Candidate surname

Other names

Pearson Edexcel
International GCSE (9–1)

Centre Number

Candidate Number

Time 1 hour 10 minutes

Paper reference

4SS0/1B

Science (Single Award)
PAPER 1B: Biology

You must have:
Ruler
Calculator

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*.
- Show all the steps in any calculations and state the units.
- 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 ☒.

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.
- Good luck with your examination.

Turn over ▶

P66634A0120

Pearson

...

Answer ALL questions.

1 The diagram shows *Chlamydomonas*, a single-celled protoctist that is found in water.

flagella

vacuole

B

chloroplast

A

15 μm

starch grain

cell wall
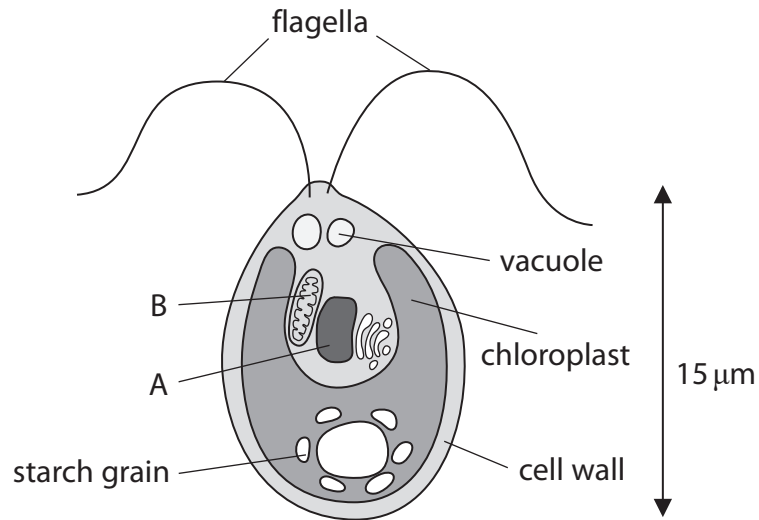
(a) Name the structures labelled A and B.

(2)

A ....

B ....

(b) (i) *Chlamydomonas* has some structures that are normally found in plant cells, but not found in animal cells.

Name two of these structures.

(2)

1 ....

2 ....

(ii) State why *Chlamydomonas* is not classified as a plant.

(1)

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(c) Explain how *Chlamydomonas* obtains energy.

(2)

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(d) *Chlamydomonas* has flagella.

Suggest a function of these flagella.

(1)

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(e) The magnification of the cell in the diagram is calculated using this formula.

$$\text{magnification} = \frac{\text{length of cell in diagram}}{\text{actual length of cell}}$$

The actual length of the cell is $15\,\mu\text{m}$.

Calculate the magnification of the diagram.

(2)

magnification = ...

(Total for Question 1 = 10 marks)

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P66634A0420

2 A student uses this apparatus to investigate the effect of light intensity on the rate of gas production in pondweed.
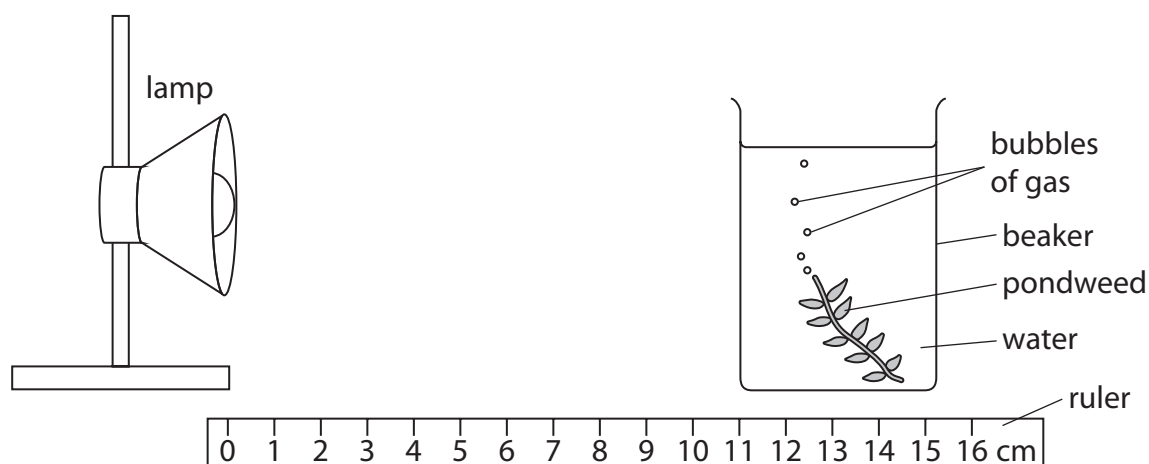
This is the student's method.

- place a cut piece of pondweed in a beaker of water
- place a lamp 11 cm from the beaker
- count the number of bubbles of gas released from the cut end of the pondweed in one minute
- repeat this count for two more one-minute periods

The student repeats the method, moving the lamp 2 cm nearer the beaker each time.

(a) Which of these is the gas given off by the pondweed?

(1)

- ☒ **A** carbon dioxide
- ☒ **B** carbon monoxide
- ☒ **C** methane
- ☒ **D** oxygen

(b) (i) Name the independent variable in this investigation.

(1)

....

(ii) Give an abiotic variable that the student should control in his investigation.

(1)

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(c) The table shows the student's results.

Distance of lamp from beaker in cm	Number of bubbles released per minute			
	Count 1	Count 2	Count 3	Mean (average)
1	20	20	19	20
3	20	18	18	19
5	14	16	16	
7	9	10	11	10
9	4	5	5	5
11	2	3	1	2

(i) Complete the table by calculating the mean number of bubbles released per minute at a distance of 5 cm.

(1)

mean number = ...

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

Use a ruler to join your points with straight lines.

(5)
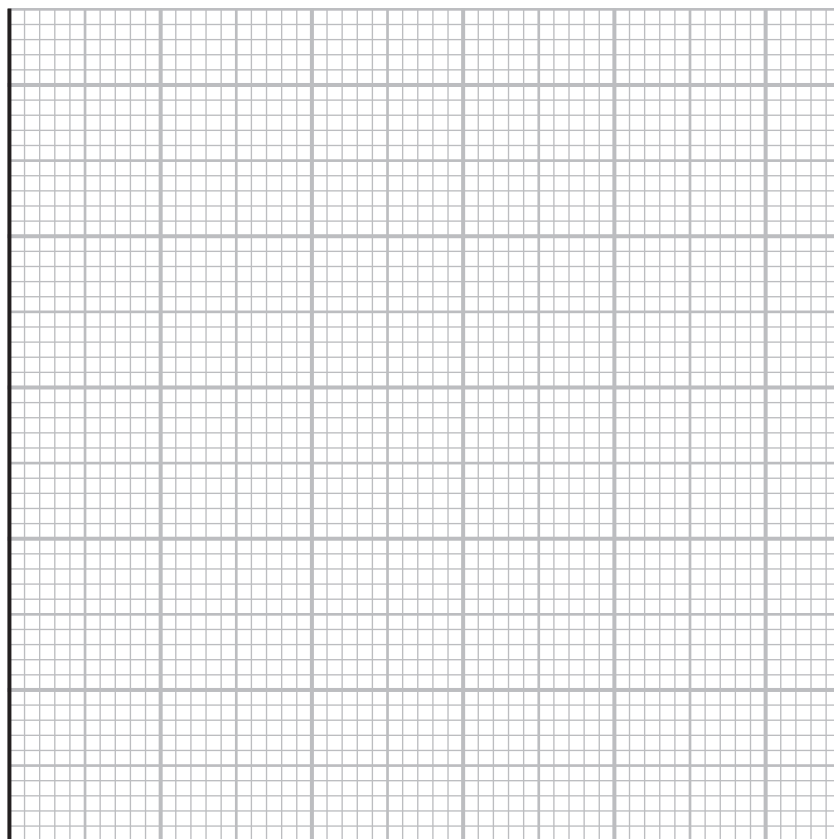
(iii) Explain the relationship between distance and mean number of bubbles released.

(3)

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(d) Explain one other factor that can affect the rate of gas production in this plant.

(2)

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(Total for Question 2 = 14 marks)

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P66634A0920

3 Human blood cells have different roles within the body.

(a) The diagram shows a blood sample containing layers labelled P, Q and R.

The sample has been spun in a machine called a centrifuge, which separates the components into layers depending on their density.
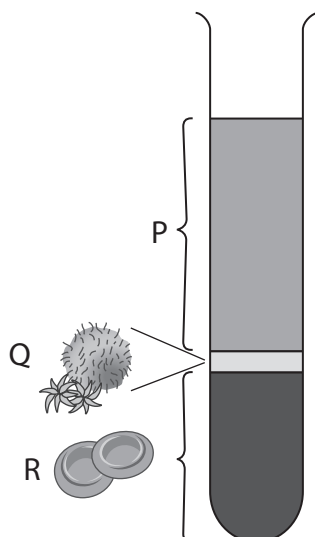
(i) Which component does layer P contain?

(1)

⊠ **A** plasma

⊠ **B** platelets

⊠ **C** red cells

⊠ **D** white cells

(ii) The diagram can be used to estimate the percentage of total blood volume that is made up by each layer.

The estimated percentage of each layer is

(1)

⊠ **A** P 5% Q 40% R 55%

⊠ **B** P 40% Q 55% R 5%

⊠ **C** P 55% Q 5% R 40%

⊠ **D** P 55% Q 40% R 5%

(iii) Some people have a condition called anaemia, in which the blood contains less haemoglobin. This alters the percentage of each layer.

Describe how a blood sample from a person with anaemia would differ in appearance from a normal blood sample.

(1)

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(b) Explain how white blood cells protect the body from disease.

(4)

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(c) Name two substances that are transported around the body in plasma.

(2)

1 ....

2 ....

(Total for Question 3 = 9 marks)

4 Pea plants can grow from seeds that are wrinkled or seeds that are round.

A scientist carried out a number of crosses using pea plants.

wrinkled   round

(Source: © Martin Shields/Alamy Stock Photo)

(a) In the first cross, the scientist takes pollen from a flower of a plant grown from a wrinkled seed. She transfers the pollen to a flower of a plant grown from a round seed.

All the seeds produced by pollinating the plant are round.

In pollination, pollen is transferred from

(1)

    ☒   **A** anther to petal

    ☒   **B** anther to stigma

    ☒   **C** filament to ovary

    ☒   **D** stigma to style

(b) The scientist grows the round seeds produced from the first cross into adult plants.

In the second cross, she allows these adult plants to self-pollinate so that each flower self-fertilises.

She then collects and observes all the seeds produced from the second cross.

(i) Suggest how the scientist could ensure that flowers only self-pollinate.

(1)

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(ii) Draw a genetic diagram to represent the second cross.

Include the genotypes of the self-pollinating plants, the gametes they produce and the ratio of the genotypes and phenotypes in the offspring.

(4)

(c) Plants can reproduce sexually and asexually.

Give three differences between sexual and asexual reproduction.

(3)

1 ....

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2 ....

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3 ....

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(Total for Question 4 = 9 marks)

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5 Two different areas, A and B, of a woodland habitat were studied.
This food chain in area A was observed.

oak leaves ⟶ caterpillars ⟶ blue tits ⟶ sparrowhawks

(a) (i) Give the producer in this food chain.

(1)

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(ii) Give the tertiary consumer in this food chain.

(1)

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(b) A sample is taken from area A of the woodland.

Table 1 shows the number of individuals of each species recorded in area A.

Area A	
Species	**Number**
oak leaves	150 000
caterpillars	12 000
blue tits	140
sparrowhawks	2

Table 1

(i) Draw a labelled pyramid of numbers for this data.

(3)

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(ii) A sample is also taken from area B in the woodland.

Table 2 shows the number of individuals of each species recorded in each area.

Species	Area A	Area B
	Number	Number
oak leaves	150 000	190 000
caterpillars	12 000	8000
blue tits	140	90
sparrowhawks	2	1

Table 2

A scientist concludes that, because area B is next to farmland, the differences in species numbers are due to the farmer using a chemical to kill insects on his land.

Evaluate this claim.

(5)

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(Total for Question 5 = 10 marks)

6 Organisms can be genetically modified (GM) by changing their DNA.

(a) Explain how enzymes are used to modify the DNA of an organism.

(2)

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(b) GM plants can be produced that can survive very low temperatures.

Design an investigation to find out if these GM plants are more able to survive low temperatures than non-GM plants.

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

(6)

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(Total for Question 6 = 8 marks)

TOTAL FOR PAPER = 60 MARKS

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