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)

Friday 7 June 2024

Afternoon (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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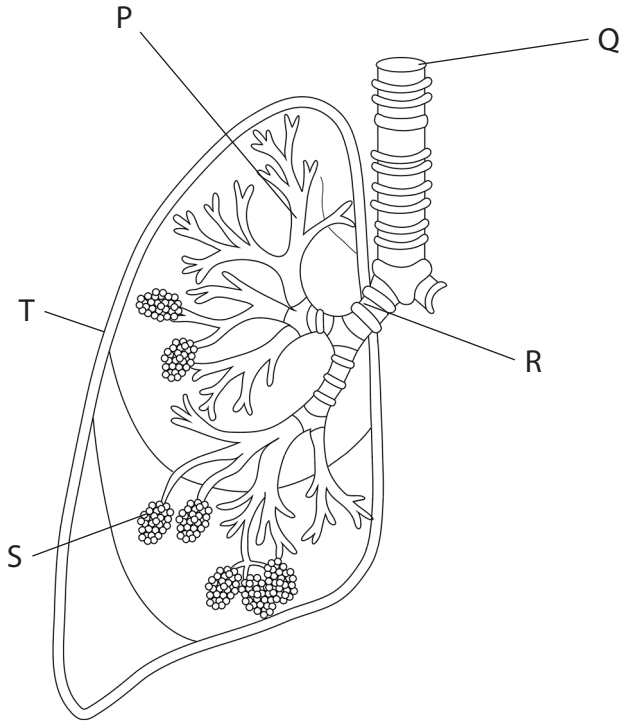
P 7 4 4 9 7 A 0 1 2 0

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 part of the human breathing system with structures P, Q, R, S and T labelled.



(Source: https://www.shutterstock.com/image-vector/brochiole-alveoli-diagram-lungs-clipartline-art-1815242549)

(a) (i) Which structure is the trachea?

(1)

☒ **A** Q

☒ **B** R

☒ **C** S

☒ **D** T

(ii) Which structure is the site of gas exchange?

(1)

☒ **A** Q

☒ **B** R

☒ **C** S

☒ **D** T

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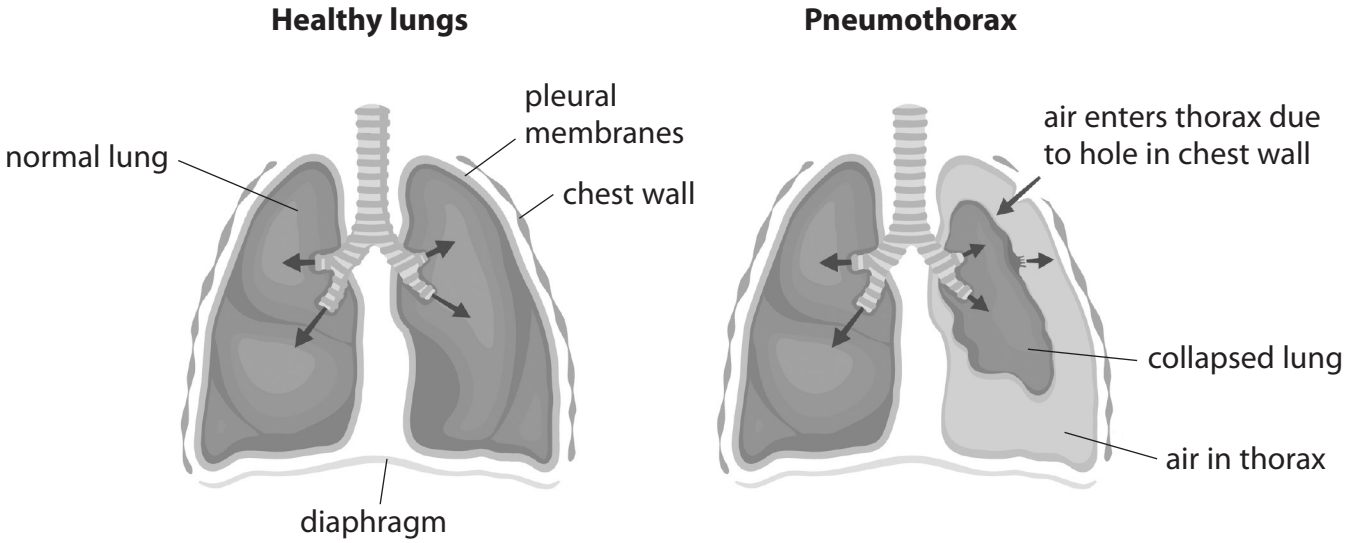
(iii) Which two structures have rings of cartilage?

(1)

- ☒ **A** P and Q
- ☒ **B** Q and R
- ☒ **C** Q and S
- ☒ **D** S and T

(b) A lung condition called pneumothorax can develop if the chest wall is punctured.

The diagram shows healthy lungs and a pneumothorax.



(Source: https://www.shutterstock.com/image-vector/human-lungs-pneumothorax-hemothorax-hemopneumothorax-1405120004)

(i) Give one difference between the healthy lung and the lung in pneumothorax.

(1)

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.....

.....

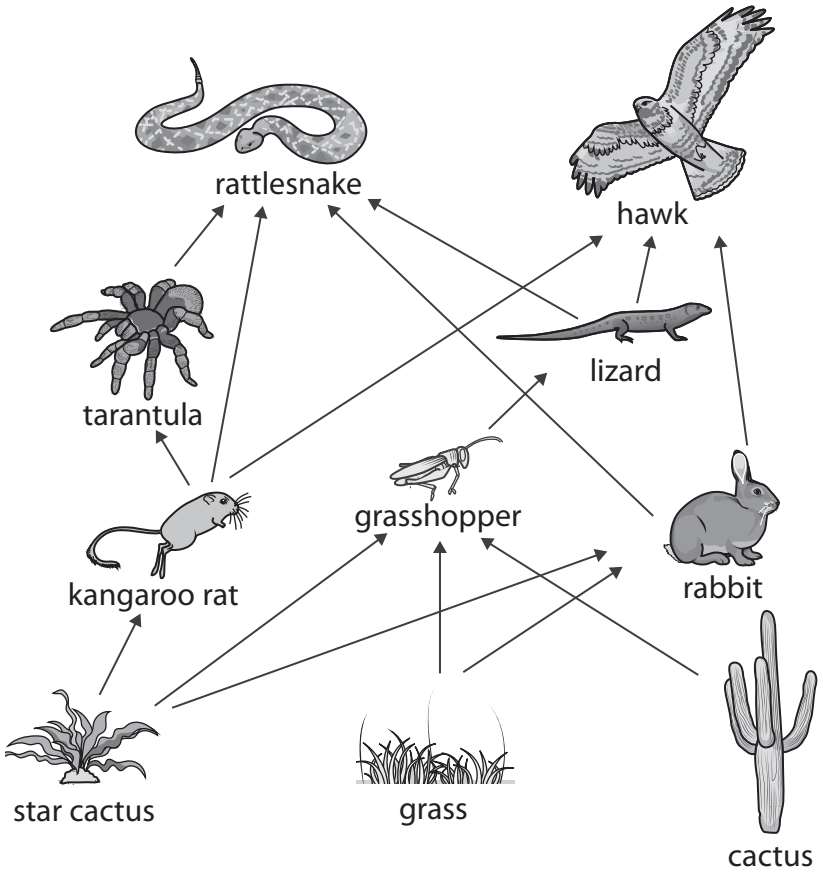
(ii) Comment on the effects of pneumothorax on the processes of breathing and gas exchange.

Use information from the diagram and your own knowledge.

(4)

(Total for Question 1 = 8 marks)

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



(a) (i) Which of these organisms is a primary consumer in this food web?

(1)

- ☒ **A** cactus
- ☒ **B** lizard
- ☒ **C** rabbit
- ☒ **D** tarantula

(ii) Which of these organisms is both a secondary consumer and a tertiary consumer in this food web?

(1)

- ☒ **A** lizard
- ☒ **B** rabbit
- ☒ **C** rattlesnake
- ☒ **D** tarantula

(b) A disease develops in the rabbit population which results in a decrease in the number of rabbits.

(i) Explain what effect this decrease in the number of rabbits would have on the population of hawks.

(2)

(ii) The rabbit immune system responds to infection in a similar way to the human immune system.

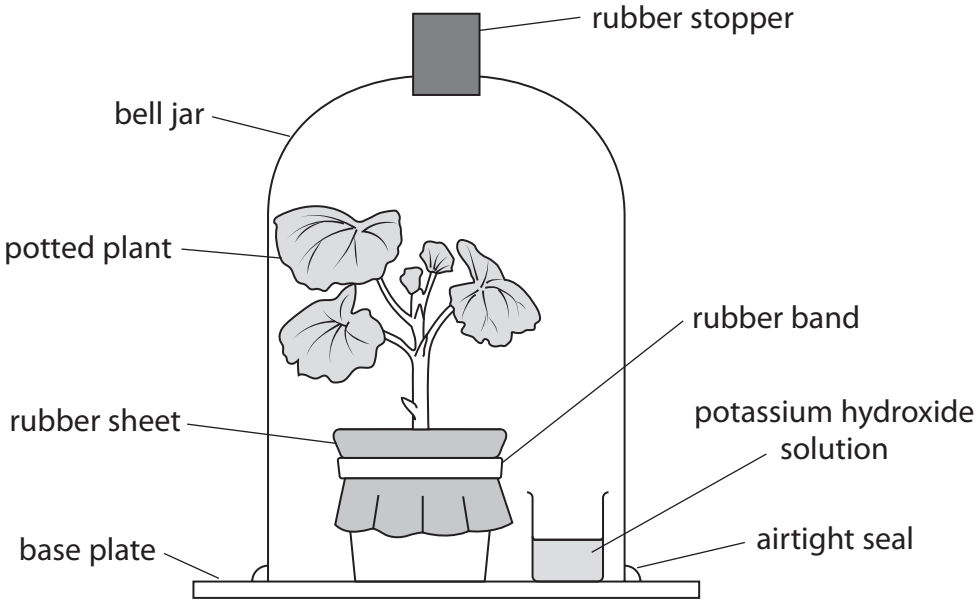
Describe the response of the immune system of the rabbit to a bacterial infection.

(4)

(Total for Question 2 = 8 marks)

3 A teacher uses this method to show that carbon dioxide is required for photosynthesis.

- step 1 destarch a potted plant by placing it in a dark place for 48 hours
- step 2 cover the soil in the plant pot with a rubber sheet
- step 3 use a rubber band to hold the rubber sheet in position
- step 4 place the destarched plant in a bell jar
- step 5 place a small beaker of potassium hydroxide solution in the bell jar
- step 6 make sure the bell jar has an airtight seal
- step 7 shine a light on the potted plant for 6 hours
- step 8 remove a leaf from the plant
- step 9 test the leaf for starch



(a) (i) State the function of the potassium hydroxide solution.

(1)

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.....

(ii) Explain the reason for covering the soil of the potted plant in step 2.

(2)

(b) Give the reason for step 6 in the teacher's method.

(1)

(c) Describe how the teacher could safely test the leaf for starch in step 9.

(4)

(d) The teacher needs to set up a control for this experiment.

Describe a suitable control experiment.

(2)

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(Total for Question 3 = 10 marks)

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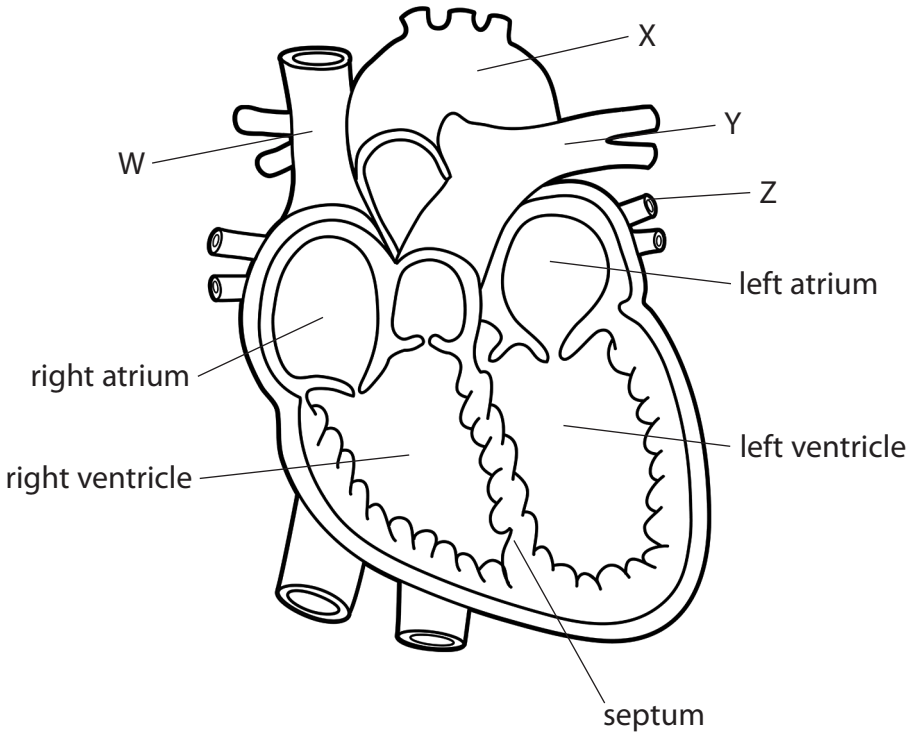
4 The diagram shows the human heart with some blood vessels.



(Source: https://www.shutterstock.com/image-vector/heart-anatomy-cross-section-outline-vector-561719803)

(a) Name the blood vessels labelled W, X, Y and Z.

(4)

W .....

X .....

Y .....

Z .....

(b) Give the function of the septum.

(1)

.....

.....

(c) Scientists produced a report that looked at the link between smoking, heart disease and strokes.

A stroke happens when the blood supply to part of the brain is reduced.

The scientists used data from 140 different studies, so included many patients.

They calculated the risk factor for developing heart disease and the risk factor for having strokes in men and women.

They did this for men and women who smoked one cigarette a day and for men and women who smoked 20 cigarettes a day.

A risk factor of 2.0 would mean that a person is twice as likely to develop the condition.

The table shows their results.

Group	Risk factor for heart disease		Risk factor for strokes	
	men	women	men	women
non-smokers	1.00	1.00	1.00	1.00
smoked one cigarette per day	1.74	2.19	1.30	1.46
smoked 20 cigarettes per day	2.27	3.95	1.56	2.42

(i) Calculate the percentage increase in the risk factor for developing heart disease in men who smoke 20 cigarettes per day compared with men who smoke one cigarette per day.

(2)

increase = ... %

(ii) A newspaper article claimed

'The scientists' report proves that it is better to quit smoking entirely rather than cutting down in order to reduce the risk of these two diseases.'

Discuss the newspaper's claim.

Refer to information about the report and the data in the table in your answer.

(5)

(Total for Question 4 = 12 marks)

5 The photograph shows a corn cob with different coloured kernels.

A single corn cob can have as many as 200 kernels.

If planted, each kernel can grow into a new corn plant.

The colours of the corn kernels are inherited from the parent plants.

(Source: https://www.shutterstock.com/image-photo/purple-corn-studio-shoot-white-background-145326139)

The colour of the kernel is determined by a single gene with two alleles. The allele P codes for purple kernel and the allele p codes for yellow kernel.

In a first cross a plant grown from a purple kernel is crossed with a plant grown from a yellow kernel.

All the kernels produced are purple.

In a second cross one of the offspring from the first cross is allowed to self-pollinate.

(a) Use a genetic diagram to show the second cross including the

- phenotypes and genotypes of the parents
- gametes
- genotypes and phenotypes of the offspring

(4)

(b) This second cross was repeated several times.

The offspring had cobs with a total of 1915 kernels.

The cobs had 1453 purple kernels.

Calculate the ratio of purple to yellow kernels. Express your answer as N : 1

(2)

ratio = ... : 1

(c) Scientists expected an exact ratio of 3 : 1.

If this exact ratio was observed, calculate the expected number of purple kernels out of the 1915 produced.

(2)

number of purple kernels = ...

(d) Explain why the number of purple kernels observed is not the same as the expected number of purple kernels.

(2)

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(Total for Question 5 = 10 marks)

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6 Genetically modified plants can be used to improve crops.

(a) Describe how named enzymes can be used to produce a genetically modified plant.

(4)

(b) The plants produced are described as transgenic.

(i) State what is meant by the term **transgenic**.

(1)

(ii) Give an example of how genetically modifying a plant has resulted in improved food production.

(1)

(Total for Question 6 = 6 marks)

7 Breathing rate and heart rate are often related.

Design an investigation to find out if a change in breathing rate also produces a change in heart rate.

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

(6)

(Total for Question 7 = 6 marks)

TOTAL FOR PAPER = 60 MARKS

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