Cambridge Assessment International Education

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CANDIDATE NAME

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3262335927

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **October/November 2021**

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.

DC (PQ/JG) 211603/5

1 A student investigated the effect of temperature on the rate of respiration in yeast cells. When yeast cells respire they produce carbon dioxide gas.

In this investigation the gas was collected in a balloon that was attached to a test-tube containing a yeast suspension.

Step 1 The student prepared a hot water-bath and a cold water-bath.

Step 2 The student measured the temperature of the water in the hot water-bath and in the cold water-bath.

Step 3 A yeast suspension was stirred with a glass rod. 25 cm^3 of the yeast suspension was put into each of two test-tubes.

Step 4 A balloon was stretched over the top of each test-tube.

Step 5 One test-tube and balloon was put into the hot water-bath and the other test-tube and balloon was put into the cold water-bath, as shown in Fig. 1.1.

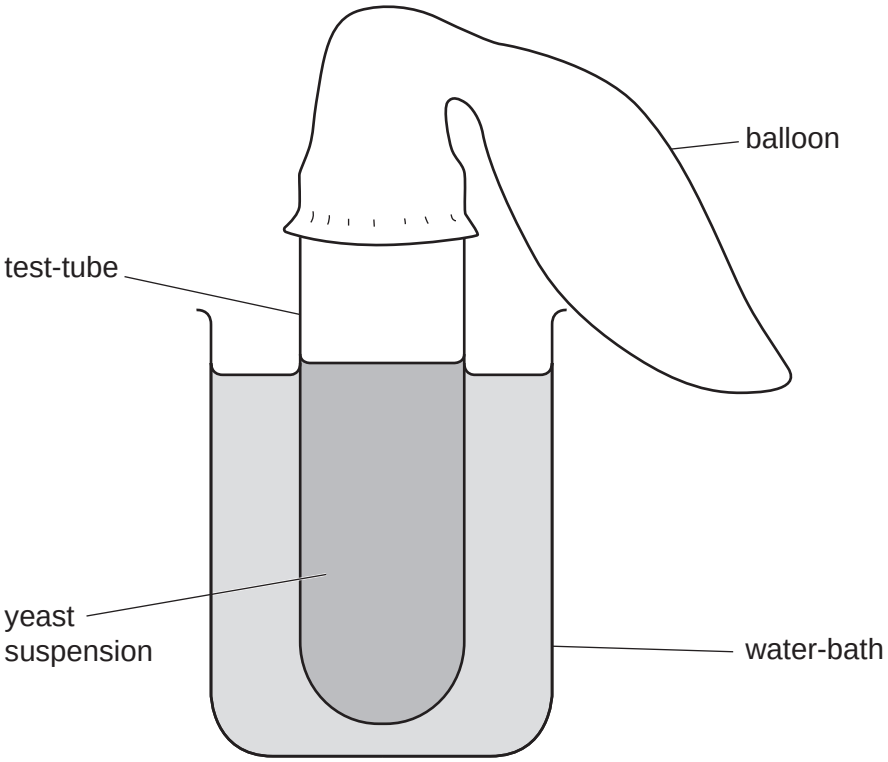

Fig. 1.1

Step 6 The circumference of each balloon was measured by placing a piece of string around the widest part of the balloon, as shown in Fig. 1.2. A ruler was then used to measure the length of the string that wrapped around each balloon once.

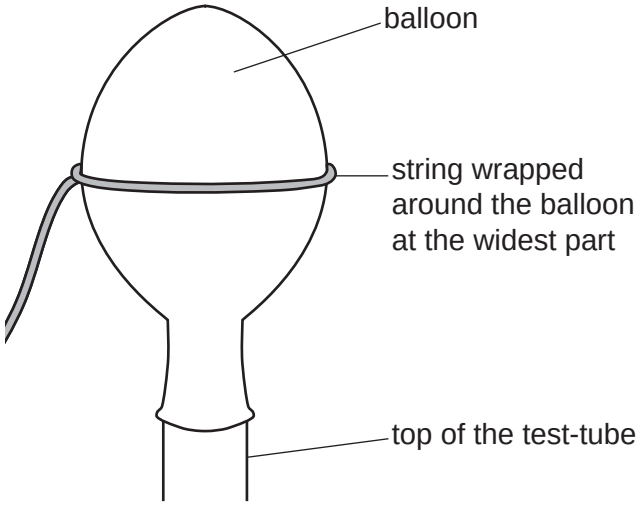

Fig. 1.2

Step 7 The circumference of each balloon was measured at 0 minutes, 5 minutes, 10 minutes and 15 minutes.

The student's results are shown in Fig. 1.3.

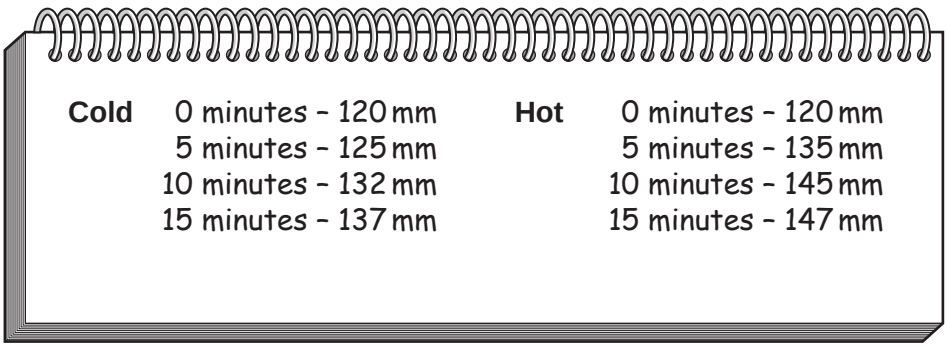

Fig. 1.3

(a) (i) Prepare a table and record the results shown in Fig. 1.3.

[3]

(ii) State a conclusion for the results shown in Fig. 1.3.

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..... [1]

(iii) Suggest why it was important to stir the yeast suspension in step 3.

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..... [1]

(iv) State **two** variables, other than stirring, that should be kept constant in this investigation.

1 .....

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2 .....

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[2]

(b) (i) Balloons and string were used to collect and measure the gas produced by the yeast cells.

Suggest another, more accurate, method of collecting and measuring the gas.

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..... [1]

(ii) State the name of an indicator which could be used to show that the gas produced by the yeast is carbon dioxide and give the result of a positive test.

indicator .....

positive test result .....
[2]

(c) (i) The temperatures of the water in the hot water-bath and in the cold water-bath were measured again at the end of the investigation. Fig. 1.4 is a diagram of the thermometers showing the temperatures in the two water-baths.

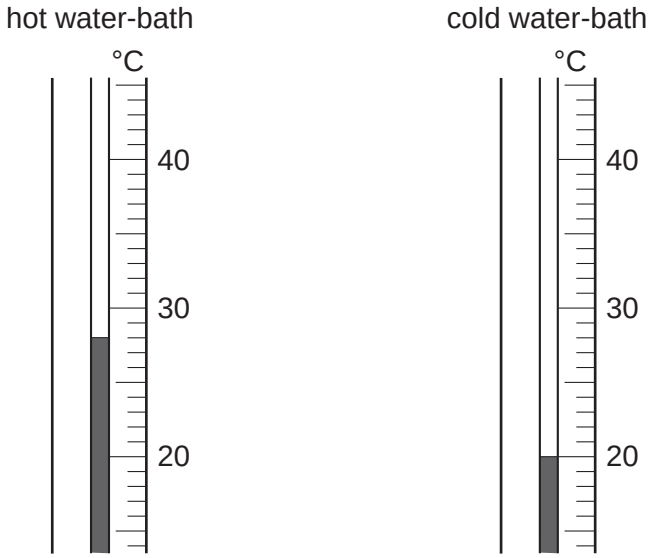

Fig. 1.4

Complete Table 1.1 by recording the temperatures from Fig. 1.4 and calculating the change in temperature.

Table 1.1

water-bath	temperature in step 2 / °C	temperature at the end of the investigation / °C	change in temperature / °C
hot	40		
cold	20		

[2]

(ii) Describe how the method could be modified to prevent a change in the temperature of a water-bath.

.....

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..... [1]

[Total: 13]

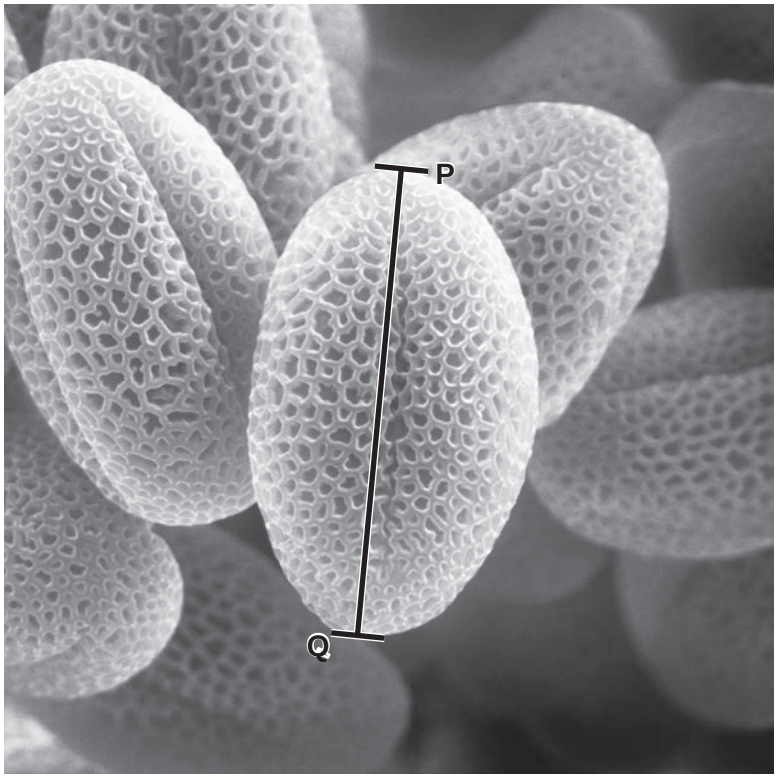
2 Fig. 2.1 is a photograph of a flower from the wind-pollinated grass plant, *Briza maxima*.

Fig. 2.1

(a) (i) Draw a large diagram of the flower in Fig. 2.1.

[4]

(ii) Fig. 2.2 is a photomicrograph of grass pollen grains.



magnification ×1500

Fig. 2.2

Measure the length of line **PQ** on Fig. 2.2.

length of **PQ** ..... mm

Calculate the actual length of the pollen grain using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual length of the pollen grain}}$$

Give your answer in millimetres and to **two** decimal places.

Space for working.

..... mm
[3]

(b) Scientists investigated the effect of wind speed on the average distance travelled by single pollen grains and groups of five pollen grains joined to form a clump. The pollen grains were dropped from a height of 2 m.

The results of the investigation are shown in Table 2.1.

Table 2.1

wind speed / m per s	average distance travelled by single pollen grains / m	average distance travelled by clumps of five pollen grains / m
0.0	0	0
0.2	38	21
0.4	81	39
0.6	118	55
0.8	154	70

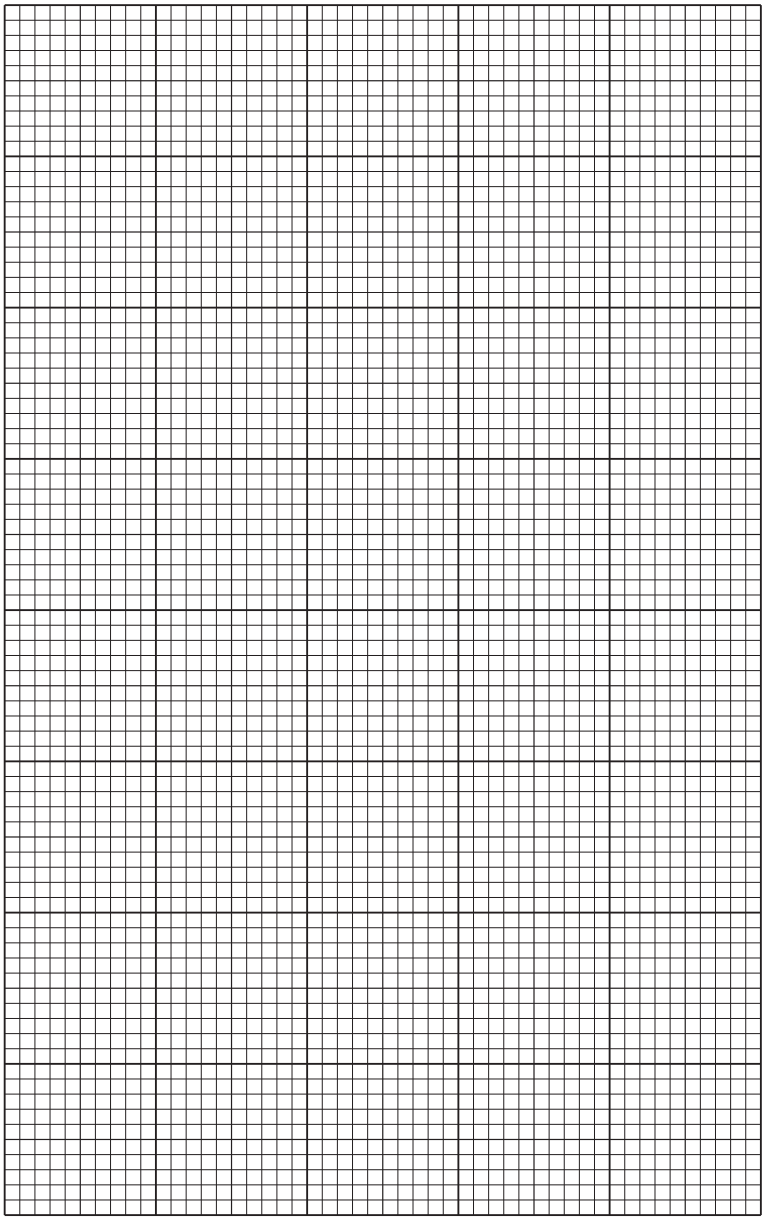
(i) Calculate the percentage decrease in the average distance travelled when the pollen grains fell as a clump compared to a single pollen grain, at a wind speed of 0.6 m per s.

Give your answer to **two** significant figures.

Space for working.

..... %
[3]

(ii) Plot a line graph on the grid of the data in Table 2.1. Include both sets of data and a key.



[5]

(iii) Use your graph to estimate the average distance travelled by **single** pollen grains at a wind speed of 0.5 m per s.

Show on your graph how you obtained your estimate.

..... m
[2]

(iv) Successful pollination results in fertilisation and the production of seeds.

Describe how you could test the seeds to show that they contain reducing sugars. Include the result of a positive test.

method .....

.....

.....

.....

positive test result .....

[3]

(c) (i) Plan an investigation to determine the effect of temperature on the rate of transpiration from leaves.

You may wish to include the apparatus listed and any other apparatus that you think is suitable in your plan:

- leafy plants
- electronic balance
- thermometer
- string
- stop-clock

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..... [6]

(ii) Humidity also affects the rate of transpiration from leaves.

Suggest how you could change the humidity that the leaves are exposed to in a transpiration investigation.

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..... [1]

[Total: 27]

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