Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

3898204780

BIOLOGY **5090/42**

Paper 4 Alternative to Practical **May/June 2024**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Any blank pages are indicated.

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1 A student investigated the structure and nutrient content of a flower.

Fig. 1.1 shows the flower. Some petals have been removed so that the internal structure can be clearly seen.

Fig. 1.1

(a) **(i)** Make a large drawing of the flower as it appears in Fig. 1.1 in the space below.

[5]

(ii) On your drawing, draw a line and label it **P** to show where pollen must land when pollination takes place. [1]

(b) The student tested two parts of the flower, **A** and **B**, for their nutrient content.

The student tested both parts with Benedict's solution, biuret reagent and iodine solution.

(i) Draw a table in which to record the results of the student's tests in the space below.

[4]

(ii) At the end of the tests, the student noted:

- part **A** tested positive with Benedict's solution and negative with biuret reagent and iodine solution
- part **B** tested positive with biuret reagent and iodine solution and negative with Benedict's solution.

In the table you have drawn, record the colours the student would have observed at the end of each test.

[3]

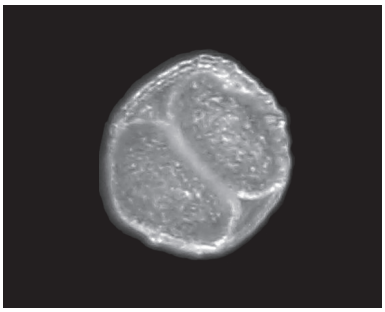
(iii) State the nutrients present in:

part **A** .....

part **B** .....

[3]

(c) Fig. 1.2 is a photomicrograph of a pollen grain.



×400

Fig. 1.2

(i) Measure and record the diameter of the pollen grain at its widest point.

diameter ..... mm [1]

(ii) Calculate the diameter of the **actual** pollen grain and record your answer to 2 decimal places.

Space for working.

diameter of the actual pollen grain ..... [3]

(iii) Fig. 1.3 is a photomicrograph of a pollen grain from a different species of plant.

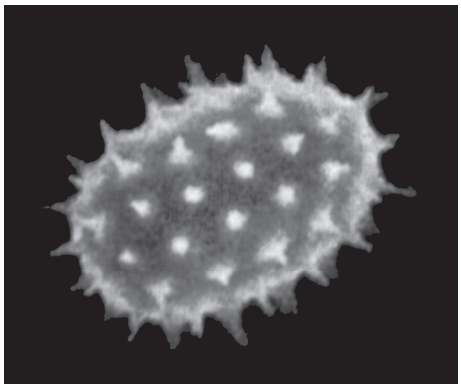


Fig. 1.3

Describe **two visible** differences in the structure of the pollen grains in Fig. 1.2 and Fig. 1.3.

	Fig. 1.2 pollen grain	**Fig. 1.3 pollen grain**
1		
2		

[2]

[Total: 22]

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2 A student investigated the number of plants on a school field.

This was done by examining small samples of the field using a square frame measuring 0.5 m × 0.5 m.

Fig. 2.1 shows the plants in one of these 0.5 m × 0.5 m samples.

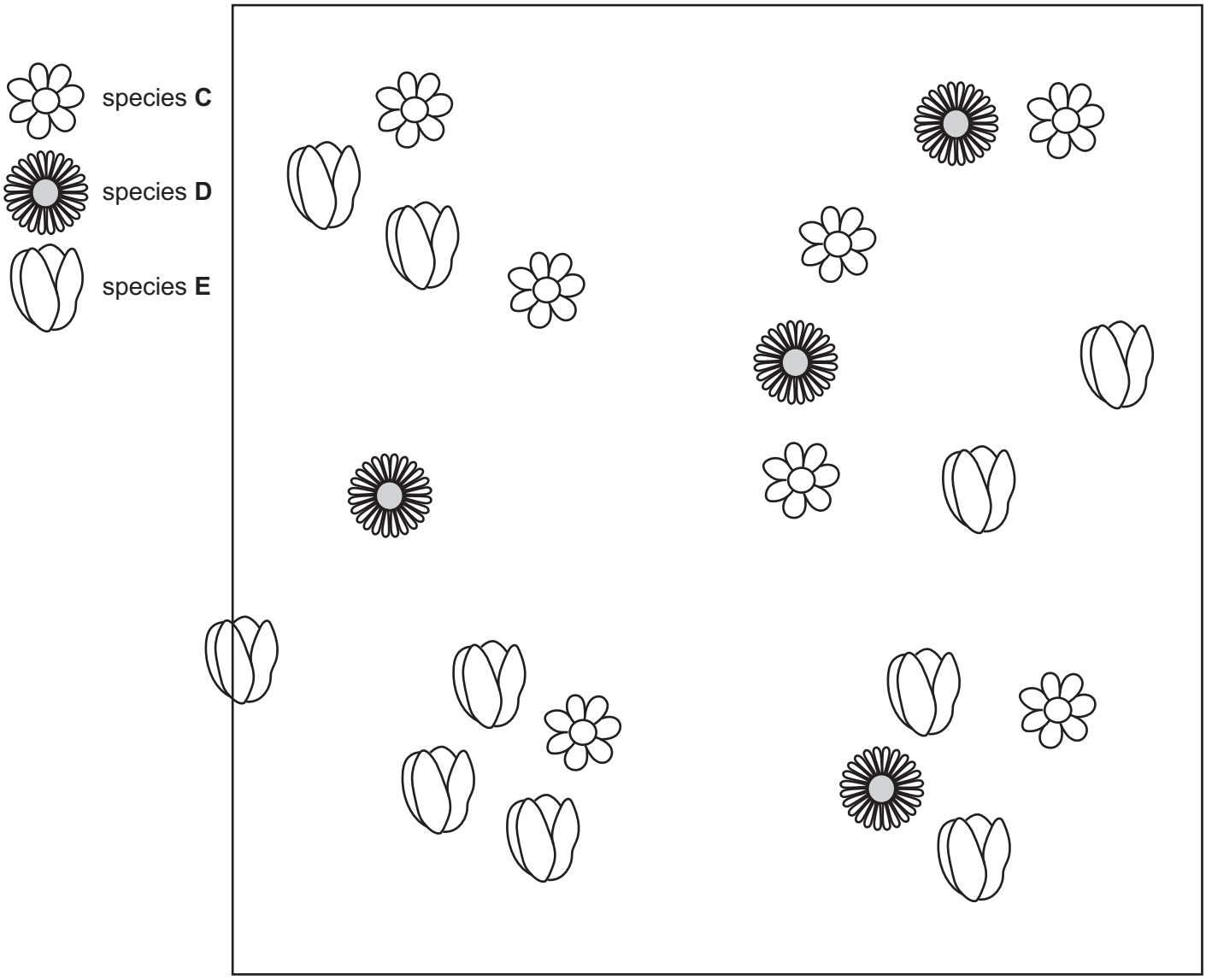

Fig. 2.1

(a) The sample contained three different plant species.

The student counted the number of plants of each of these species in this sample.

One plant was **not** fully within the square frame. Suggest and explain what you would do about this plant.

.....

..... [1]

(b) Count the number of plants of species **E** in Fig. 2.1, taking into account your answer to **(a)**.

Record your answer in Table 2.1.

Table 2.1

plant species	number of plants in the sample	estimated number of plants in the whole field
C	7	5600
D	4	3200
E		

[1]

(c) The whole field measured 10 m × 20 m.

Use the sample in Fig. 2.1 to estimate the number of plants of species **E** in the whole field and record this value in Table 2.1.

Show your working. [2]

(d) Explain why the student counted the numbers of plants in samples of the field instead of counting the number of plants in the whole field.

.....

..... [1]

(e) Suggest **two** reasons why taking several samples would improve the accuracy of the estimate for the number of plants in the whole field.

1 .....

.....

.....

2 .....

.....

.....

[2]

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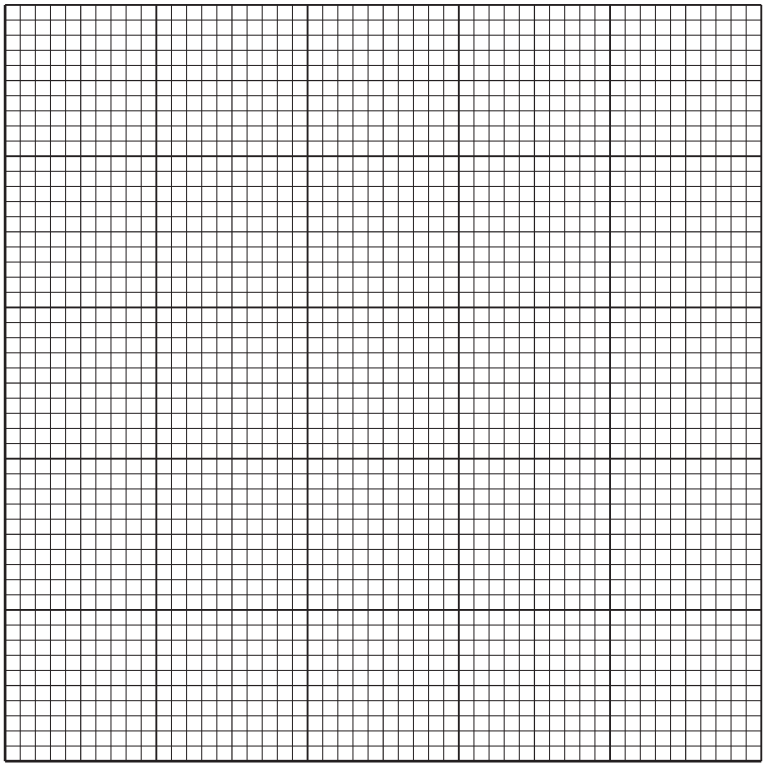
(f) Use the data in Table 2.1 to construct a bar chart to show the estimated number of plants of species **C**, **D** and **E** in the whole field.



[4]

[Total: 11]

3 **(a)** Plants can be provided with fertiliser to help them grow.

Some students were provided with germinated seeds of the same species in some shallow dishes and a 10% fertiliser solution. One dish is shown in Fig. 3.1.

The students had access to any other common laboratory apparatus.

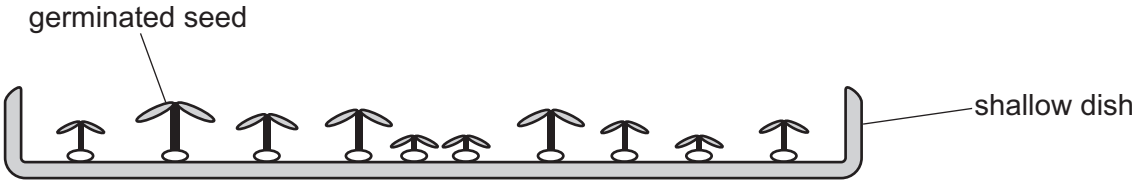


Fig. 3.1

Plan an investigation the students could carry out to find the effect of different fertiliser concentrations on plant growth.

.....

.....

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..... [6]

(b) Identify the independent variable in this investigation.

..... [1]

[Total: 7]

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