Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0303755506

BIOLOGY **5090/62**

Paper 6 Alternative to Practical **October/November 2022**

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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Answer **all** questions in the spaces provided.

1 Yeast is a microorganism that can use the sugar sucrose to obtain energy for growth. When yeast is added to a sucrose solution it grows, producing bubbles of a gas that cannot escape from the mixture and so the volume of the mixture increases.

A student investigated the effect of varying the concentration of sucrose solution on the growth of yeast, by measuring this increase in volume.

He started with a supply of 5% sucrose solution.

He labelled four test-tubes, **A**, **B**, **C** and **D**.

(a) (i) State what you would use to label the test-tubes.

..... [1]

He followed this procedure:

- add 15 cm^3 of 5% sucrose solution to test-tube **A**
- add 9 cm^3 of 5% sucrose solution and 6 cm^3 of distilled water to test-tube **B** to produce 15 cm^3 of 3% sucrose solution
- add 3 cm^3 of 5% sucrose solution and 12 cm^3 of distilled water to test-tube **C** to produce 15 cm^3 of 1% sucrose solution
- add 15 cm^3 of distilled water to test-tube **D**.

(ii) He measured the volumes of 5% sucrose solution and distilled water with a small measuring cylinder. Describe how he could ensure that the dilutions produced were correct.

.....

..... [1]

(b) He set up a beaker as a water-bath at a temperature of 40 °C.

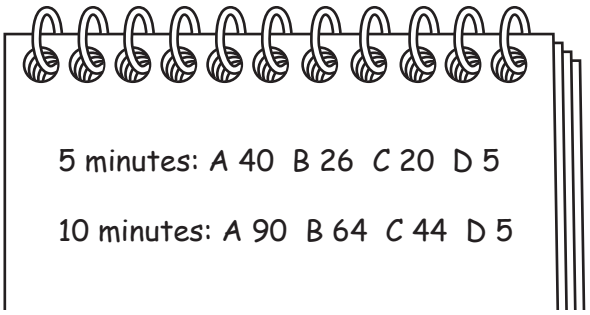
He added 1 g of yeast to each test-tube and stirred each mixture well.

The four test-tubes were then placed in the water-bath.

He decided that any change in height of the mixture in each test-tube would be an indication of a change in its volume and so of how much the yeast had grown.

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He measured the **total increase** in height of the mixtures in the test-tubes in mm after 5 minutes and 10 minutes and recorded them in his notebook.



(i) Complete the table using the information given.

test-tube	percentage sucrose solution	.....	
		after 5 minutes	after 10 minutes
A			
B			
C			
D			

[4]

(ii) Use his results to describe the effect of sucrose concentration on yeast growth.

.....

.....

.....

.....

.....

..... [3]

(iii) Suggest an explanation for the results in test-tube **D**.

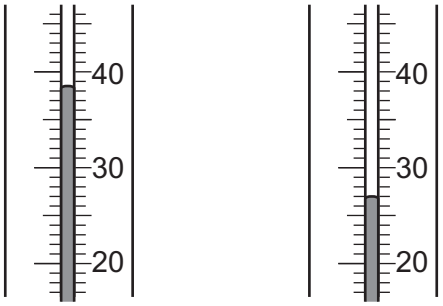
.....

.....

.....

..... [1]

(c) **(i)** He wanted to carry out this investigation at a temperature of 40 °C. The thermometers in the diagram show the temperature of the water when he first placed the test-tubes in the water-bath (**E**) and after 10 minutes (**F**).



Record the temperature when the test-tubes were first placed in the water-bath.

.....

Record the temperature after 10 minutes.

.....

[2]

(ii) Suggest how the temperature of the yeast mixtures could have been maintained at 40 °C throughout the investigation.

.....

.....

.....

.....

.....

..... [3]

(d) Yeast uses sucrose to obtain energy for growth.

Suggest a simple method to demonstrate that this process requires enzymes to be present in the yeast.

.....

.....

.....

.....

..... [3]

[Total: 18]

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2 A student thought that seeds might germinate better in the dark than in the light.

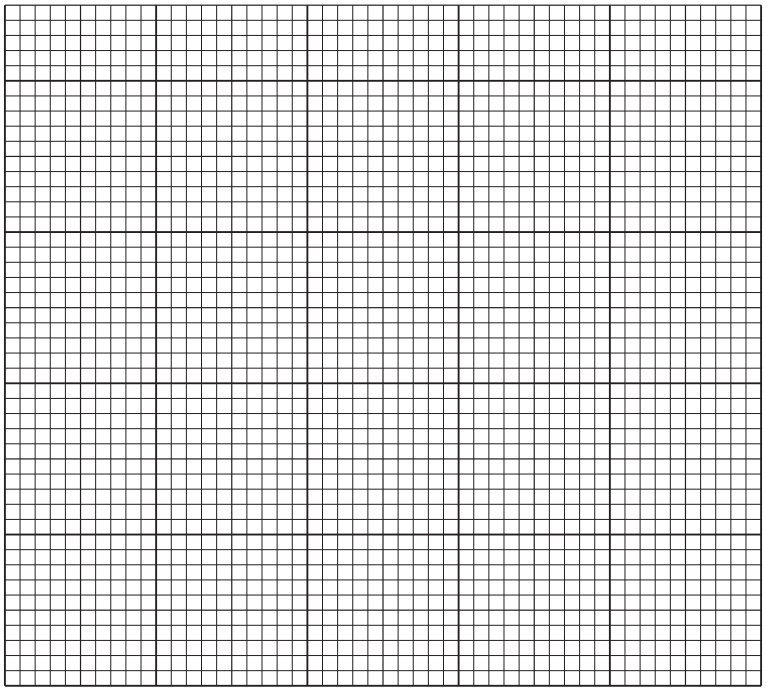
To investigate this she set up six identical Petri dishes each with 20 seeds on moist filter paper. Three of these dishes she placed in the dark and three under lights in the laboratory. The lights were left on all the time.

After each 24-hour period she counted and recorded the total number of seeds in each dish that had germinated. She then calculated the mean numbers of seeds (to the nearest whole number) that had germinated in the light and in the dark.

Her results are shown in the table.

time / hours	**seeds germinated / mean number per Petri dish**	
	light	**dark**
0	0	0
24	0	5
48	11	15
72	13	16
96	15	17

(a) (i) Construct line graphs of the data for seeds germinated in the light and in the dark using the same axes on the grid below. Join the points with straight lines.



[5]

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(ii) Use your graph to estimate the mean number of seeds that had germinated after 36 hours in the dark. Show your working on the graph.

mean number of seeds ..... [2]

(iii) Use the data and your graph to suggest what the student could conclude about the effect of light and dark on the germination of these seeds.

.....

.....

.....

..... [2]

(b) (i) State **two** variables other than light that the student should have controlled in her investigation.

.....

..... [2]

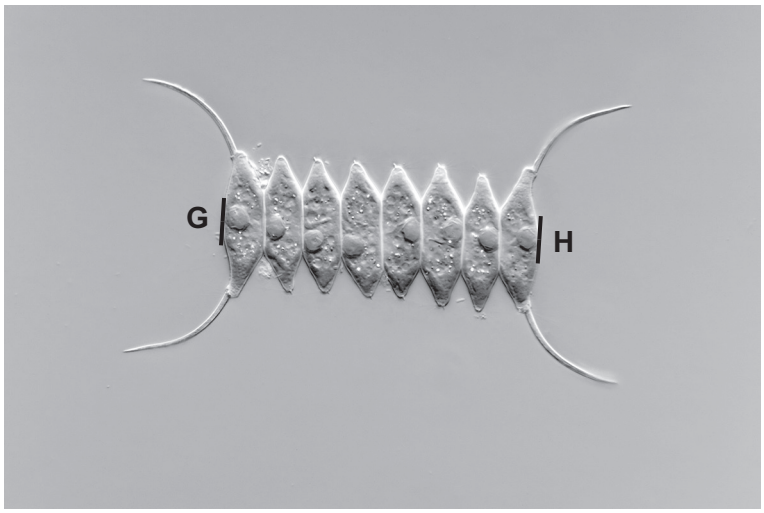
(ii) Suggest **one** reason for using 20 seeds in each of the Petri dishes in this investigation.

.....

..... [1]

[Total: 12]

3 The photomicrograph shows a simple plant that lives in ponds and lakes.



magnification ×630

(a) In the space below make a large drawing of the plant as it appears in the photomicrograph.

[5]

(b) Draw a straight line on the photomicrograph to join lines **G** and **H**. Measure the length of this line and record it.

.....

Use your measurement to calculate the actual length of the plant. Round your answer to 3 decimal places.

Space for working.

..... mm
[3]

(c) Describe how you would find out whether a sample of pond water contained this plant.

.....

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.....

.....

..... [2]

[Total: 10]

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