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)

Time 1 hour 10 minutes

Paper reference **4SS0/1B**

Science (Single Award)

Biology
PAPER: 1B

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.*

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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Q:1/1/1/1/

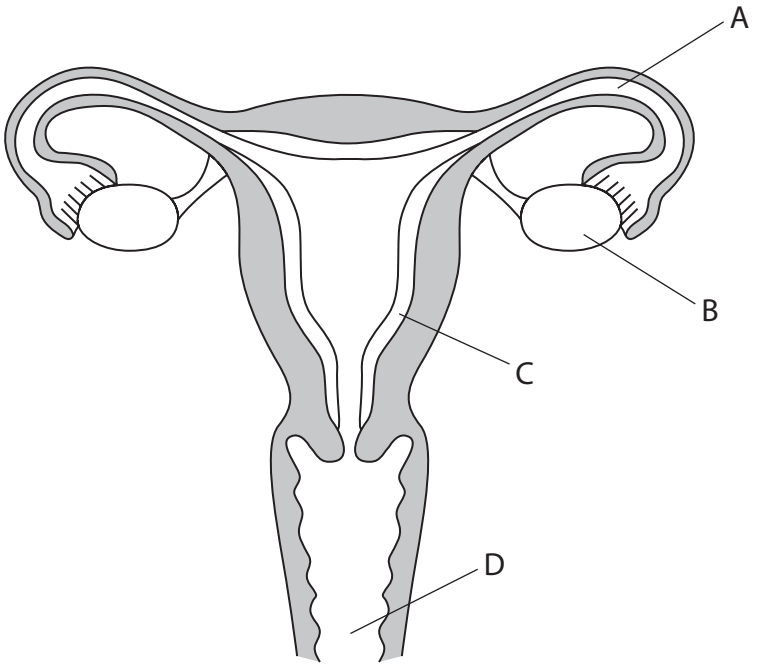
P 7 0 9 4 2 A 0 1 2 0

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 ☒.

1 The diagram shows the female reproductive organs with structures A, B, C, and D labelled.



(a) Name the structures labelled C and D.

(2)

C .....

D .....

(b) Describe the role of structure A in human reproduction.

(2)

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(c) Explain the role of structure B in the development of secondary sexual characteristics.

(2)

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(Total for Question 1 = 6 marks)

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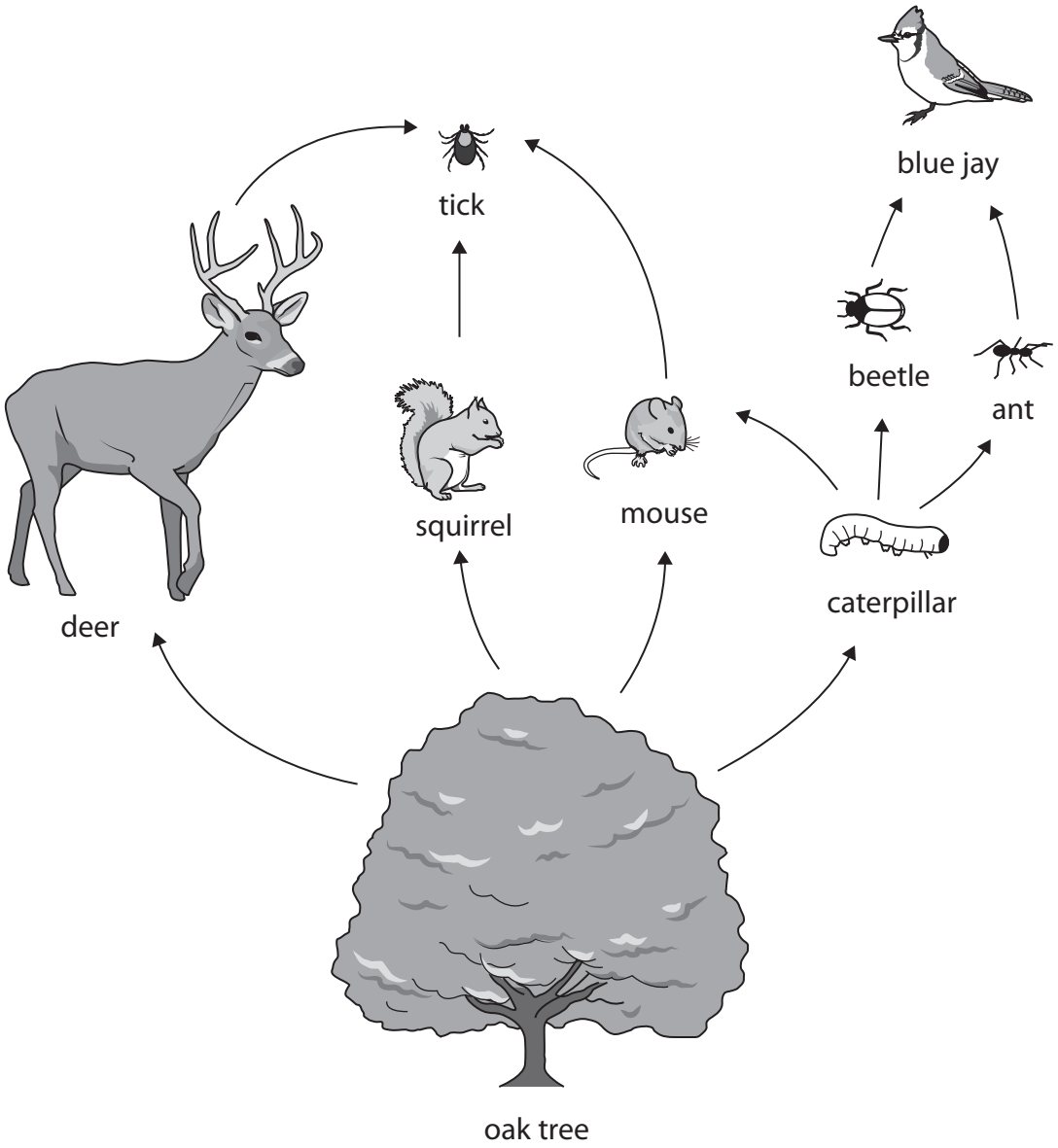
2 The diagram shows part of a food web from a forest.



(a) From the food web, give a food chain that has four trophic levels and includes the mouse.

(1)

(b) The number of caterpillars in the forest decreases.

Explain what effect this would have on the mouse population.

(2)

(c) Explain why the biomass of the oak tree is much greater than the total biomass of all of the organisms at the end of all of the food chains.

(3)

(Total for Question 2 = 6 marks)

3 Fur colour in mice is controlled by a single gene that has two alleles.

Mice can have grey fur or white fur.

In a first cross, a female white mouse is mated with a male grey mouse.

They have eight offspring, each with grey fur.

(a) Which allele is dominant?

(1)

(b) One of the female offspring from this first cross is mated with a male white mouse in a second cross.

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

(4)

(ii) This second cross produces six offspring.

Four are male and two are female.

Give a reason why the ratio of male to female mice in the offspring is not 1 : 1

(1)

.....

.....

(iii) The parents of the second cross mate again and produce another set of offspring.

Calculate the probability that one of these offspring will be male and have white fur.

(2)

probability = ...

(c) Scientists have found that mice with white fur may be more likely to develop some bacterial infections.

The mouse immune system is similar to the human immune system.

Describe how the immune system of a mouse responds when exposed to a bacterial infection.

(3)

(Total for Question 3 = 11 marks)

4 Plants use photosynthesis for nutrition.

(a) What is the term used for plants at the beginning of food chains?

(1)

☒ **A** decomposers

☒ **B** primary consumers

☒ **C** producers

☒ **D** secondary consumers

(b) Which of these is the balanced chemical equation for photosynthesis?

(1)

☒ **A** $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

☒ **B** $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

☒ **C** $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

☒ **D** $C_6H_{12}O \rightarrow 2C_3H_6O_3$

(c) A student uses this method to demonstrate that light is required for photosynthesis.

Step 1 Put two potted plants in a dark cupboard for 24 hours.

Step 2 Take one plant out of the cupboard and place it in sunlight for 24 hours but keep the other plant in the dark cupboard.

Step 3 Remove a leaf from the plant in the sunlight.

Step 4 Place the leaf in boiling water for 30 seconds.

Step 5 Put the leaf in a boiling tube containing hot ethanol for 15 minutes.

Step 6 Wash the leaf in cold water and place it on a white tile.

Step 7 Add iodine solution to cover the leaf and observe any changes in the colour of the leaf.

Repeat steps 4 to 7 for a leaf removed from the plant that was kept in the dark cupboard.

(i) Explain why the student put the plants in a dark cupboard for 24 hours in step 1.

(2)

(ii) Describe how the student could heat ethanol safely in step 5.

(2)

(iii) State the colour change for each of the leaves tested in step 7.

(1)

Leaf in sunlight

.....

Leaf in the dark

.....

(Total for Question 4 = 7 marks)

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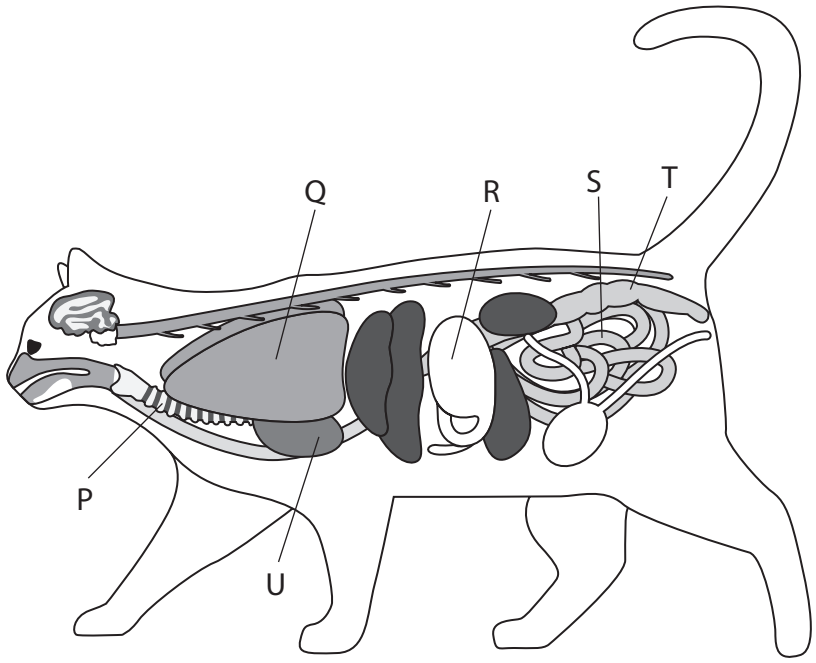
5 The diagram shows the internal anatomy of a cat with some organs labelled.



(Source: VectorMine / Shutterstock)

(a) (i) Some of the organs labelled are part of the digestive system.

Which of these structures is part of the digestive system?

(1)

- ☒ **A** structure P
- ☒ **B** structure Q
- ☒ **C** structure S
- ☒ **D** structure U

(ii) One of the organs labelled is part of the circulation system.

Which of these structures is part of the circulation system?

(1)

- ☒ **A** structure P
- ☒ **B** structure R
- ☒ **C** structure S
- ☒ **D** structure U

(b) Ventilation and gas exchange take place in the cat's lungs.

The movement of air into the lungs is caused by the movement of the rib cage and the diaphragm.

Which of these makes the cat breathe in?

(1)

- ☒ **A** diaphragm contracts and the volume within the rib cage decreases
- ☒ **B** diaphragm contracts and the volume within the rib cage increases
- ☒ **C** diaphragm relaxes and the volume within the rib cage decreases
- ☒ **D** diaphragm relaxes and the volume within the rib cage increases

(c) The table gives some information about the composition of inhaled air and exhaled air.

It compares the volumes of three gases in inhaled air and in exhaled air.

Gas	Volume of gas in one litre of inhaled air in cm^3	Volume of gas in one litre of exhaled air in cm^3
oxygen	200	160
carbon dioxide	0.4	40
nitrogen	790	790

(i) Determine which gas shows the greatest percentage change from its volume in inhaled air to its volume in exhaled air.

(2)

(ii) Explain the differences between the composition of inhaled air and exhaled air shown in the table.

(4)

(iii) Explain how the structure of the lungs is adapted for efficient gas exchange.

(4)

(Total for Question 5 = 13 marks)

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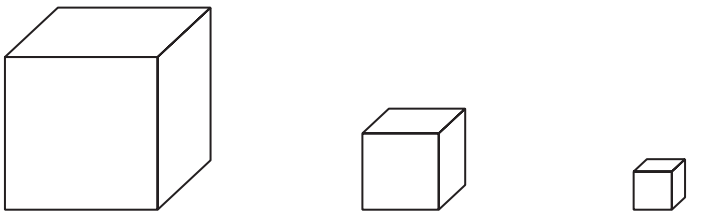
6 A student uses this method to investigate the movement of molecules by diffusion.

- cut three different sized cubes, A, B, and C, from a block of clear agar jelly

  cube A has sides 2 cm × 2 cm × 2 cm

  cube B has sides 1 cm × 1 cm × 1 cm

  cube C has sides 0.5 cm × 0.5 cm × 0.5 cm



cube A cube B cube C

- place each cube in a beaker of red dye solution for five minutes
- remove the cubes from the dye solution
- wash the surface of each cube with water and dry with filter paper
- cut each cube in half and examine the newly cut surfaces

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

(1)

.....

.....

(b) Give two factors that the student should control in their investigation.

(2)

1 .....

2 .....

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(c) The table gives some information about cubes A, B and C.

Cube	Side in cm	Surface area in cm^2	Volume in cm^3	Surface area to volume ratio
A	2.0		8.0	
B	1.0	6.0	1.0	6:1
C	0.5	1.5	0.125	12:1

(i) Calculate the surface area of cube A.

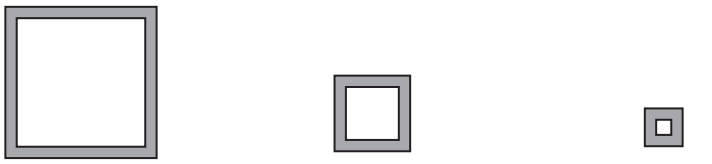
(2)

surface area = ... cm^2

(ii) Complete the table by calculating the surface area to volume ratio for cube A.

(1)

(iii) The diagram shows the newly cut surfaces of the cubes.



cube A cube B cube C

Using a ruler, determine the distance the red dye has diffused into the cubes.

(1)

distance = ... mm

(iv) Using the data from the table and your measurement from (c)(iii), comment on the effect of size on transport in an organism.

(4)

(Total for Question 6 = 11 marks)

7 Farmers often want to increase the yield of their crops.

Design an investigation to find out if crop yield is increased by changing the carbon dioxide concentration in a glasshouse.

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

(6)

(Total for Question 7 = 6 marks)

TOTAL FOR PAPER = 60 MARKS