unit B2: The Components of Life

Higher Tier

Friday 10 June 2016 – 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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1/1/1/1/1/

P 4 6 2 7 4 A 0 1 2 0

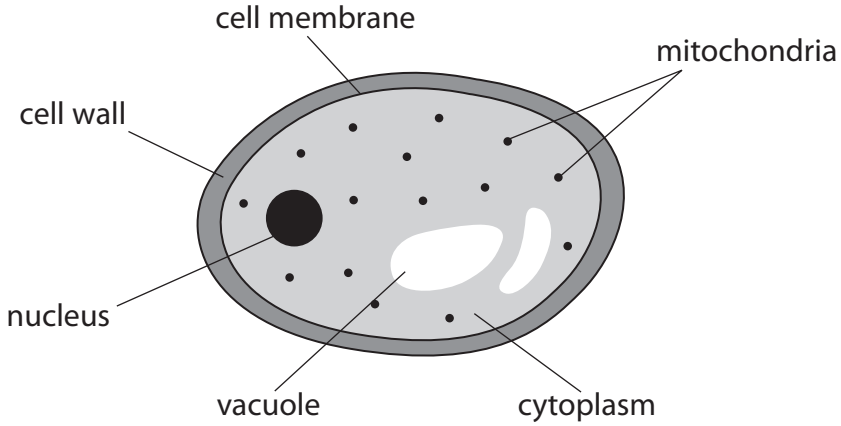
PEARSON

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 ☒.

Respiration

1 The diagram shows a yeast cell.



(a) Describe how the structure of a bacterial cell differs from this yeast cell.

(2)

(b) Yeast use both aerobic and anaerobic respiration to release energy.

(i) Which organelle in the yeast cell is the site of aerobic respiration?

(1)

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(ii) The word equation for anaerobic respiration in yeast is

glucose ⟶ alcohol + carbon dioxide

Describe how aerobic respiration is different from anaerobic respiration in yeast.

(2)

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(c) Six test tubes, U, V, W, X, Y and Z, were set up to investigate how the type of sugar and range of pH affect the rate of anaerobic respiration in yeast.

Each test tube was at a different pH and contained 2 g of yeast, 2 g of sugar (either sucrose or lactose) and 30 cm^3 of water.

The temperature of each test tube was kept at 30 °C.

The volume of carbon dioxide produced from each test tube after one hour is shown in the table.

test tube	pH	type of sugar	volume of carbon dioxide produced after one hour / cm^3
U	9	sucrose	369
V	7	sucrose	455
W	5	sucrose	225
X	9	lactose	28
Y	7	lactose	35
Z	5	lactose	

(i) Estimate the volume of carbon dioxide produced in test tube Z after one hour.

(1)

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(ii) Explain the differences in the volume of carbon dioxide produced in test tubes U, V and W.

(2)

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(Total for Question 1 = 8 marks)

The digestive system

2 The photograph shows a model of the small intestine.

Bread, saliva and water were mixed together.

This bread mixture was placed inside a tube made from one leg of a pair of tights.

(a) The person squeezed the tube behind the mixture to move the mixture along the tube.

Name the physical process in the digestive system that is being modelled in this demonstration.

(1)

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(b) Liquid came through the sides of the tube during the demonstration.

This liquid was collected and the concentration of sugar was measured at the start and after every 30 seconds.

The results are shown in the table.

time / s	concentration of sugar in liquid / mg per cm^3
0	9
30	15
60	22
90	28
120	32
150	32
180	32

(i) Describe how the concentration of sugar in the liquid changes between 0 and 180 seconds.

(2)

(ii) Explain how the sugar was produced in the bread mixture.

(2)

(iii) Suggest **one** way that the tube is not a good model of the small intestine.

(1)

(c) Which of these statements are true?

1. The small intestine receives food from the stomach.
2. The pancreas produces bile.

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

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

Bile is added to the contents of the small intestine to emulsify

(1)

☒ **A** fats and lower the pH

☒ **B** proteins and lower the pH

☒ **C** fats and increase the pH

☒ **D** proteins and increase the pH

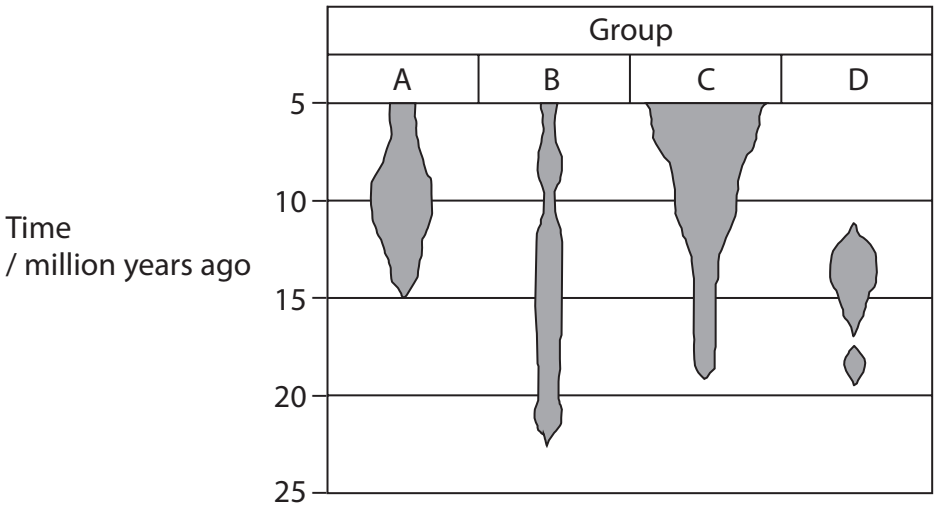
(Total for Question 2 = 8 marks)

Fossils

3 Scientists investigated fossils of four different groups of mammals.

The diagram shows how the estimated population of each group of mammals changed from 25 million to 5 million years ago.

The width of each shaded area shows the estimated population size, based on the number of fossils found.



(a) (i) Which statement is supported by the information in the diagram?

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

(1)

☒ **A** Group A contains mammals that came into existence 10 million years ago

☒ **B** Group B contained the largest group of mammals 15 million years ago

☒ **C** Group C is the most recent group of mammals to come into existence

☒ **D** Group D were extinct 10 million years ago

(ii) The scientists compared the pentadactyl limbs of these groups of mammals.

Describe the structure of a pentadactyl limb.

(2)

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(iii) Suggest reasons for the change in the estimated population size of group A from 10 million to 7 million years ago.

(3)

(b) Scientists investigated a protein found in a mammal.

The protein contains 630 amino acids.

What is the minimum number of bases in the gene that codes for this protein?

(2)

.....bases

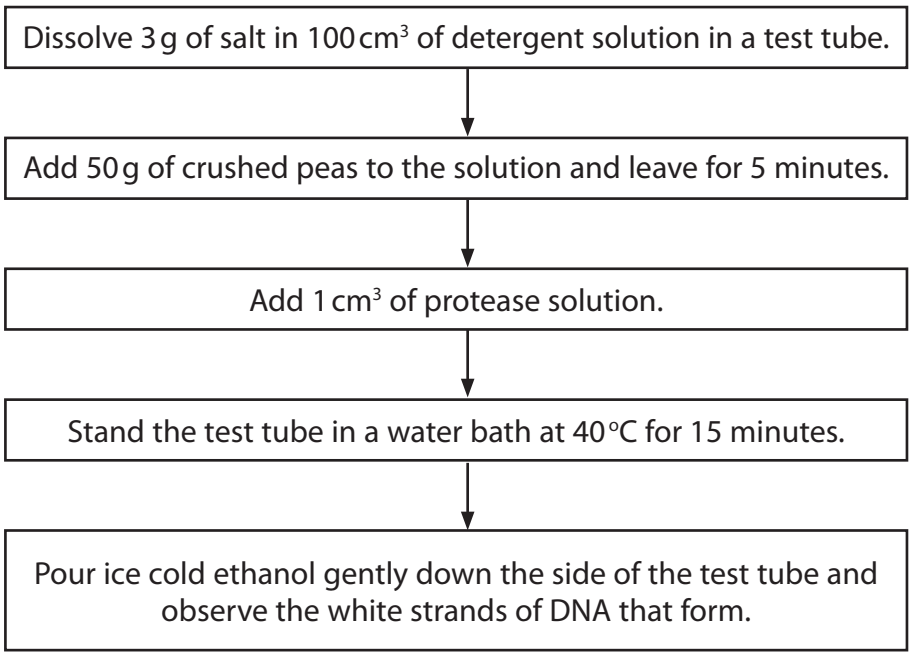
(c) Explain how a mutation in DNA may result in a different protein.

(2)

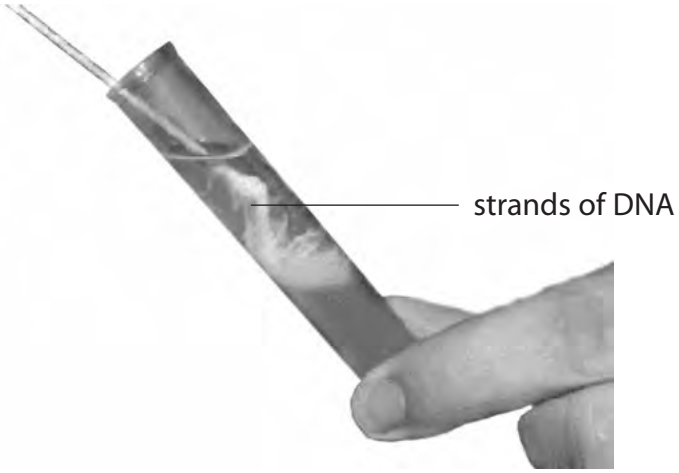
(Total for Question 3 = 10 marks)

DNA and meiosis

4 The flow chart shows a sequence for extracting DNA from peas.



The photograph shows the DNA extracted from the peas.



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(a) (i) Explain why the peas need to be crushed and added to detergent solution in order to extract the DNA from the cells of the peas.

(2)

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

Protease was added to the solution to

(1)

☒ **A** join amino acids to synthesise proteins

☒ **B** digest proteins in the nucleus

☒ **C** break down the lipids in the membranes

☒ **D** digest the DNA

(b) Describe how Watson and Crick contributed to the understanding of the structure of DNA.

(2)

(c) DNA is involved in the processes of meiosis and mitosis.

Describe how the cells formed by meiosis are different from the cells formed by mitosis.

(3)

(d) A fertilised ovum (egg cell) divides by mitosis to form an embryo.

Describe how some cells in an embryo become specialised cells.

(2)

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(Total for Question 4 = 10 marks)

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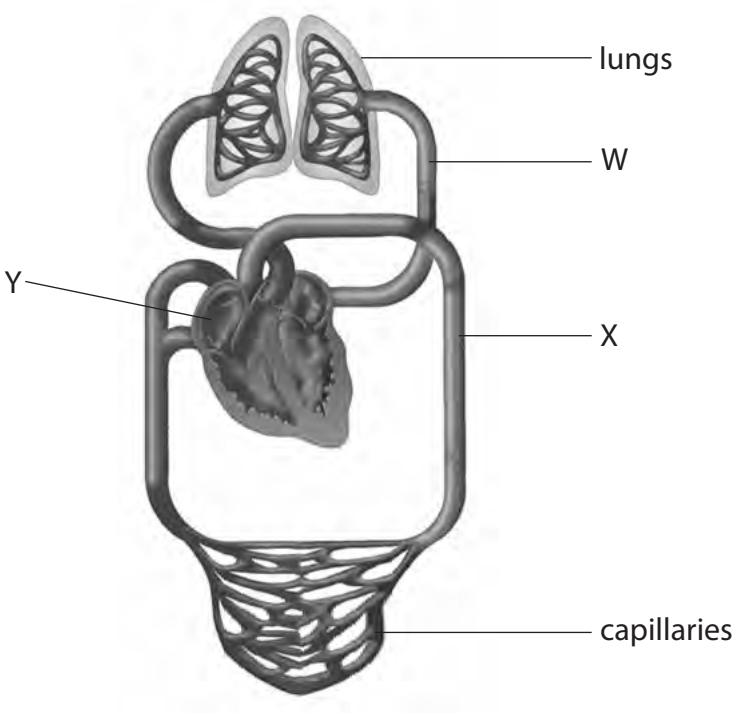
The circulatory system

5 The diagram shows the human circulatory system.



(a) (i) Name blood vessel W.

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

(1)

- ☒ **A** aorta
- ☒ **B** pulmonary artery
- ☒ **C** pulmonary vein
- ☒ **D** vena cava

(ii) Deoxygenated blood enters the heart in the chamber labelled Y.

Explain how blood is moved from chamber Y to the lungs.

(3)

(iii) The blood vessel labelled X carries blood to capillaries.

Explain how substances are exchanged between capillaries and body cells.

(2)

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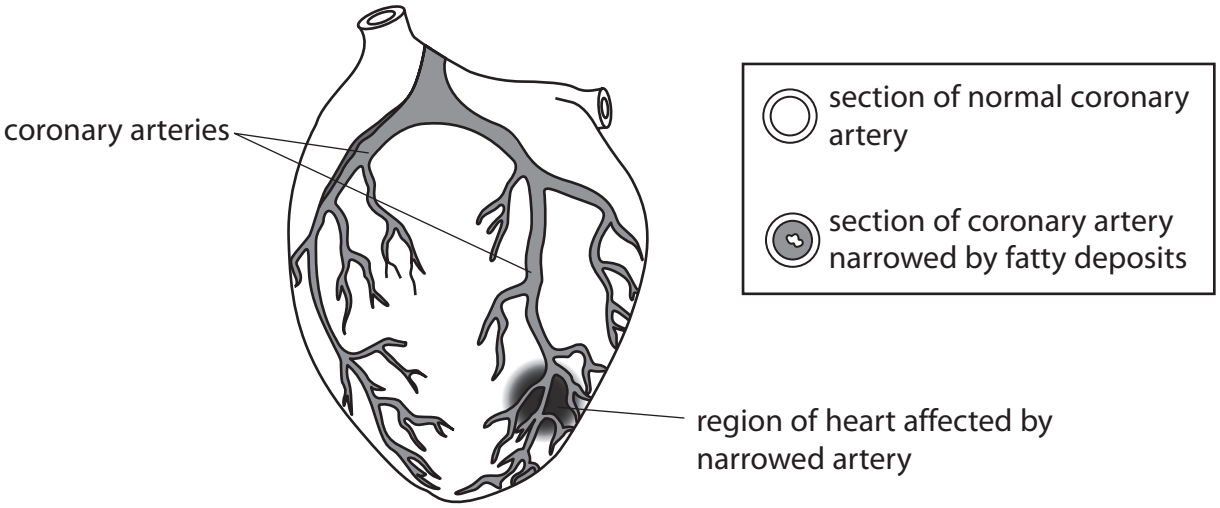
*(b) The diagram shows the coronary arteries surrounding a human heart.

The coronary arteries deliver blood to the muscle cells in the heart.

The coronary arteries can become narrowed or blocked by fatty deposits.



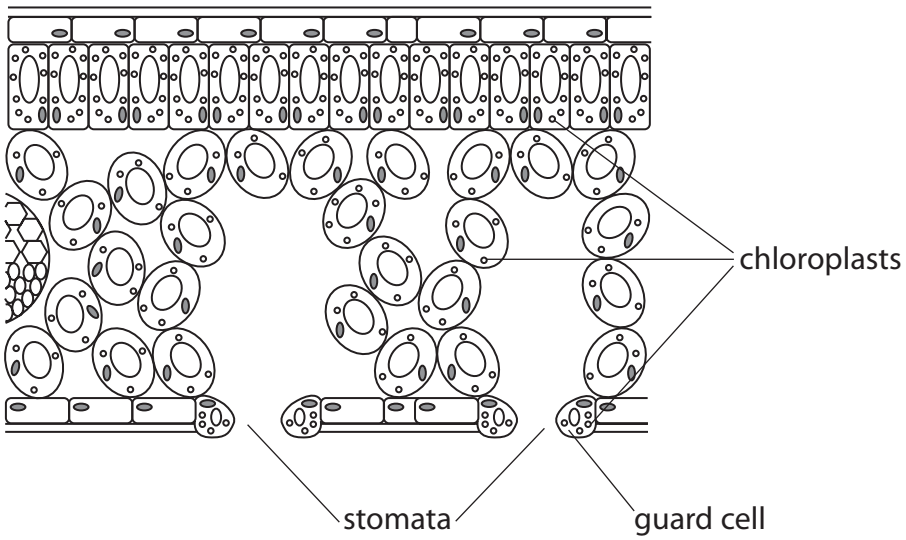
Suggest how the narrowing of the coronary artery may affect how the heart functions and how this may affect other body cells.

(6)

(Total for Question 5 = 12 marks)

Photosynthesis

6 The diagram shows a section through a leaf.



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

During the day, guard cells open stomata to allow diffusion of

(1)

☒ **A** carbon dioxide into the leaf for photosynthesis

☒ **B** light into the leaf for photosynthesis

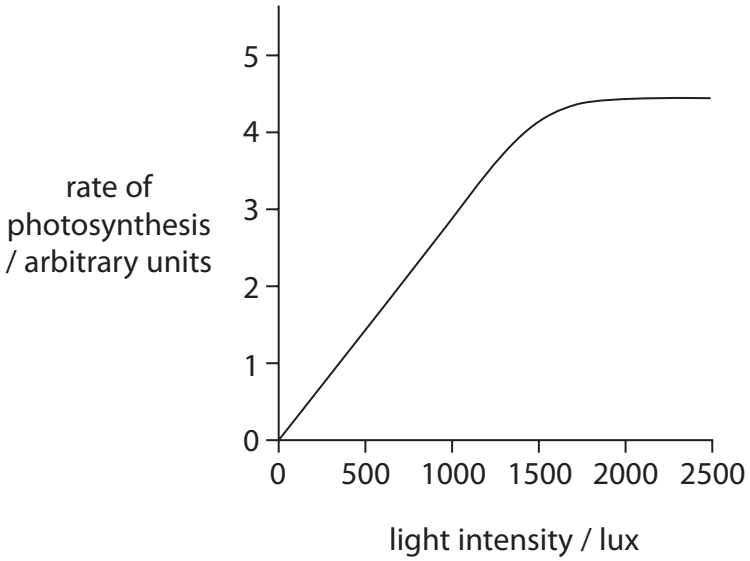
☒ **C** oxygen into the leaf for photosynthesis

☒ **D** nitrogen into the leaf to make nitrates

(ii) Suggest the benefits to a plant of having different numbers of chloroplasts in different types of cell in the leaf.

(3)

(b) The graph shows how light intensity affects the rate of photosynthesis.



Explain why the rate of photosynthesis does not increase after 1750 lux.

(2)

*(c) Explain how water enters a plant and is moved to the leaf.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS