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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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 structures A, B, C, D and E labelled.
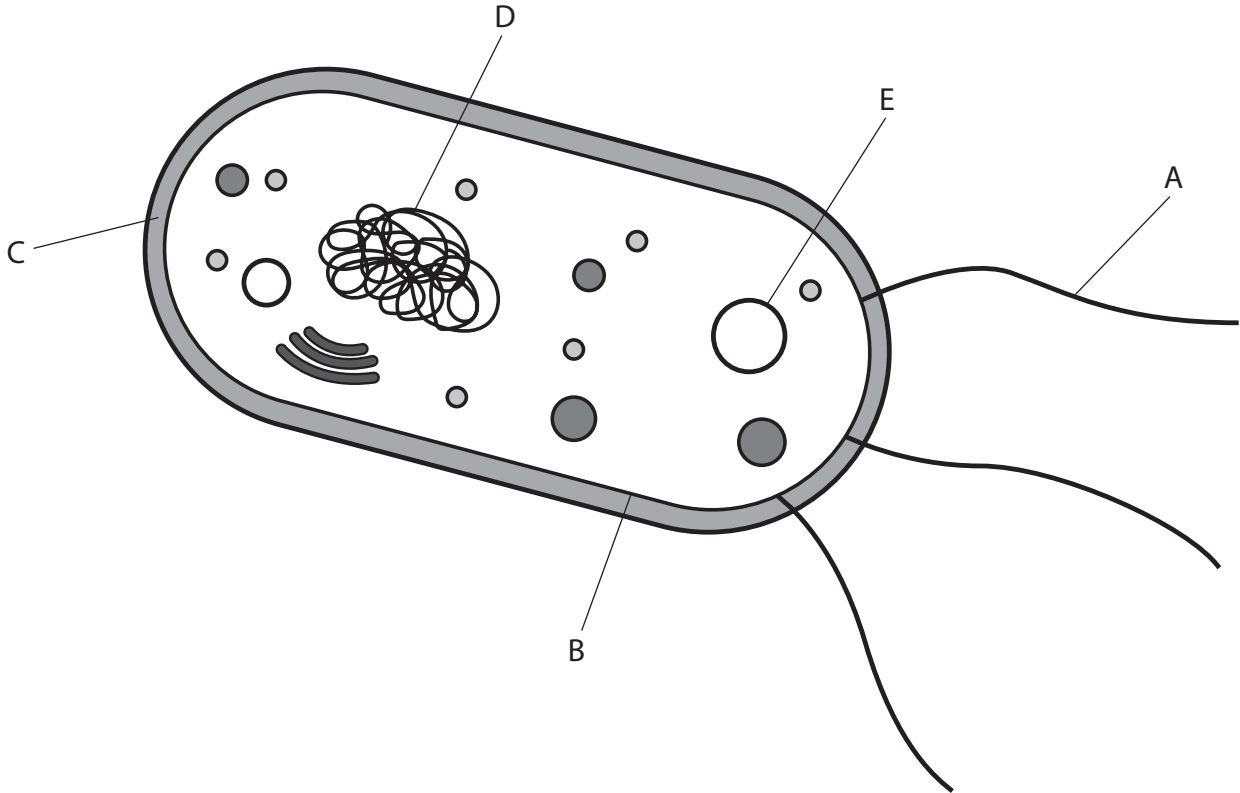
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(a) (i) Which structure contains the genetic material used by the bacterium in reproduction?

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(ii) Which structure controls the substances entering and leaving the bacterium?

(1)

☒ **A**

☒ **B**

☒ **D**

☒ **E**

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(b) Give three differences between the structure of this bacterium and the structure of a plant cell.

(3)

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2 ....

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3 ....

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(Total for Question 1 = 5 marks)

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2 (a) The diagram shows part of the human thorax with structures P, Q, R, S and T labelled.

Q

R

S

P

T
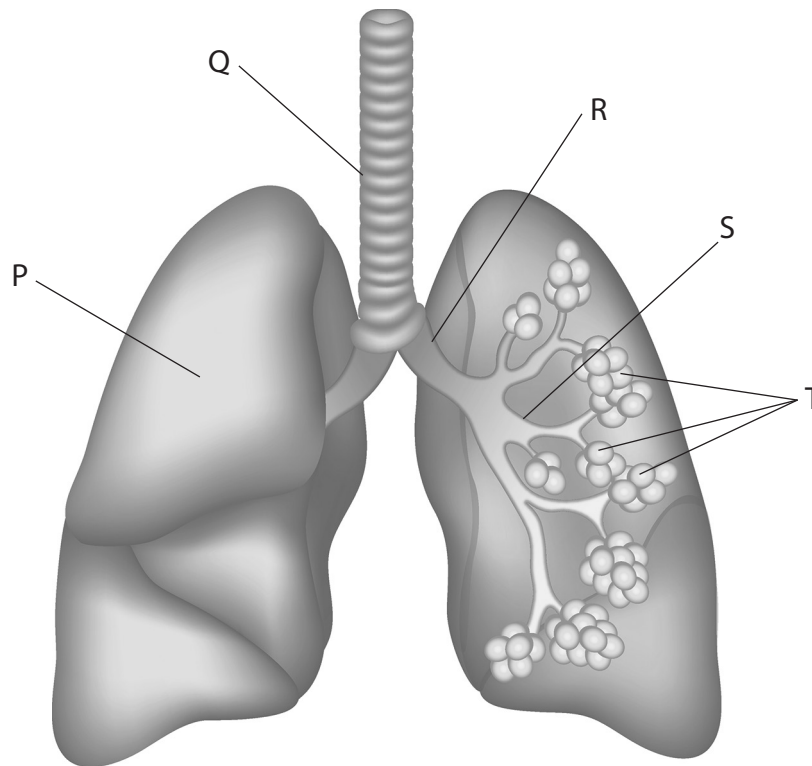
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(i) Which structure is a bronchus?

(1)

☒ **A** **P**

☒ **B** **Q**

☒ **C** **R**

☒ **D** **S**

(ii) Give three ways that structures labelled T are adapted for efficient gas exchange.

(3)

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(b) Vital capacity is a measure of how much air can be forced out of the lungs in one breath.

The graph shows how mean vital capacity changes with age for males and for females.
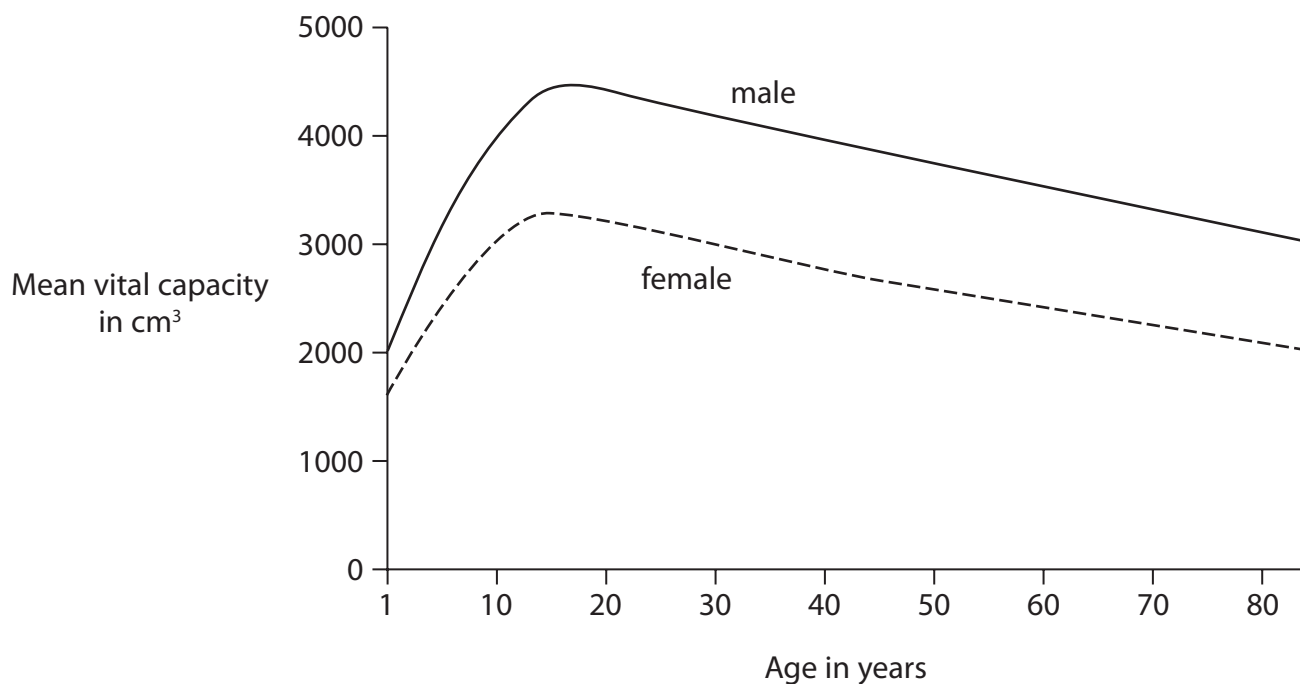
(i) Describe the relationship between mean vital capacity and age for males and for females.

(3)

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(ii) Suggest a reason for the difference between the mean vital capacity of males and of females.

(1)

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(Total for Question 2 = 8 marks)

Turn over ▶

3 A student investigates the effect of the colour of light on the rate of photosynthesis in pondweed.

This is the student's 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

- repeat this count for two more one-minute periods

The student repeats the method using blue light, green light and red light.

The table shows the student's results.

Colour of light	Number of bubbles of oxygen released in one minute			
	Count 1	Count 2	Count 3	Mean (average)
white	16	15	17	16
blue	13	11	12	12
green	4	5	3	4
red	10	12	11	11

(a) (i) Calculate the percentage difference in the mean number of bubbles released when using green light compared to white light.

(2)

percentage difference = ... %

(ii) Give the independent variable in this investigation.

(1)

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(iii) Give an abiotic variable the student should control in their investigation.

(1)

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(b) Comment on the effect of colour of light on the rate of photosynthesis.

(4)

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(c) Explain how the structure of a leaf is adapted for photosynthesis.

(4)

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(Total for Question 3 = 12 marks)

4 Plants use some of the biomass that they produce as a source of energy.

(a) Name the process that releases energy in plant cells.

(1)

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(b) The productivity of plants in different ecosystems can be compared by calculating their net primary productivity.

Net primary productivity is the difference between the biomass produced and the biomass used.

The table shows the net primary productivity of different ecosystems in one year. This is measured in grams of biomass produced by one square metre of ground.

Ecosystem	Mean net primary productivity in one year in g per m^2
desert	80
temperate grassland	600
cultivated farmland	625
temperate deciduous forest	1250
tropical rainforest	2200

A temperate ecosystem has no extremes of temperature.

(i) Describe a method that a scientist could use to determine the mean net primary productivity of temperate grassland in a year.

(3)

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(ii) Draw a bar chart to show the mean net primary productivity in g per m^2 for each ecosystem in one year.

(5)
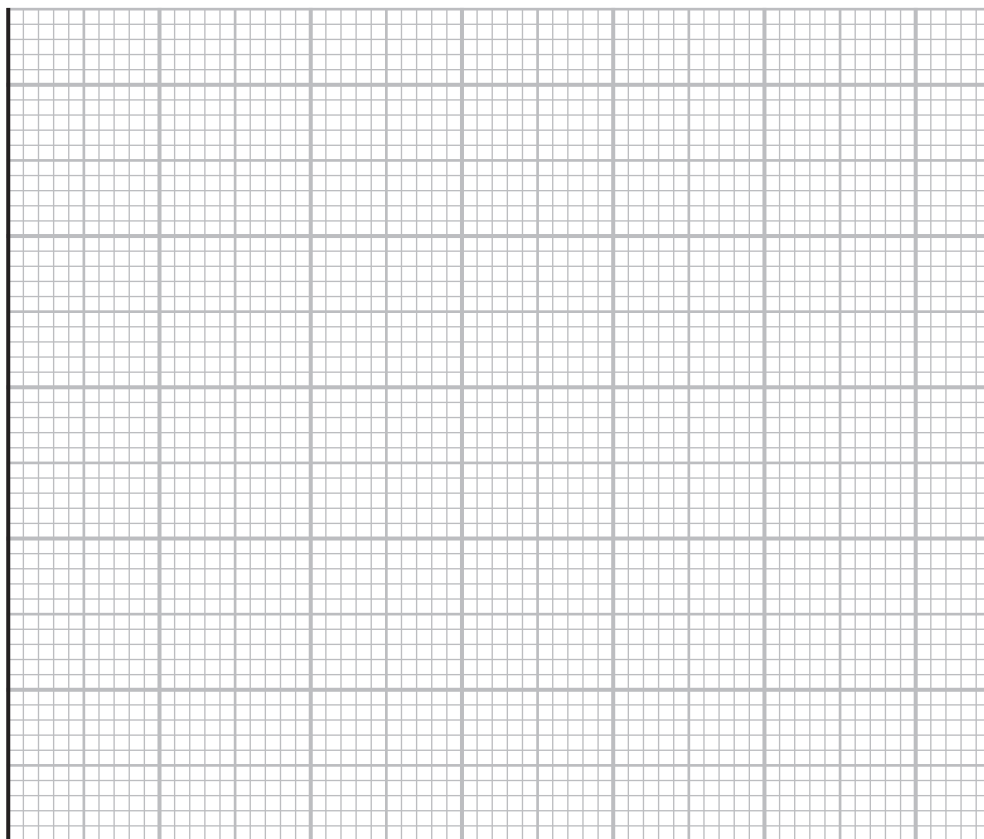
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(iii) Comment on the differences between the mean net primary productivity in the ecosystems.

(5)

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(Total for Question 4 = 14 marks)

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5 The photograph shows an insect-pollinated plant called a stock.

(a) Give two features of insect-pollinated flowers.

(2)

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(b) There are two types of stock plant. One type has single flowers and the other type has double flowers.

The double flower is caused by a recessive allele (d) and has no stamens.

Gardeners often grow plants that have double flowers because they are larger and last longer than single flowers.

Plants with double flowers cannot reproduce. Plants with double flowers are usually produced by self-pollinating a plant with single flowers that carries the recessive allele.

(i) Explain why plants with double flowers cannot reproduce on their own.

(2)

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(ii) A plant with single flowers that carries the recessive allele is self-pollinated.

Draw a genetic diagram to show the parent genotypes, the gametes produced, and the genotypes and phenotypes of the offspring.

(4)

(iii) This self-pollinated plant with single flowers produces 600 seeds.

Calculate the expected number of plants with double flowers that will grow from these seeds.

(2)

expected number = ...

(Total for Question 5 = 10 marks)

P 7 1 9 6 6 A 0 1 7 2 0

6 Genetically modified bacteria can be used to produce large quantities of human insulin.

(a) State what is meant by the term **genetically modified bacteria**.

(1)

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(b) Describe how bacteria can be genetically modified to produce large quantities of human insulin.

(4)

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(Total for Question 6 = 5 marks)

7 Exercise programmes can reduce a person's resting heart rate.

Some programmes rely on long distance running while others rely on training with weights.

Design an investigation to find out which exercise programme is more effective at reducing resting heart rate.

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

(6)

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(Total for Question 7 = 6 marks)

TOTAL FOR PAPER = 60 MARKS

P 7 1 9 6 6 A 0 1 9 2 0

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