Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1134997165

BIOLOGY **5090/31**

Paper 3 Practical Test **May/June 2024**

1 hour 30 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

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 [ ].

For Examiner's Use	
1	
2	
3	
Total	

This document has **8** pages.

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[Turn over

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In order to plan the best use of your time, read through all the questions on this paper carefully before starting work.

1 You are going to investigate the structure and nutrient content of a flower. You are provided with a flower and samples of substances **A** and **B** from a flower.

Carefully remove some petals from the flower so that you leave **two** petals that are next to each other.

(a) (i) Place the flower with two petals on the white tile. Ensure that the petals are resting on the tile so that you can see the internal parts of the flower clearly. Examine the flower carefully with a hand lens.

Make a large drawing of the two petals and the internal parts of the flower 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]

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(b) (i) You are going to test substances **A** and **B** for their nutrient content using Benedict's solution, biuret reagent and iodine solution.

Draw a table in which to record the results of your tests in the space below.

[4]

To carry out the tests, follow these instructions, making sure that you label the test-tubes so that you know which test is being done on which substance.

Raise your hand when you are ready to be supplied with hot water in your water-bath.

(ii) Measure and record the temperature of the water in the water-bath. ..... [1]

- Pour about 1 cm depth of substance **A** into each of three clean test-tubes.
- Add about 1 cm depth of Benedict's solution to one of these test-tubes and place it in your hot water-bath.
- Add about 1 cm depth of biuret reagent to another one of these test-tubes and place it in the test-tube rack.
- Add a few drops of iodine solution to the third test-tube and place it in the test-tube rack.
- After five minutes observe these test-tubes and observe the colour of the solution at the end of each test.
- Repeat the above procedure with clean test-tubes and substance **B**. Raise your hand if you require more hot water. You do **not** need to record the temperature of the water again.

(iii) Record your observations in the table you have drawn in **(b)(i)**. [3]

(iv) State the nutrients present in:

substance **A** .....

substance **B** .....
[2]

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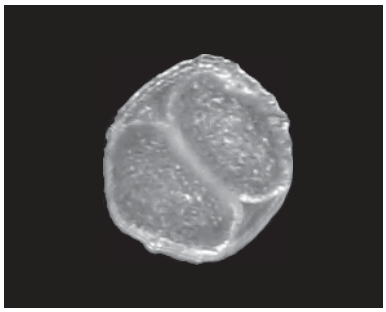
(c) Fig. 1.1 is a photomicrograph of a pollen grain.



×400

Fig. 1.1

(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. 1.2 is a photomicrograph of a pollen grain from a different species of plant.

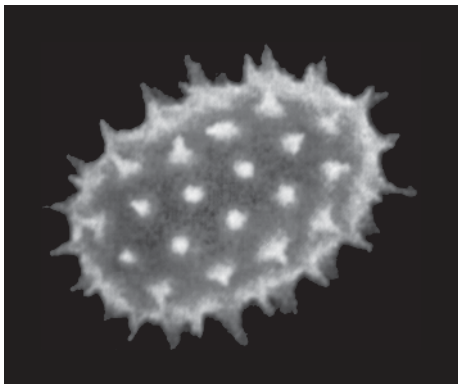


Fig. 1.2

Describe **two visible** differences in the structure of the pollen grains in Fig. 1.1 and Fig. 1.2.

	Fig. 1.1 pollen grain	Fig. 1.2 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.

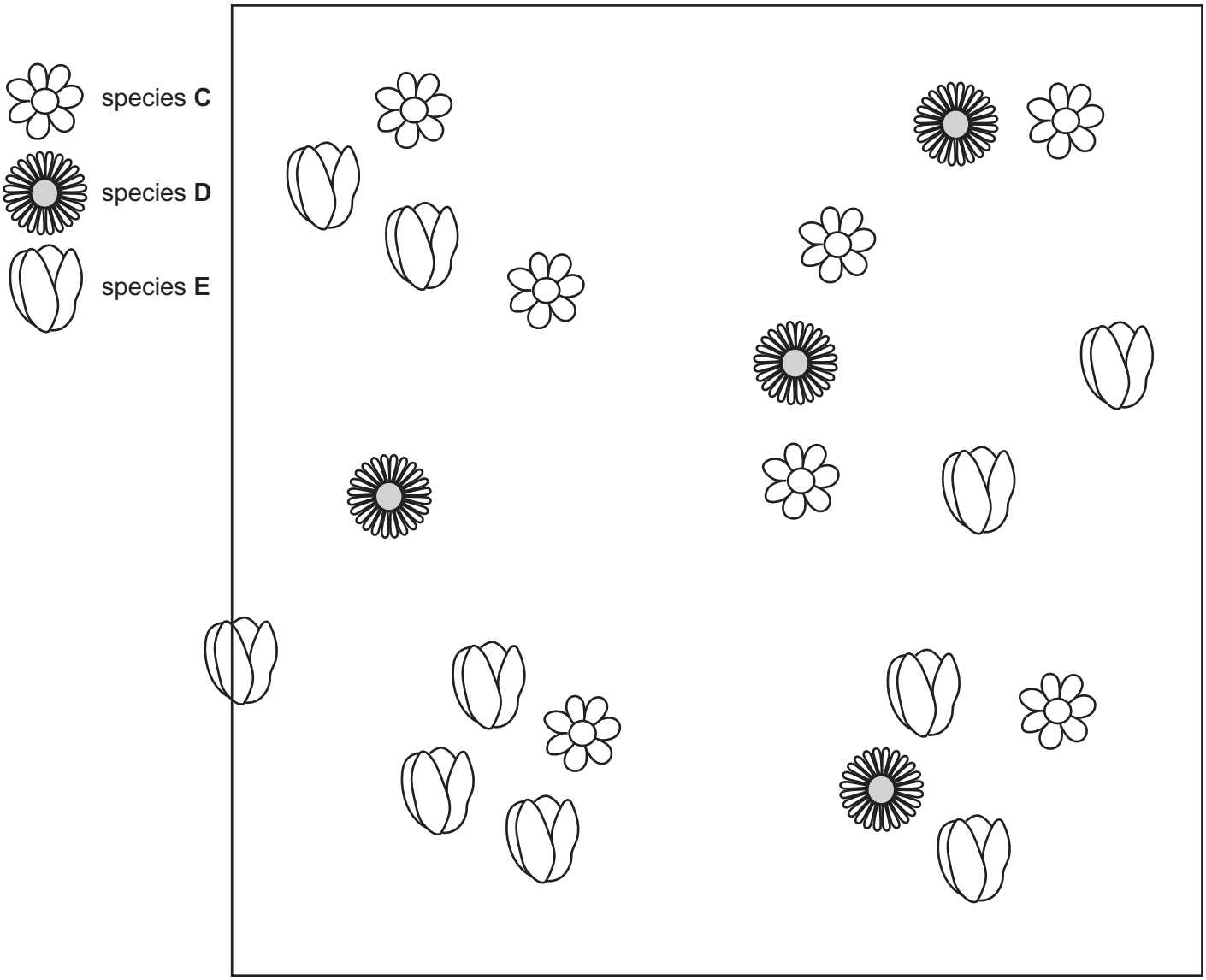

Fig. 2.1

(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]

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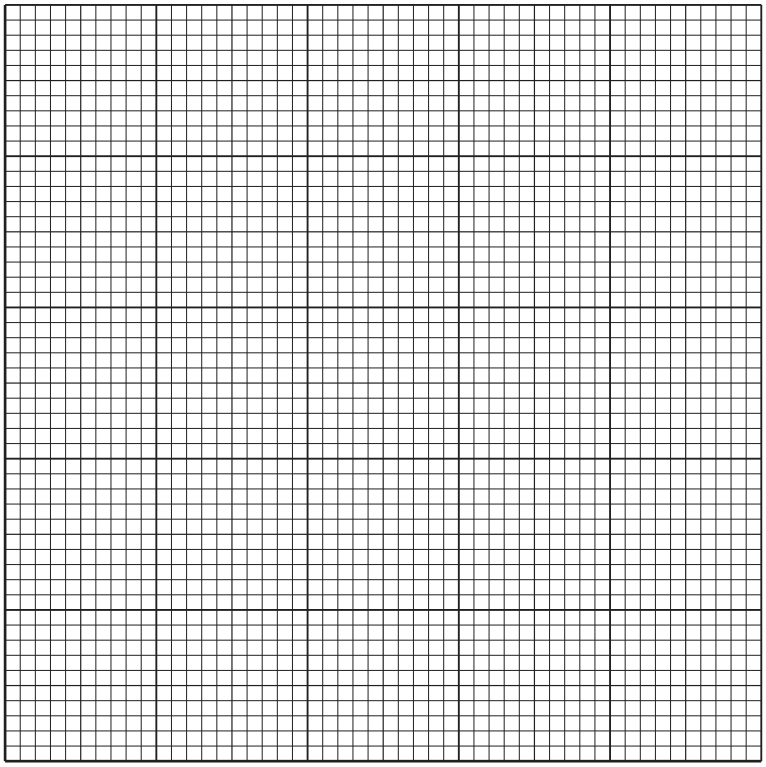
(f) Use the data in Table 2.1 to construct a bar chart to show the estimated number of plants of species **C**, **D** and **E** in the whole field.



[4]

[Total: 11]

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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.

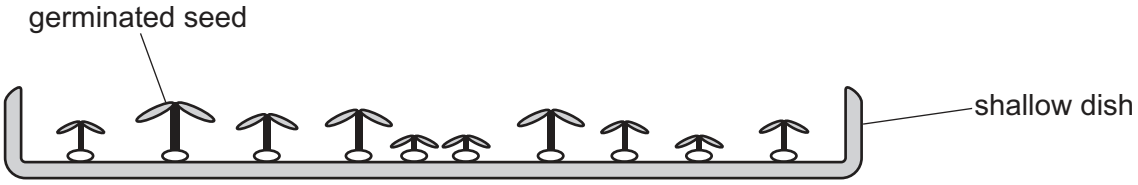

Fig. 3.1

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

.....

.....

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.....

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.....

.....

..... [6]

(b) Identify the independent variable in this investigation.

..... [1]

[Total: 7]

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