Respiration

Question Paper 1

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Respiration
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Question Paper 1

Time Allowed: **48 minutes**

Score: **/40**

Percentage: **/100**

1 Yeast is a single-celled organism that is used in bread-making and brewing.

Some students carried out an investigation into respiration in an active yeast culture.

The active yeast culture was prepared in a glucose solution and was kept in a warm environment. The glucose was dissolved in cooled, boiled water, (boiling removed the gases from the water) before the yeast was added.

The yeast culture was stirred and $10\,cm^3$ added to each of test-tubes **A** and **B**.

In test-tube **B**, a few drops of oil were carefully added to form a layer on the surface of the yeast culture.

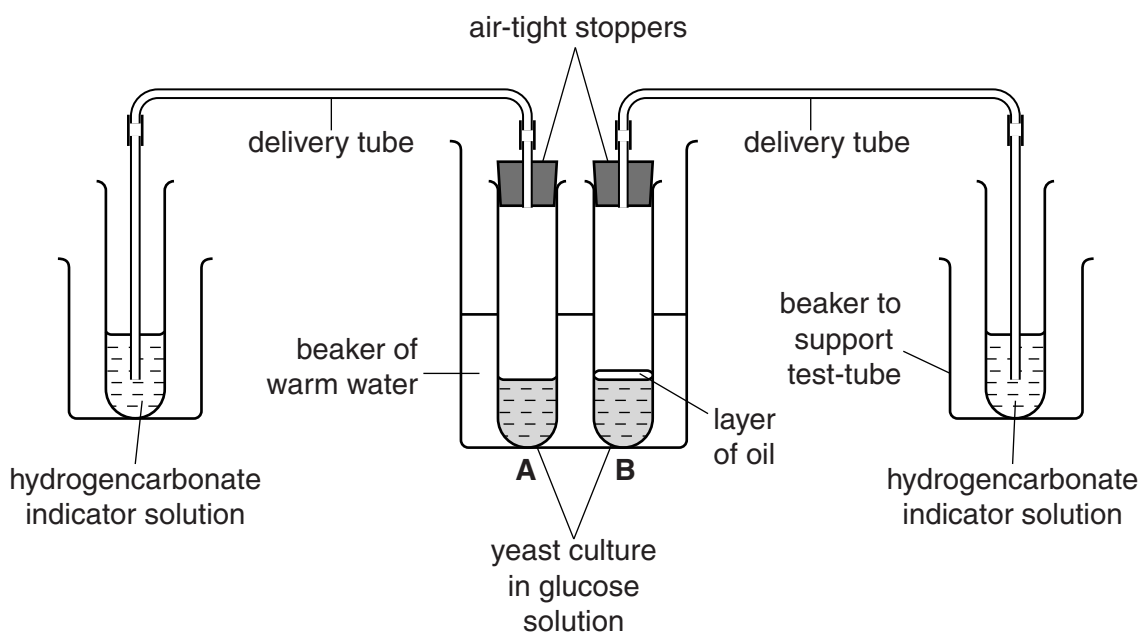The apparatus was set up as shown in Fig. 1.1.

Fig. 1.1

The appearance of the yeast cultures and hydrogencarbonate indicator solutions were recorded. The numbers of bubbles released from test-tubes **A** and **B** into the hydrogencarbonate indicator solution were also recorded.

This was repeated at five minute intervals.

The results and observations were recorded in Table 1.1.

Table 1.1

time / min	appearance of yeast culture in **A** and **B**		number of bubbles released in one minute		appearance of the hydrogencarbonate indicator solution	
	A	**B**	**A**	**B**	**A**	**B**
0	pale cream bubbles forming	pale cream no bubbles	0	0	red	red
5	foam starting to form on top	bubbles forming	5	4	pale red	red
10	thicker foam on top	frothy below oil	8	6	pale pink	pale red
15	thicker foam on top	frothy below oil	11	9	yellow-pink	pale pink red
20	foam 2 cm in depth	foam 0.5 mm in depth	16	12	yellow	yellow-pink

(a) (i) Draw a graph of the results on the grid below. Use the same set of axes to show the number of bubbles released in one minute for the 20 minute period from test-tubes **A** and **B**.

[5]

(ii) Describe **and** explain the results and observations shown in Table 1.1.

....

....

....

....

....

....

....

....

....

....

.... [5]

(iii) Suggest why the number of bubbles released per minute would decrease for both test-tubes **A** and **B** after a period of 24 hours.

....

....

.... [1]

(b) Explain why:

(i) the yeast culture was stirred at the beginning of the investigation

....

....

.... [1]

(ii) the oil was introduced into test-tube **B**

....

....

.... [1]
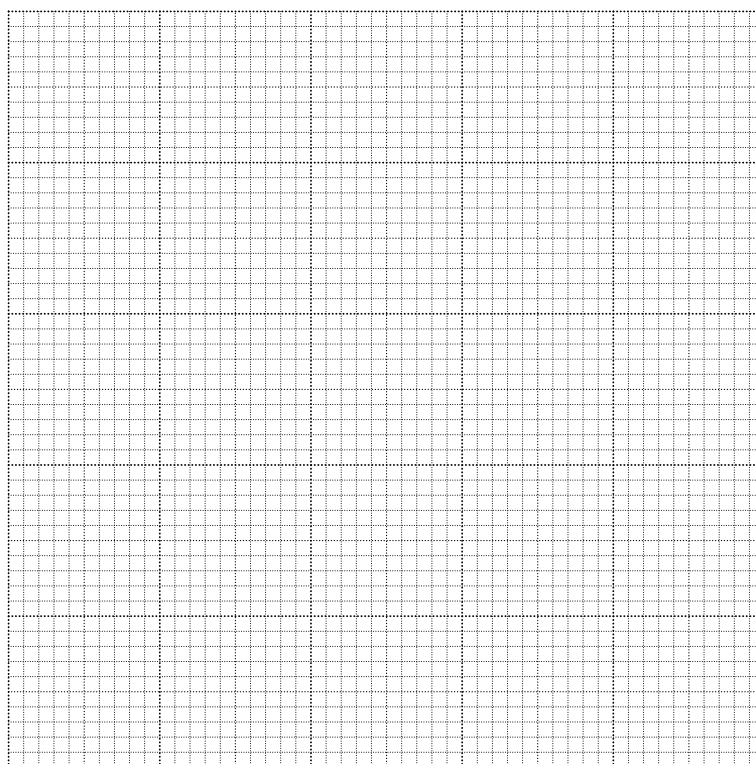
(iii) the test-tubes containing the yeast culture were kept in a container of warm water.

....

....

.... [1]

(c) For this investigation give:

(i) the independent variable (variable that is deliberately changed)

....

....

.... [1]

(ii) **two** variables that need to be controlled.

....

....

....

....

.... [2]

(d) The dependent variable in this investigation was the rate of respiration. This cannot be measured directly.

Describe how the rate of respiration was determined in this investigation.

....

....

....

....

.... [2]

(e) Fig. 1.2 shows yeast as seen using a microscope.

x 5000
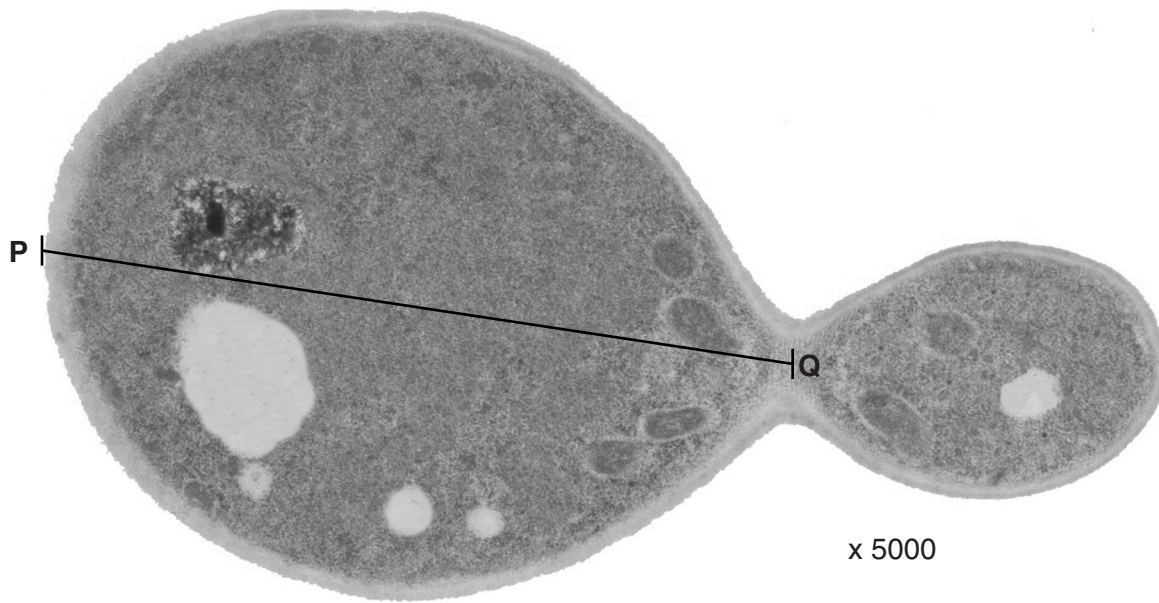
Fig. 1.2

(i) Name the process that is occurring in Fig. 1.2.

.... [1]

(ii) You are going to calculate the actual length of a yeast cell shown in Fig. 1.2.

Measure the length of line **PQ**.

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

Calculate the actual length of the yeast cell.

Show your working.

actual length of cell .... mm [3]

[Total: 23]

2 Yeast, *Saccharomyces cerevisiae*, is used in bread-making.

Some students mixed flour, sugar and a yeast suspension to make bread dough and investigate the rate at which the dough rises.

- 25 g of wheat flour and 1 g of sugar were weighed and placed in a beaker.

- 25 cm^3 of yeast suspension was added to the flour and sugar.

- The mixture was stirred with a glass rod until it formed a smooth paste. This was the bread dough.

- The narrow opening of three clean 20 cm^3 syringes was sealed as shown in Fig.1.1.

- 5 cm^3 of the dough was poured into each of the syringes.

- The syringes were placed vertically in a test-tube rack, as shown in Fig. 1.1.
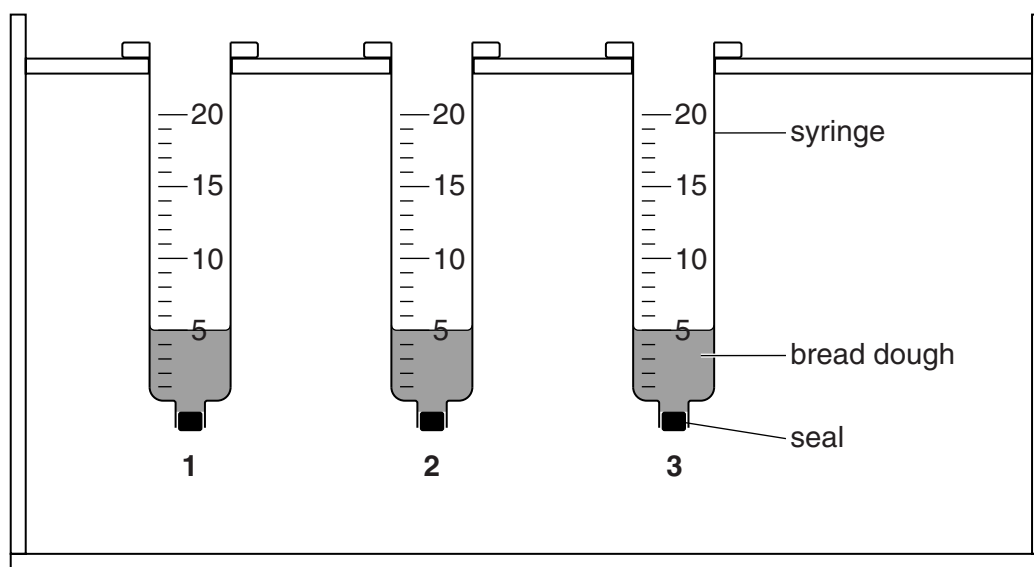
Fig. 1.1

- After 5 minutes, the volume of the dough in each syringe was measured and recorded.

- The volume of the dough in each syringe was then measured and recorded every 5 minutes for a total of 20 minutes.

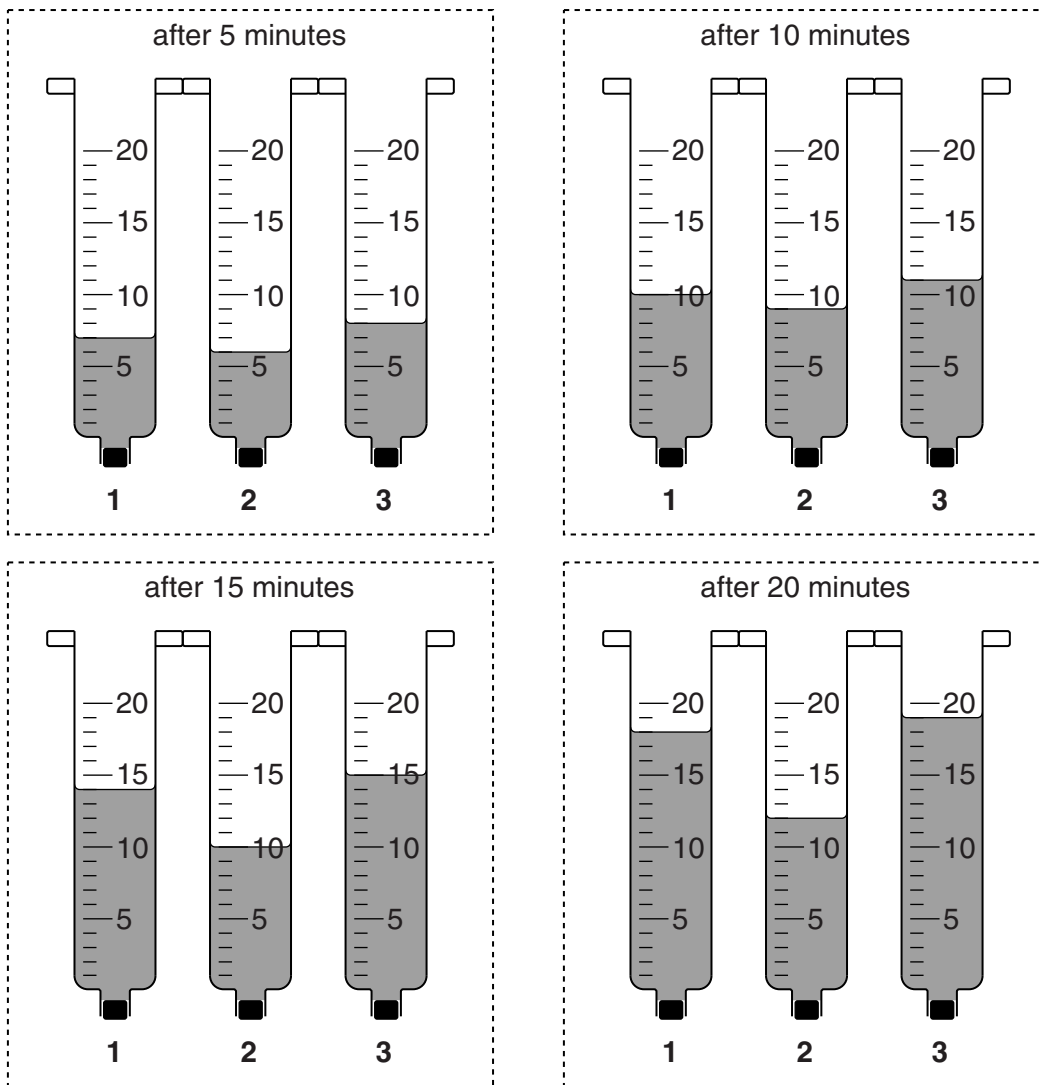Fig. 1.2. shows the appearance of the three syringes after 5, 10, 15 and 20 minutes.

Fig. 1.2

(a) Prepare a table to record the results of the investigation shown in Fig. 1.1 and Fig. 1.2.

Read the volume of the dough in each syringe and record it in your table.

[6]

(b) **(i)** Give a reason why **three** syringes were used.

....

....[1]

(ii) Identify the syringe in which the results may be anomalous and explain your choice.

....

....[1]

(iii) Calculate the average volume of the bread dough in the three syringes after 20 minutes.

Show your working.

Give your answer to the nearest whole number.

....cm^3 [1]

(c) Some students used the same method described in part **(a)** to investigate the effect of temperature on the volume of bread dough.

They used three $50\,cm^3$ syringes at each of seven temperatures.

The starting volume in each syringe was $5\,cm^3$.

Their results are recorded in Table 1.1.

Table 1.1

temperature / °C	average volume of bread dough after 20 minutes / cm^3	average increase in volume / cm^3
10	6	1
20	10	5
30	20	15
40	35	....
50	47	42
60	30	25
70	7	2

(i) Calculate the average increase in volume at 40 °C.

Write your answer in the space in Table 1.1. [1]

(ii) Use the data in Table 1.1 to plot a graph of the average increase in volume of bread dough against temperature.
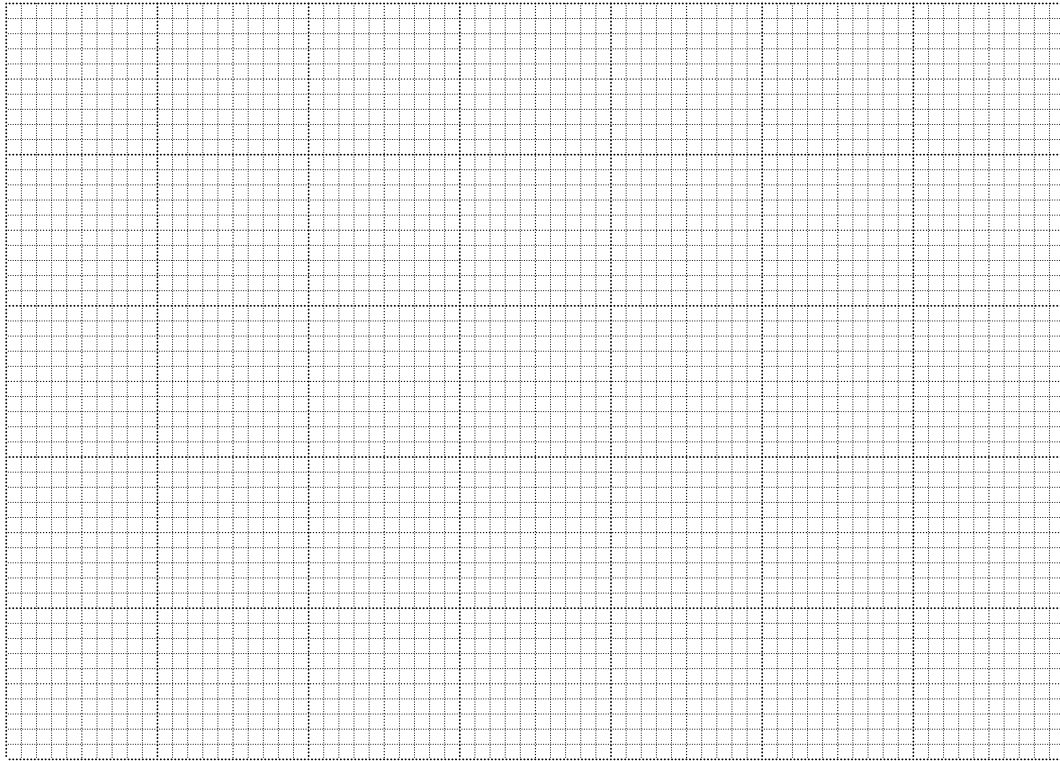
[4]

(iii) Describe the results shown by the graph.

....

....

....

....[2]

(iv) Suggest what the students could conclude from this investigation about the effect of temperature on the activity of yeast.

....

....[1]

[Total: 17]