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)

## Monday 9 June 2025

Morning (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.
- 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 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.
- 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

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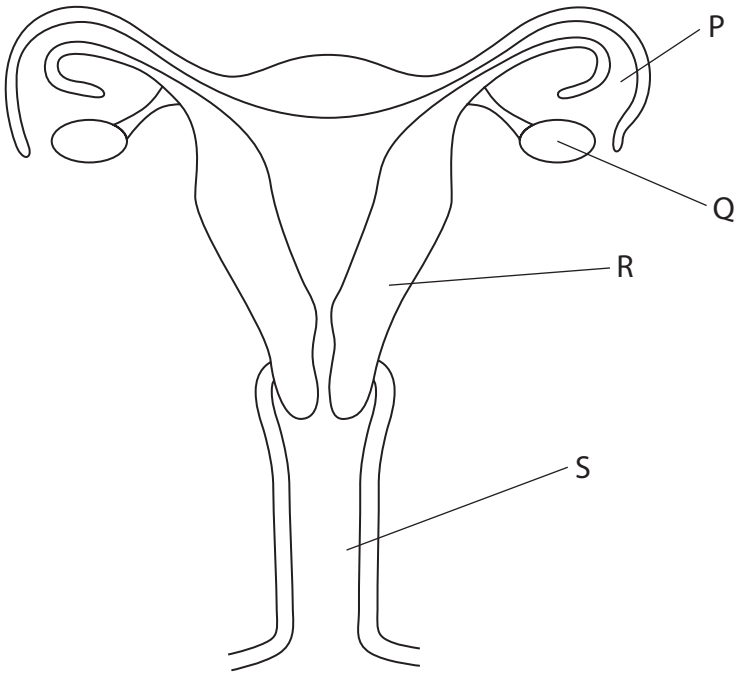
**Answer ALL questions.**

**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** (a) The diagram shows the human female reproductive system with some structures labelled.




(i) Give the names of these structures.

**(3)**

P .....

Q .....

R .....

(ii) Describe the role of structure S in reproduction.

**(2)**

.....

.....

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.....

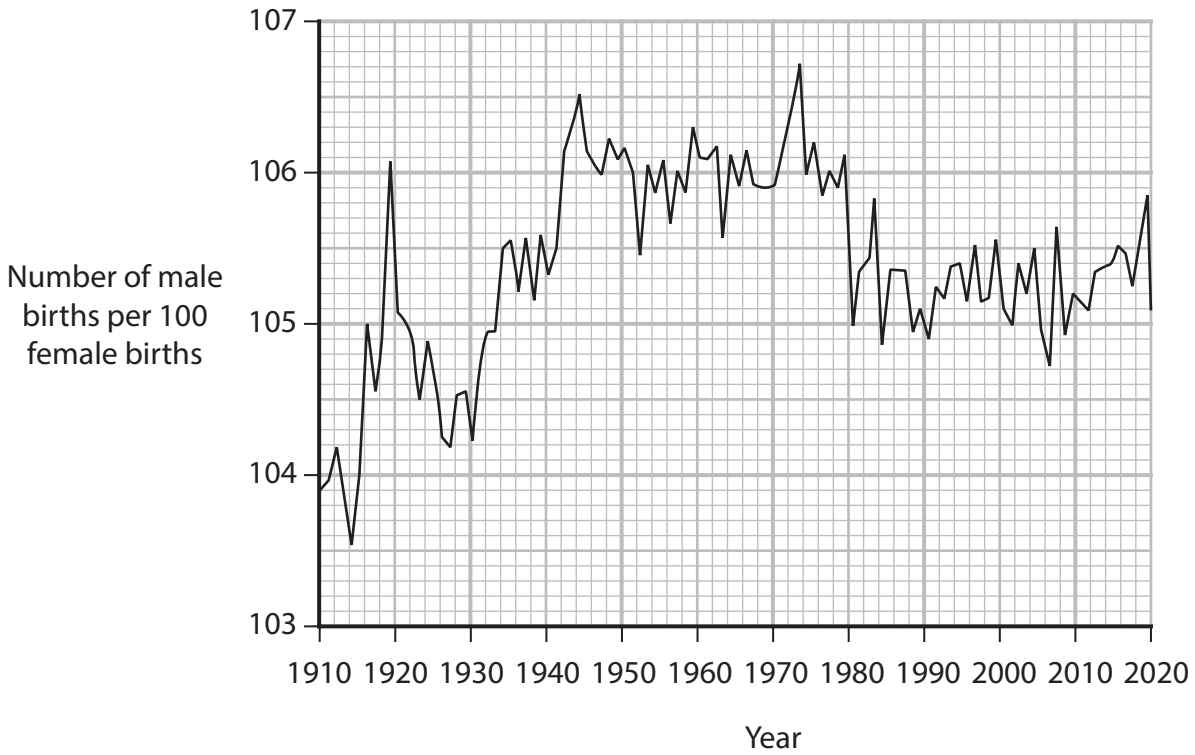
(b) The sex chromosomes inherited from the parents determine the sex of an offspring at fertilisation.

Draw a genetic diagram to show which parent determines the sex of an offspring at fertilisation.

**(3)**

(c) The number of male and female births varies from the expected ratio.

The graph shows the number of male births per 100 female births in the United Kingdom from 1910 to 2020.



(i) Calculate the percentage difference in the number of male births per 100 female births in 2020 compared with 1910.

**(2)**

percentage difference = ..... %

(ii) Use the graph to determine the difference between the highest number and the lowest number of male births per 100 female births.

**(2)**

difference = .....

(iii) Suggest a reason why the number of male births per 100 female births varies.

**(1)**

.....

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**(Total for Question 1 = 13 marks)**

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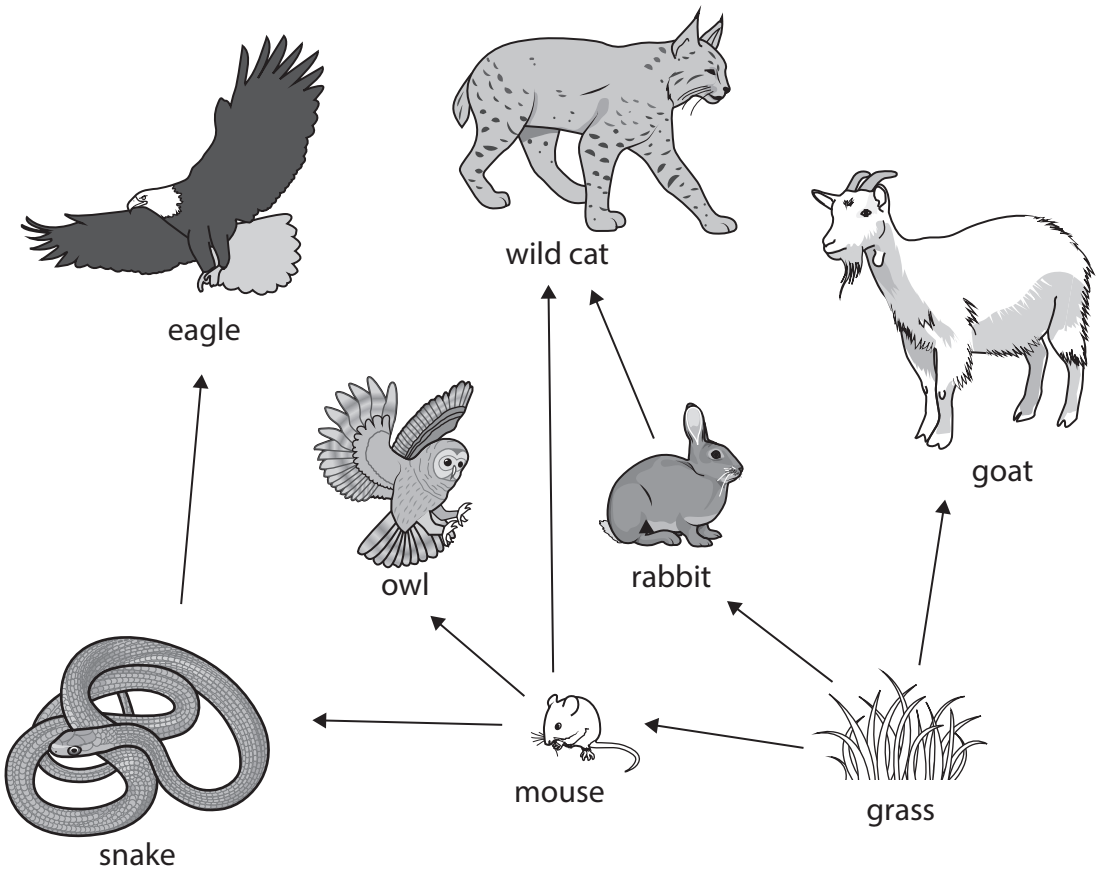
**2** (a) The diagram shows part of a food web.




(i) Which of these is the producer in this food web?

**(1)**

- ☒ **A** goat
- ☒ **B** grass
- ☒ **C** mouse
- ☒ **D** owl

(ii) Give a food chain from this food web that has four trophic levels.

**(2)**

(iii) Name the trophic level that the rabbit belongs to.

**(1)**

(b) Scientists investigate the energy transfers in a woodland.

They find that 2 000 000 kJ of energy from light is available to 1 $m^2$ of woodland in one year.

For each trophic level, the scientists measure the energy in one year that is

- available
- lost in respiration
- stored in biomass

The table shows their results for 1 $m^2$ of woodland in one year.

| Trophic level | Energy transfers in kJ (percentage of energy available) | | |
|---|---|---|---|
| | energy available | energy lost in respiration | energy stored in biomass |
| **producer** | 2 000 000 | 22 460 (1%) | 90 000 (5%) |
| **primary consumer** | 90 000 | 4 600 (5%) | 9 400 (10%) |
| **secondary consumer** | 9 400 | 240 (3%) | 1 320 (14%) |
| **tertiary consumer** | 1 320 | 36 (3%) | 184 (14%) |

Comment on the differences in energy transfers shown in the table.

In your answer refer to transfers

- **within** each trophic level
- **between** the trophic levels

**(5)**

**(Total for Question 2 = 9 marks)**

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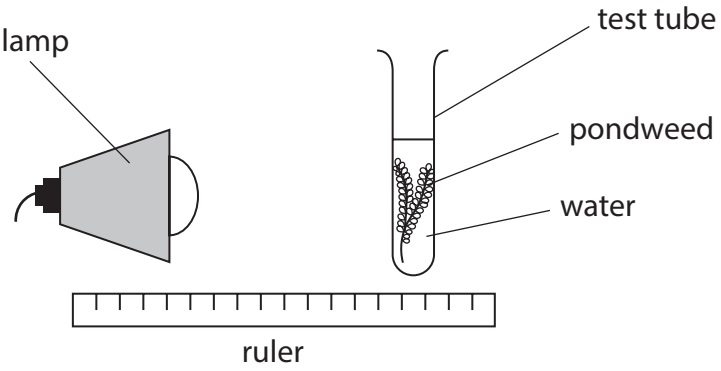
**3** Photosynthesis in green plants uses light energy to produce carbohydrates.

(a) Give the balanced chemical symbol equation for photosynthesis.

**(2)**

(b) A student uses this apparatus to investigate the effect of light intensity on the rate of photosynthesis in a water plant.




This is the student's method.

- place a cut piece of pondweed in a test tube of water
- place a lamp 35 cm from the test tube
- count the number of bubbles of gas released from the cut end of the pondweed in one minute
- count the number of bubbles of gas released for two more one-minute periods

The student repeats the method with the lamp at different distances from the test tube.

The table shows the student's results.

| Distance of lamp from test tube in cm | Number of bubbles released in one minute | | | |
|---|---|---|---|---|
| | count 1 | count 2 | count 3 | mean (average) |
| 35 | 9 | 11 | 8 | 9 |
| 30 | 10 | 12 | 9 | 10 |
| 25 | 16 | 17 | 14 | 16 |
| 20 | 23 | 20 | 24 | 22 |
| 15 | 30 | 32 | 29 | 30 |
| 10 | 40 | 37 | 39 | 39 |
| 5 | 42 | 40 | 41 | |

(i) Calculate the mean number of bubbles released in one minute when the lamp is 5 cm from the test tube.

**(2)**

mean number = .....

(ii) Give the independent variable in this investigation.

**(1)**

.....

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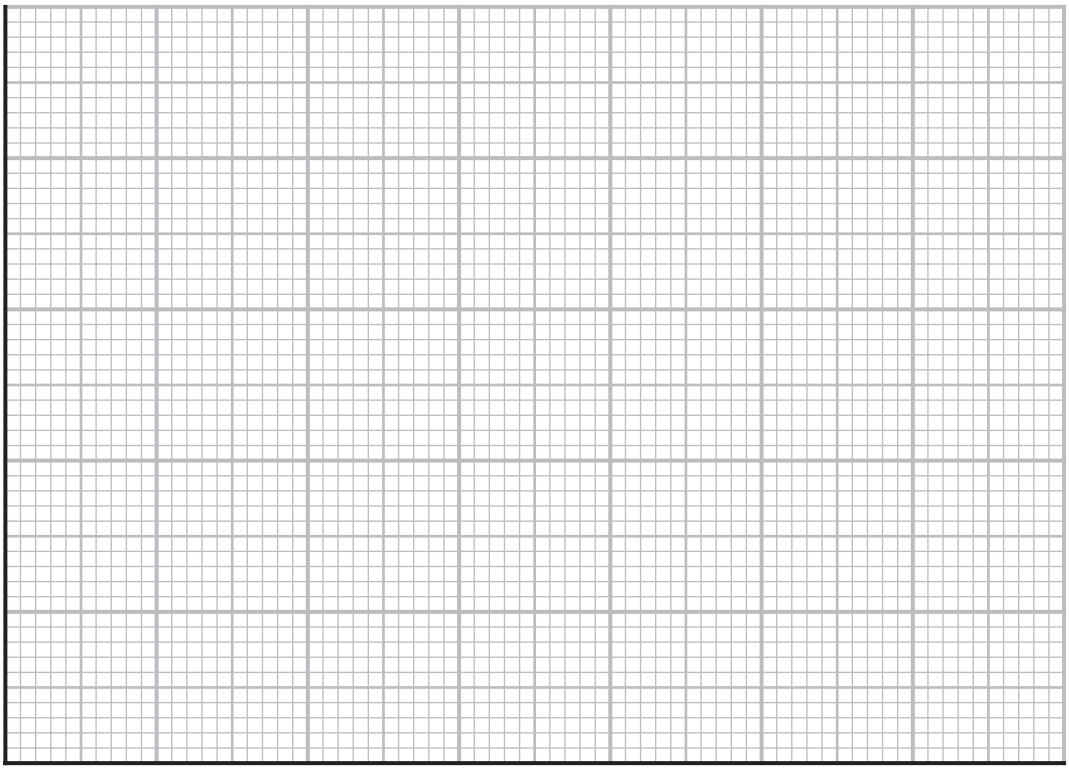
(iii) Plot a line graph to show the relationship between distance of lamp from test tube and mean number of bubbles released.

Use a ruler to join your points with straight lines.

**(5)**



(iv) Describe the relationship between distance of lamp from test tube and mean number of bubbles released.

**(2)**

.....

.....

.....

.....

.....

**(Total for Question 3 = 12 marks)**

**4** Genetic modification involves the use of enzymes to remove DNA and insert it into another organism.

Complete the passage about genetic modification by writing a suitable word in each blank space.

**(7)**

The enzyme used to cut DNA at a specific site is known as a

..... enzyme.

This enzyme is also used to cut open a small loop of bacterial DNA called a

..... .

A second enzyme called ..... is used to join the DNA pieces together.

When the pieces of DNA are joined together they are called

..... DNA.

A type of ..... called a bacteriophage can be used to transfer the DNA into a new organism.

If the DNA is inserted into a different species, the new organism is called a

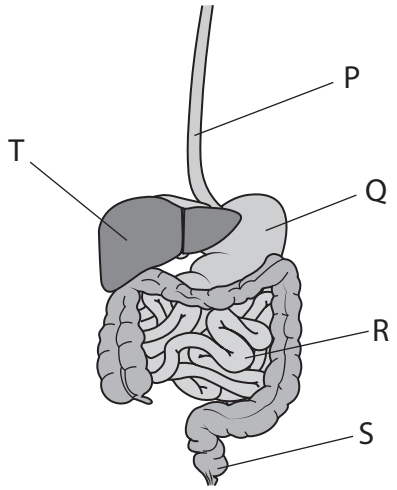
..... organism.

Genetically modified bacteria are used to produce the human hormone called

..... .

**(Total for Question 4 = 7 marks)**

**5** The diagram shows part of the human digestive system with some structures labelled.




(a) (i) Which of these structures is the stomach?

**(1)**

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

(ii) Which of these structures is the small intestine?

**(1)**

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

(iii) Which of these structures has villi?

**(1)**

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

(b) Describe the role of digestive enzymes in the small intestine.

**(4)**

(c) Consuming living microorganisms, called probiotics, may have health benefits.

One benefit is the reduction of diarrhoea in patients taking antibiotics.

Diarrhoea is the production of more frequent watery faeces and can be caused by the pathogen *Clostridium difficile*.

Scientists investigate the effect that probiotic drinks have on patients developing diarrhoea and on patients having *Clostridium difficile* bacteria in their faeces.

The scientists give some patients a probiotic drink and compare these patients with a control group.

The table shows the scientists' results.

| Patient group | Number of patients | Number of patients with diarrhoea | Number of patients with *Clostridium difficile* in their faeces |
|---|---|---|---|
| **probiotic drink** | 57 | 7 | 0 |
| **control** | 56 | 19 | 17 |

(i) Give the meaning of the term **control group**.

**(1)**

(ii) Discuss whether the results show links between having a probiotic drink and the likelihood of developing diarrhoea or having *Clostridium difficile* in the faeces.

Use information from the table and your own knowledge in your answer.

**(5)**

**(Total for Question 5 = 13 marks)**

**6** Enzymes in biological washing powders help remove stains from clothing.

Some people claim that adding salt to washing powder can improve stain removal.

Design an investigation to find out if adding salt to washing powder can improve stain removal.
Include experimental details in your answer and write in full sentences.

**(6)**

**(Total for Question 6 = 6 marks)**

**TOTAL FOR PAPER = 60 MARKS**

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