Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Tuesday 12 May 2026

Afternoon (Time: 2 hours)

Paper reference 4BI1/1B 4SD0/1B

Biology

UNIT: 4BI1
Science (Double Award) 4SDO
PAPER: 1B

You must have:
Ruler, calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 110.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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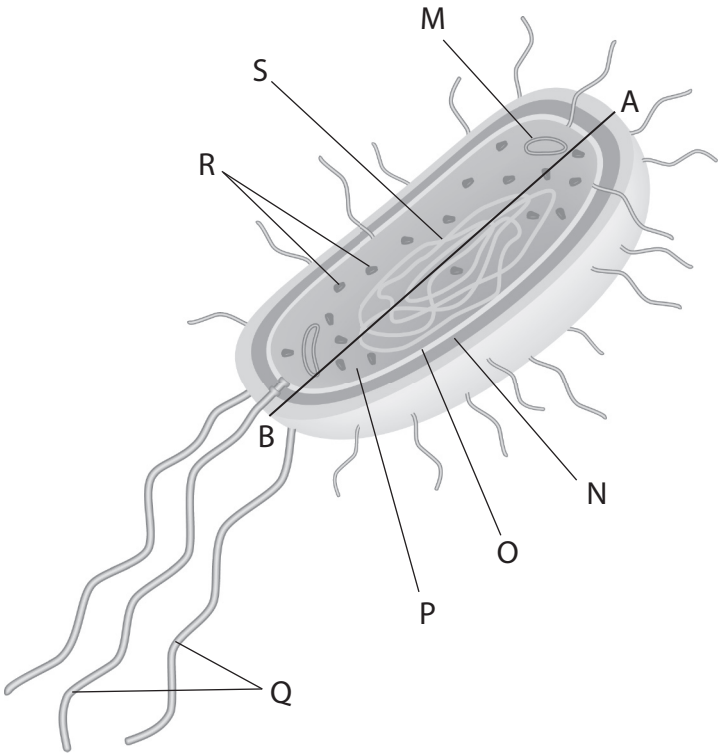
Pearson

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 ☒.

1 The diagram shows a bacterium with some structures labelled.



(Source: © Alila Medical Media / Shutterstock)

(a) The magnification of the diagram is ×15 000

Measure the length of the line from A to B on the diagram.

Use this to determine the actual length of the bacterium from A to B.

Give your answer in μm.

[1 mm = 1000 μm]

(3)

actual length = ... μm

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(b) (i) Which structure is a plasmid?

(1)

- ☒ **A** M
- ☒ **B** N
- ☒ **C** Q
- ☒ **D** R

(ii) Which structure is the cell wall?

(1)

- ☒ **A** N
- ☒ **B** O
- ☒ **C** P
- ☒ **D** Q

(iii) Which structure contains the genetic material used by the bacterium in reproduction?

(1)

- ☒ **A** N
- ☒ **B** O
- ☒ **C** P
- ☒ **D** S

(iv) Suggest the function of the structures labelled Q.

(1)

.....

.....

.....

(c) (i) State one structure found in animal cells that is not found in bacteria.

(1)

.....

(ii) State one structure found in bacteria that is also found in plant cells.

(1)

.....

(d) Bacteria differ from viruses.

Give two structural differences between a bacterium and a virus.

(2)

1 .....

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(Total for Question 1 = 11 marks)

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2 The Recommended Dietary Allowance (RDA) is the average amount of nutrients a person needs each day.

Table 1 shows the RDA for energy, protein, calcium and iron for children and for adult women.

Group	Energy in kJ	Protein in g	Calcium in mg	Iron in mg
children 0 to 1 year	3557	14	270	10
children 2 to 3 years	5440	16	500	10
children 4 to 6 years	7531	24	800	10
children 7 to 10 years	8368	28	1000	10
women 19 to 24 years	9205	46	1000	15
women 25 to 50 years	9205	50	1000	15
women over 50 years	7950	50	1000	10

Table 1

(a) Calculate the percentage change in the RDA for protein from children aged 0 to 1 year to children aged 4 to 6 years.

(2)

percentage change = ...%

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(b) Using data from table 1 and your own knowledge, discuss the differences in RDAs for energy, protein, calcium and iron between the different groups.

(4)

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(c) Table 2 shows the RDAs for pregnant women.

	Energy in kJ	Protein in g	Calcium in mg	Iron in mg
Pregnant women	10 500	60	1000	30

Table 2

Using data from table 1 and table 2 and your own knowledge, comment on the changes in RDA for pregnant women.

(3)

(Total for Question 2 = 9 marks)

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3 Some students investigate the effect of different colours of light on the rate of photosynthesis in pondweed.

This is the students' method.

- place a cut piece of pondweed in a beaker of water
- place a lamp that produces white light 10 cm from the beaker
- count the number of bubbles of oxygen released in one minute from the cut end of the pondweed
- count the number of bubbles released for two more one-minute periods

The students repeat the method using blue light, green light, yellow light and red light.

Table 1 shows the students' results.

Colour of light	Number of bubbles released per minute			
	minute 1	minute 2	minute 3	mean
white	15	18	17	17
blue	13	16	15	15
green	6	5	7	
yellow	7	6	7	7
red	10	13	11	11

Table 1

(a) Calculate the mean number of bubbles released in green light.

(1)

mean = ...

(b) Give the word equation for photosynthesis.

(1)

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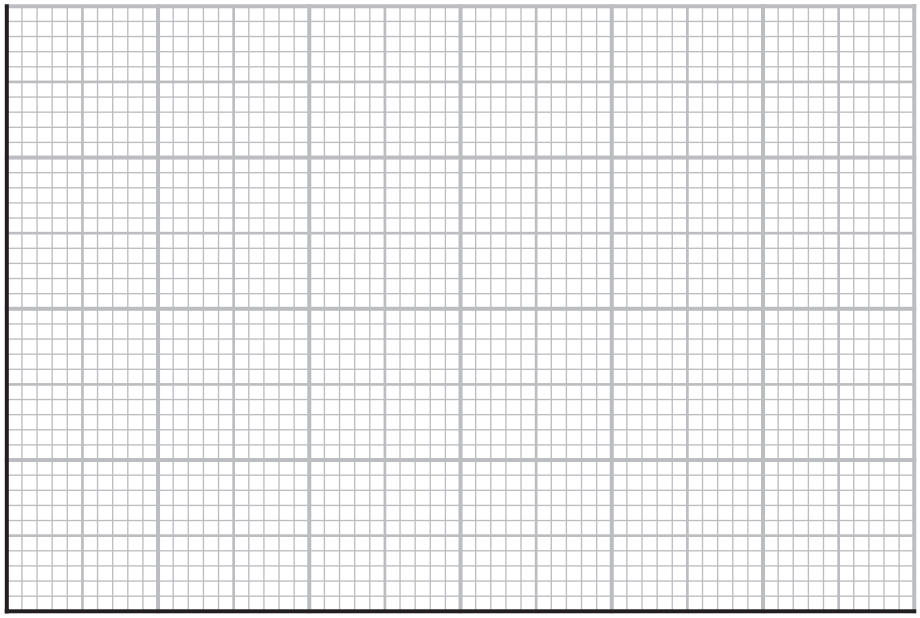
(c) Plot a bar graph to show the mean number of bubbles released per minute for each colour of light.

(5)



(d) Scientists investigate how much of each colour of light passes through a plant sample.

This is called light transmittance.

Plant samples with a lower transmittance have more light absorbed by the chloroplasts in their plant tissue.

The scientists' results are shown in table 2.

Colour of light	Percentage transmittance %
white	16.2
blue	18.9
green	19.0
red	18.7

Table 2

Using information from table 1 and table 2, discuss the effect of colour of light on photosynthesis.

(4)

(Total for Question 3 = 11 marks)

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4 This question is about diffusion.

(a) Describe what is meant by the term **diffusion**.

(2)

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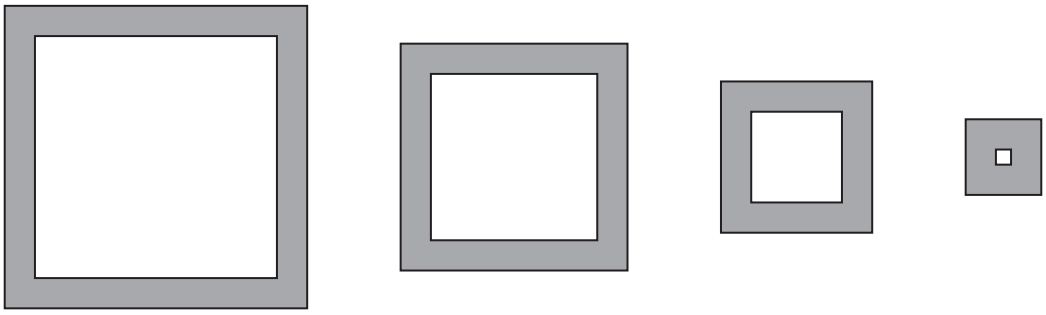
(b) A student uses this method to investigate diffusion of a coloured dye into cubes of agar jelly.

- make four agar jelly cubes of different sizes
- place each cube in a small beaker
- cover each cube with a solution of a coloured dye
- leave the cubes for five minutes
- remove the cubes from the solution and cut the cubes in half
- measure the distance that the dye has diffused into each cube

The diagram shows a cross-section through each cube after five minutes.



The table shows some of the measurements.

Cube side in cm	Distance dye has diffused in cm	Surface area of cube in cm^2	Volume of cube in cm^3	Surface area to volume ratio
4.0	0.4	96	64	1.5 : 1
3.0	0.4			
2.0	0.4	24	8	3 : 1
1.0	0.4	6	1	6 : 1

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(i) Calculate the surface area of the cube that has 3.0 cm sides.

(1)

surface area = ... cm^2

(ii) Calculate the volume of the cube that has 3.0 cm sides.

(1)

volume = ... cm^3

(iii) Calculate the surface area to volume ratio for the cube that has 3.0 cm sides.

(2)

surface area to volume ratio = ... :1

(iv) Comment on how results from the investigation show why simple, unicellular organisms can rely on diffusion for transport.

Use data from the investigation and your own knowledge in your answer.

(4)

(v) Factors other than size may affect the rate of diffusion of the dye.

Explain one factor that the student should keep constant in their investigation.

(2)

(Total for Question 4 = 12 marks)

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5 Smoking can affect the structure and function of human lungs.

(a) (i) Explain how alveoli are adapted for their role in gas exchange.

(4)

(ii) Smoking can cause a condition called chronic obstructive pulmonary disease (COPD).

In COPD, the walls of the alveoli may break down.

Explain how this affects how the alveoli work.

(2)

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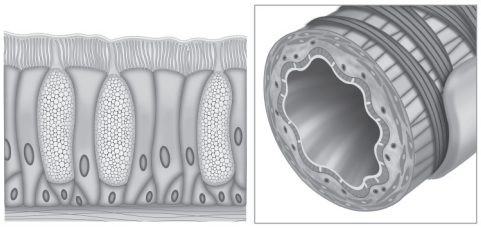
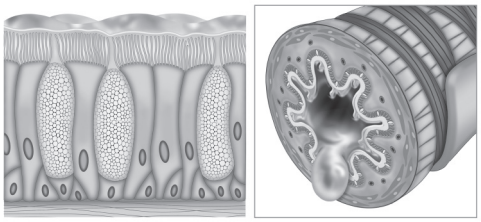
(b) In COPD, the bronchi may also be affected.

The diagram shows an unaffected bronchus and a bronchus from a person with COPD.

unaffected



COPD



(Source: © ilusmedical / Shutterstock)

Explain how the changes in the bronchus will affect the person with COPD.

(2)

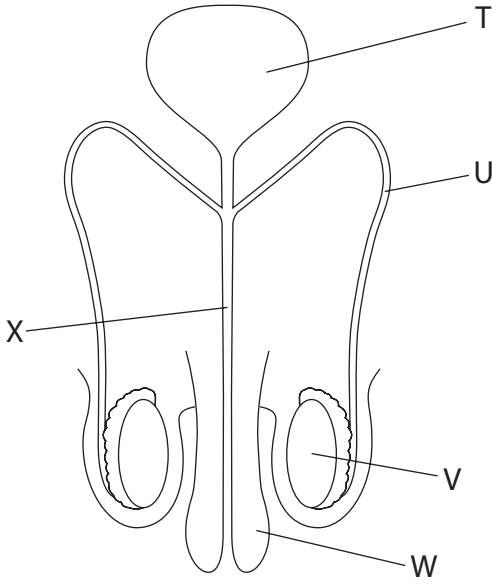
(c) Smoking also has other biological consequences.

Explain one other biological consequence that smoking has for a person.

(2)

(Total for Question 5 = 10 marks)

6 The diagram shows a human reproductive system with some structures labelled.



(a) (i) Which structure transports sperm and urine?

(1)

- ☒ **A** T
- ☒ **B** U
- ☒ **C** V
- ☒ **D** X

(ii) Which structure is the penis?

(1)

- ☒ **A** T
- ☒ **B** V
- ☒ **C** W
- ☒ **D** X

(iii) Which structure contains cells dividing by meiosis?

(1)

- ☒ **A** T
- ☒ **B** U
- ☒ **C** V
- ☒ **D** W

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(iv) Which structure produces the hormone testosterone?

(1)

- ☒ **A** T
- ☒ **B** U
- ☒ **C** V
- ☒ **D** W

(v) Describe the functions of testosterone.

(2)

(b) The ovaries produce two hormones that control the menstrual cycle.

Describe the roles of these two named hormones in the menstrual cycle.

(4)

hormone 1

hormone 2

(Total for Question 6 = 10 marks)

7 The small intestine is part of the human alimentary canal.

Part of the small intestine is the ileum.

(a) Name another part of the small intestine.

(1)

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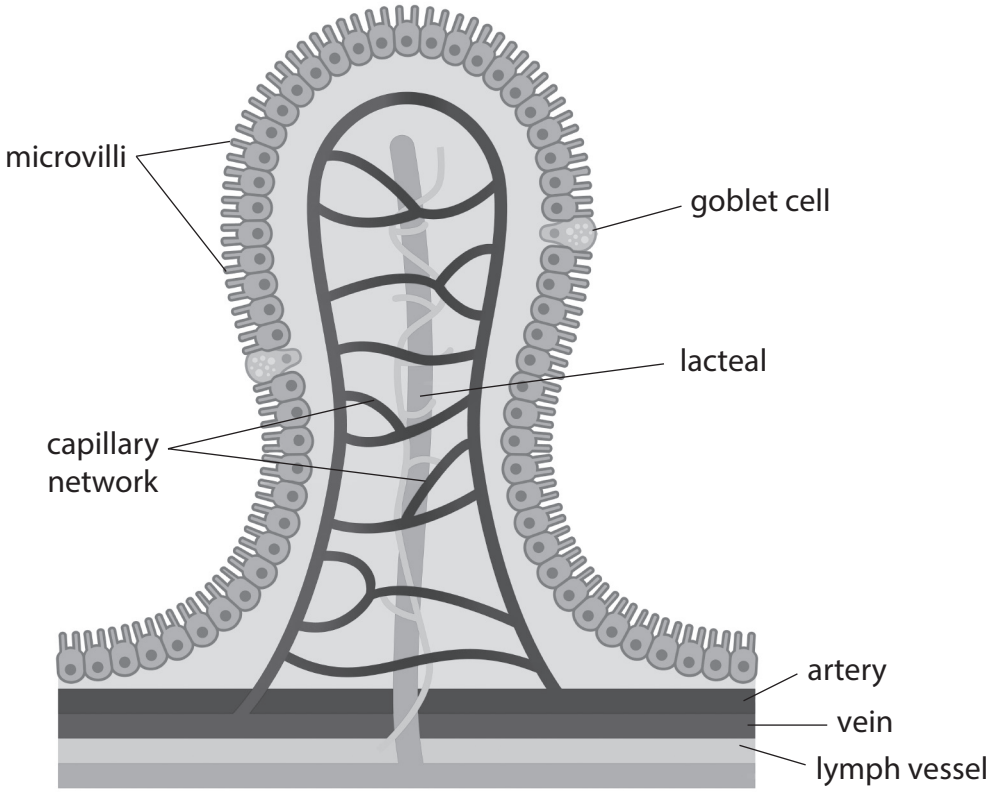
(b) The ileum contains many projections called villi.

The diagram shows a villus with some structures labelled.



(Source: © Mima Subota / Shutterstock)

(i) Explain the function of the microvilli in the ileum.

(2)

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(ii) A person eats a meal containing carbohydrates and protein.

Explain how this meal changes the contents of the blood in the vein leaving the villus.

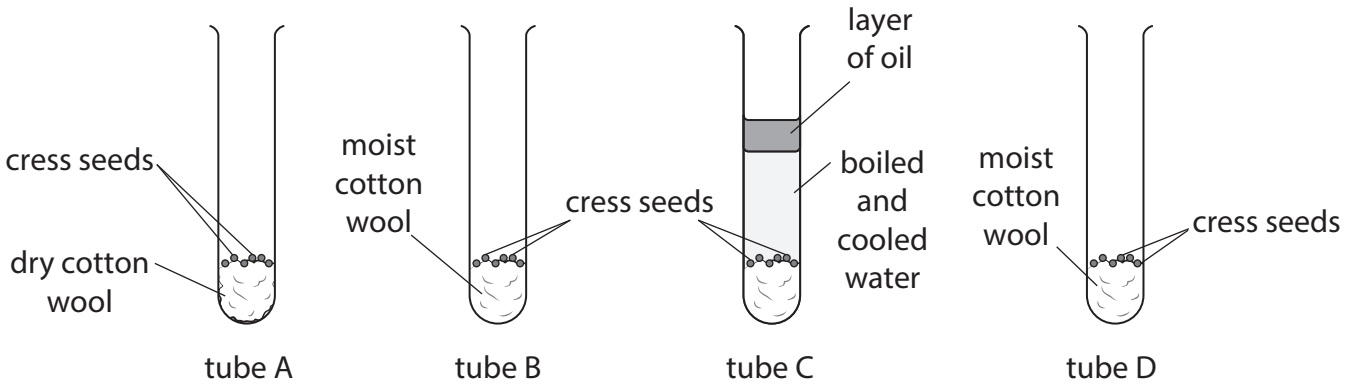
(4)

(iii) Describe the function of the lacteal in the villus.

(2)

(Total for Question 7 = 9 marks)

8 A student uses this apparatus to investigate the conditions needed for seeds to germinate.



This is the student's method.

- set up four test tubes as shown in the diagram
- keep tubes A, B and C at 20 °C
- place tube D in a fridge at 4 °C
- leave all the tubes for four days

(a) Give two observations that would show that a seed has germinated.

(2)

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2 .....

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(b) For each tube, explain whether the seeds would germinate.

(4)

(Total for Question 8 = 6 marks)

9 Farmers can use selective breeding programmes to improve animal characteristics.

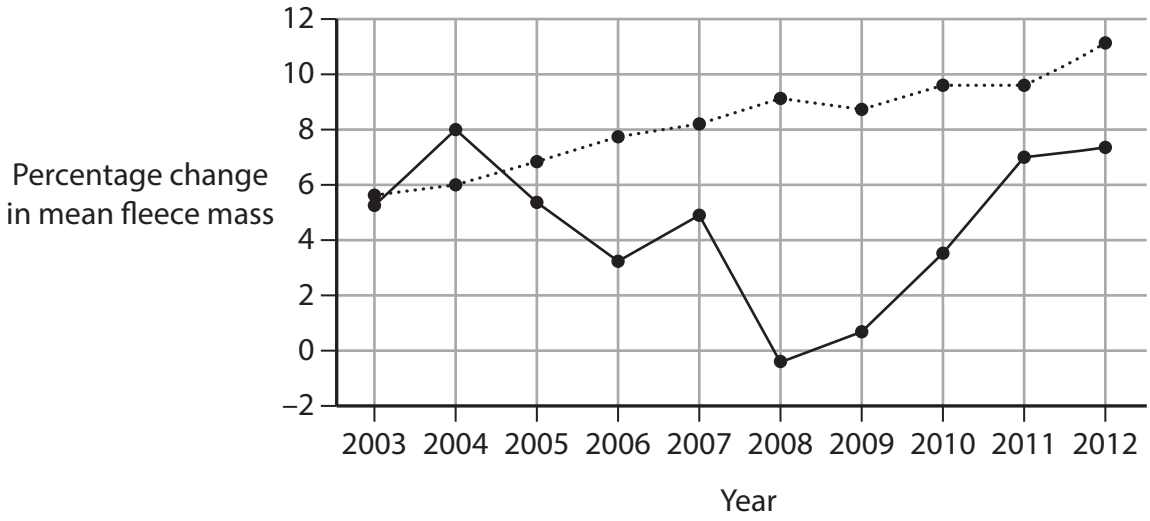
(a) Describe the process of selective breeding.

(3)

(b) Sheep grow wool which is removed each year to produce a fleece.

Farmers in Australia have used selective breeding of sheep to improve fleece mass.

The graph shows the percentage change in mean fleece mass each year from 2003 to 2012 compared with 1996.



The dotted line shows the percentage change in mean fleece mass for all sheep farms.

The solid line shows the percentage change in mean fleece mass for farm X.

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(i) Describe the differences between the percentage change in mean fleece mass for farm X and the percentage change in mean fleece mass for all farms.

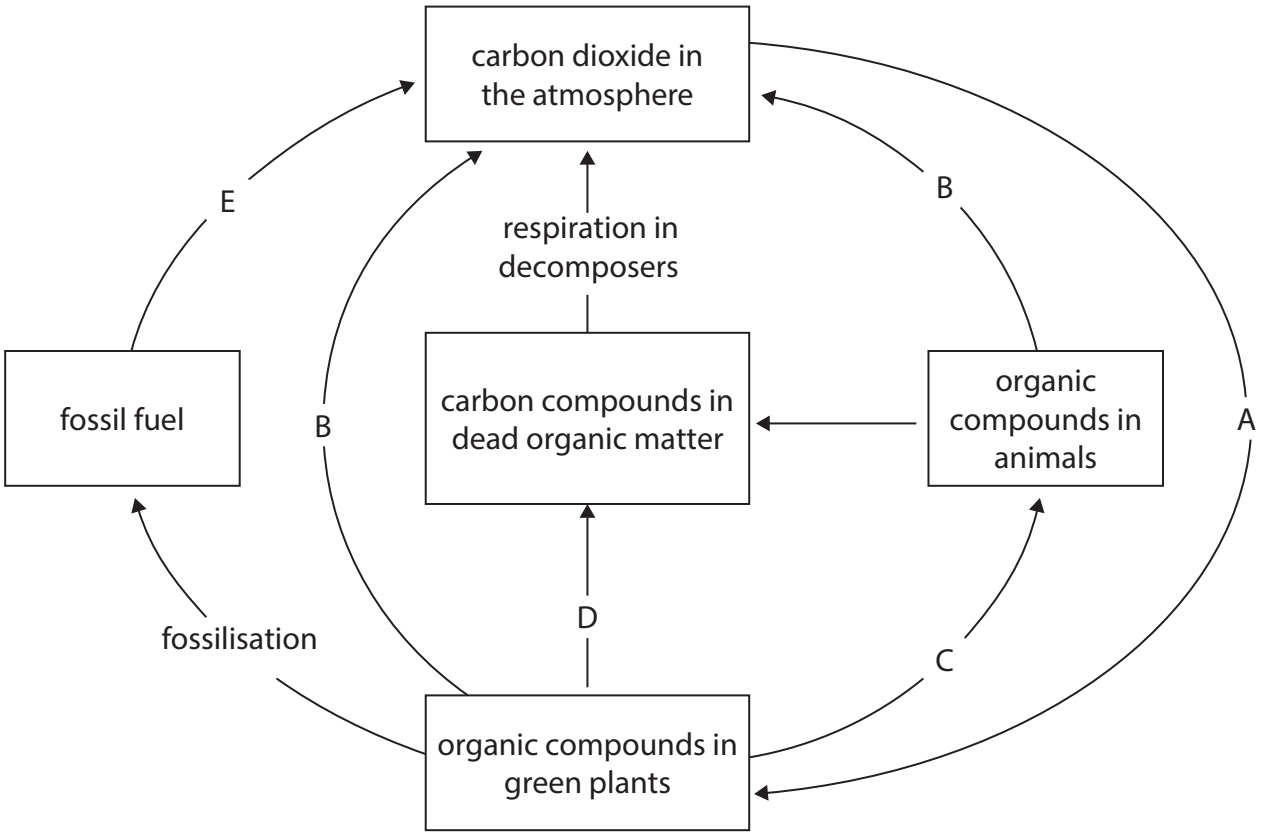
(4)

(ii) Suggest why sheep farmers would want a higher fleece mass.

(1)

(Total for Question 9 = 8 marks)

10 The diagram shows the carbon cycle with processes labelled A, B, C, D and E.



(a) (i) Name the process labelled E.

(1)

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(ii) Give the letter of a process that removes carbon dioxide from the atmosphere.

(1)

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(b) Describe the consequences of an increase in carbon dioxide for the world's ecosystems.

(4)

(c) Pollution by fertiliser can have an effect on an aquatic ecosystem.

Explain two effects that pollution by fertiliser would have on plants in a river.

(4)

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(Total for Question 10 = 10 marks)

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11 In hamsters, colour of fur is controlled by a gene with two alleles.

The dominant allele G codes for gold-coloured fur and the recessive allele g codes for cream-coloured fur.

(a) (i) State the difference between a gene and an allele.

(1)

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.....

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(ii) Give the possible genotypes of a hamster with gold-coloured fur.

(1)

.....

(b) A male hamster that has gold-coloured fur mates with a female hamster that has cream-coloured fur.

Some of the offspring have cream-coloured fur, and some have gold-coloured fur.

(i) Draw a genetic diagram to show the genotypes of the parents, the gametes they produce and the genotypes and phenotypes of the offspring from this cross.

(4)

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(ii) Explain which genetic cross could be used to identify the genotype of a hamster with gold-coloured fur.

(2)

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(Total for Question 11 = 8 marks)

12 When making bread, some people add salt to their bread dough. The salt slows down the action of the yeast and so produces a more controlled fermentation.

Design an investigation to determine the effect of salt on the increase in size of bread dough.

Include experimental details in your answer and write in full sentences.

(6)

(Total for Question 12 = 6 marks)

TOTAL FOR PAPER = 110 MARKS

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