Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

BIOLOGY HIGHER LEVEL

8321/3

PAPER 3 Practical Test

1 hour 30 minutes

Marks 40

2020

Additional Materials: As listed in Instructions to subject teachers.

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the question paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- You may use a non-programmable calculator.
- Do not write in the margin *For Examiner's Use*.
- Answer **all** questions.
- The number of marks is given in brackets [ ] at the end of each question or part question.

HIGHER LEVEL

For Examiner's Use	
1	
2	
Total	

Marker	
Checker	

This document consists of **9** printed pages and **3** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

1 The human body maintains a constant temperature regardless of the external temperature.

Fig. 1.1 shows the apparatus you will use to investigate change in temperature upon a change in environment.

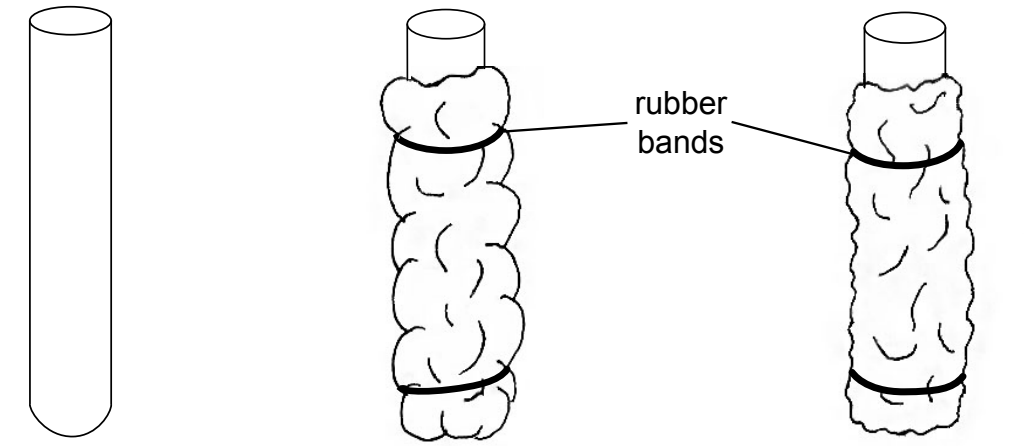


Fig. 1.1

Carefully read through the following instructions before you start with the experiment.

(a) (i) You are required to measure the temperature in each of the test-tubes every two minutes for a total of ten minutes.
Construct a suitable table to record your results in the space below.

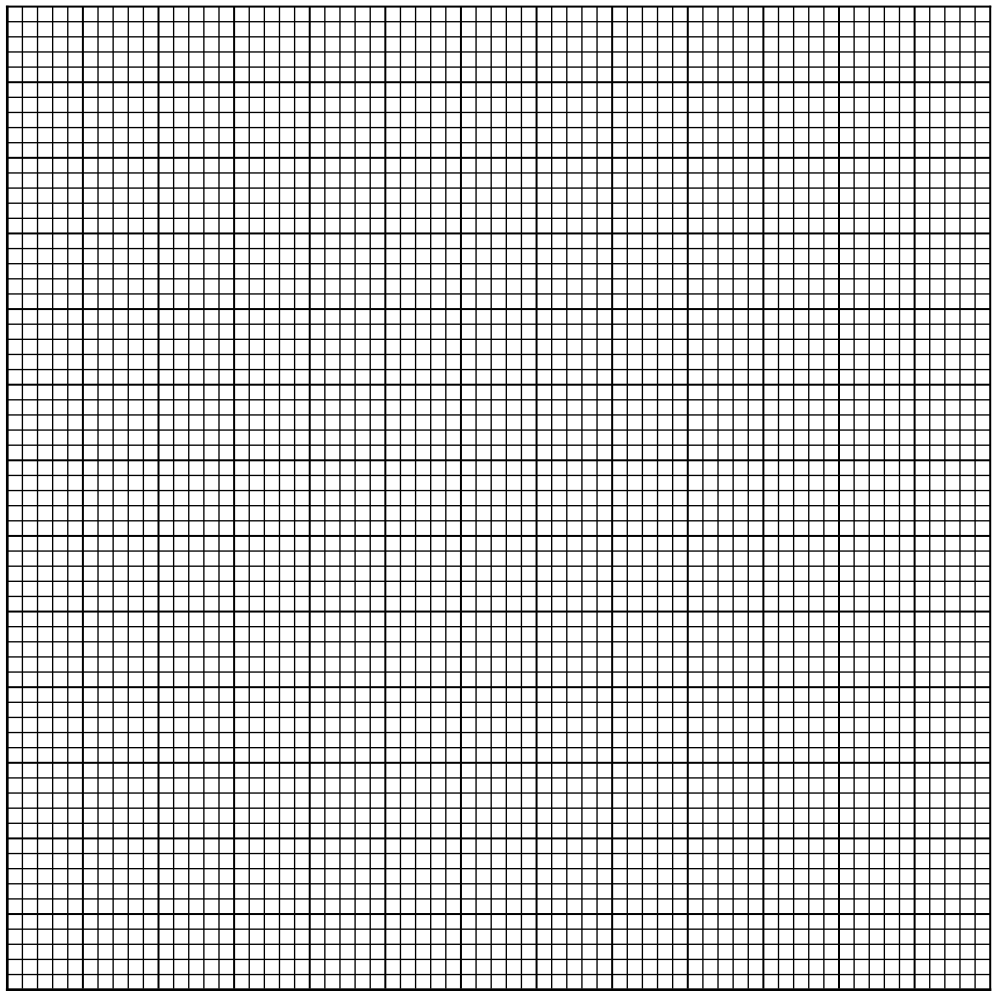
[1]

Experimental procedure

- Prepare and label your test-tubes (**A**, **B** and **C**) as shown in Fig. 1.1. Use two rubber bands to hold the cotton wool in place at the top and bottom of each test-tube. Wet the cotton wool for test-tube **C**.
- In the beaker named "hot water" collect 100 cm^3 of hot water from your invigilator / teacher.
- Add hot water to each test-tube until each tube is two-thirds full. Place a thermometer in each of the test-tubes.

(ii) Record the start temperature of the water in each test-tube in your table at **(a) (i)**. Measure the temperature of the water in each test-tube every two minutes for a total of ten minutes. Record these results in your table at **(a) (i)**. [2]

(iii) Plot all three sets of results from your table at **(a) (i)** on the same system of axes on the grid below.



[5]

(iv) Describe and explain the change of temperature in each of the three test-tubes.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(v) Name **two precautions** you took to ensure that your results are fair.

.....

.....

.....

..... [2]

(vi) Suggest **one improvement** that can be made to the experiment to ensure that the results are more reliable.

.....

..... [1]

(b) Humans are able to control their temperature by means of negative feedback.

(i) State why it is important for the human body temperature to stay close to 37°C.

.....

..... [1]

(ii) Suggest **two** ways, other than sweating, that the body can lower its temperature in warm conditions.

.....

.....

.....

..... [2]

(c) Fig. 1.2 shows elephants that are exposed to very warm conditions regulating their temperature by making use of structural and behavioural methods.

Fig. 1.2

Describe a structural adaptation which helps elephants to keep their bodies cool, as well as a behavioural mechanism.

Structural.....

.....

Behavioural.....

..... [2]

[20]

2 During respiration by yeast, one of the products of respiration is carbon dioxide. To determine the amount of carbon dioxide released by yeast, bromothymol blue can be used. In the presence of carbon dioxide, bromothymol blue changes colour from blue over green to yellow as shown in Fig. 2.1

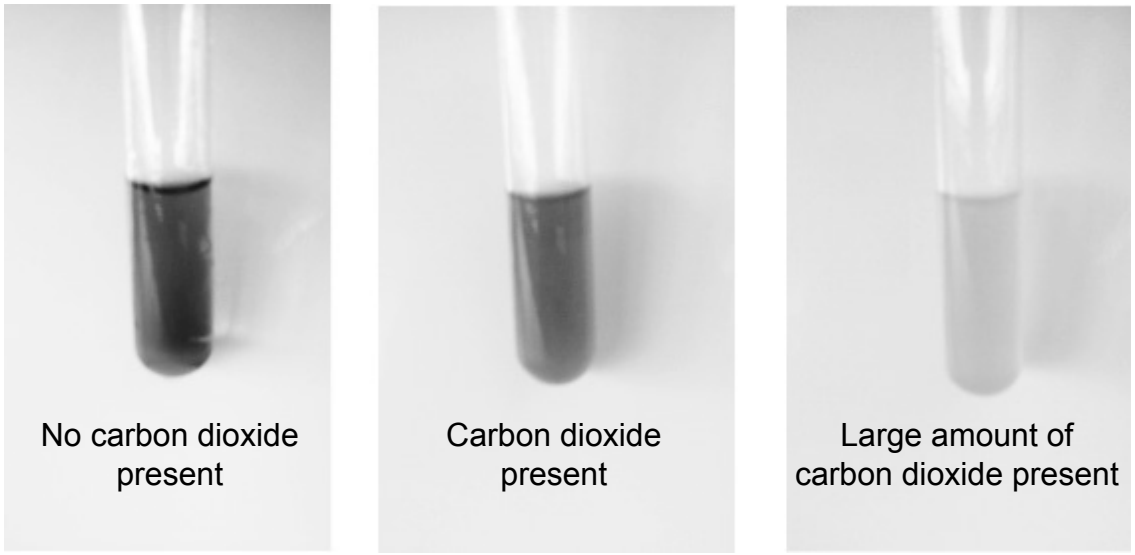


Fig. 2.1

You are supplied with four test-tubes **(E**, **F**, **G** and **H**) which contain the following:

- **E** – 2% glucose solution
- **F** – 2% lactose solution
- **G** – 2% starch solution
- **H** – 2% glucose solution

Carefully read through the experimental procedure before continuing:

- Prepare two water baths, one at 20°C and one at 40°C, using labelled beakers. Obtain the hot water from your invigilator/teacher.
- Place test-tubes **E**, **F** and **G** into the water bath at 40°C and test-tube **H** into the 20°C water bath.
- For the remainder of the experiment ensure that the temperatures of the water baths remain constant.
- To each test-tube, add 8 drops of bromothymol blue solution. Stir each test-tube with a clean stirring rod to avoid contamination.
- Using the dropper, add 10 drops of the yeast solution to each test-tube and mix using a clean stirring rod.
- Start the stop watch as soon as all test-tubes have been carefully mixed.
- After 4 minutes, stir each test-tube carefully.
- After another 4 minutes (8 minutes from the start of the experiment), stir each test-tube again. Then remove your test-tubes from the water baths and record your results on Fig. 2.2 as explained in **2 (a)**.

(a) (i) Complete Fig. 2.2 below, by writing the letter of each test-tube (**E**, **F**, **G** and **H**) at the appropriate position on the colour scale. [2]

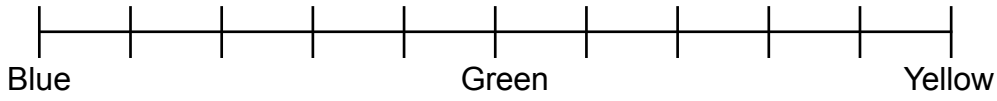


Fig 2.2

(ii) Give the letter of the test-tube which produced the most carbon dioxide after eight minutes.

Test-tube ..... [1]

(iii) Explain why there is such a difference between the results of test-tubes **E** and **H**.

.....

.....

.....

.....

.....

..... [3]

(b) Yeast undergo respiration during fermentation. Write down the **balanced** chemical equation for this type of respiration.

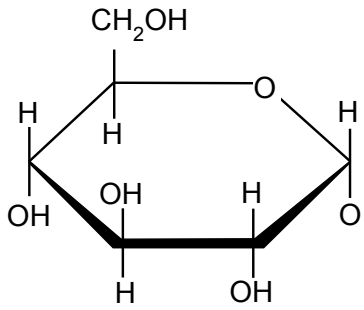
.....

.....

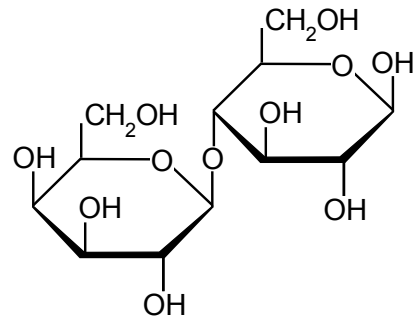
.....

..... [2]

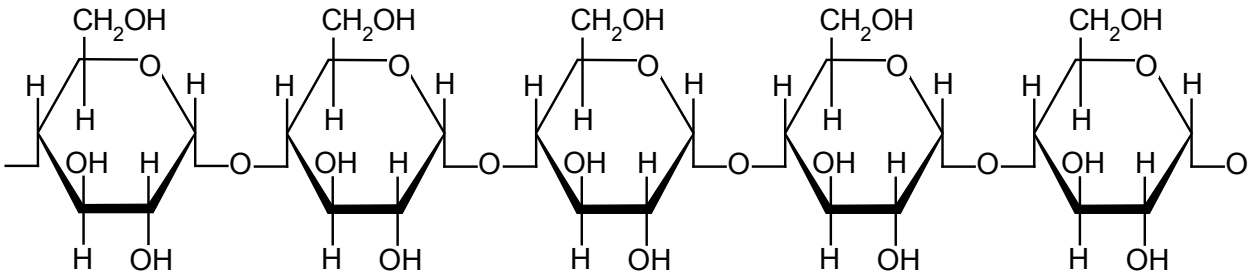
(c) Glucose, lactose and starch are all carbohydrates. Fig. 2.3 shows the structure of each.



Glucose



Lactose (Glucose + Galactose)



Starch (many glucose molecules)

Fig. 2.3

(i) Glucose is a monosaccharide. Name the bond that forms between glucose and another molecule to make it a disaccharide.

..... [1]

(ii) On Fig. 2.3, draw a circle around such a bond, where it forms a disaccharide. [1]

(iii) Lactose is the sugar found in milk which the bacteria use during yoghurt production. Name the product that is formed from lactose which makes milk curdle.

..... [1]

(iv) Using enzymes, yeast converts all carbohydrates to glucose which it can then use for respiration. Explain the reason for the difference in colour of the bromothymol blue in the test-tubes **E**, **F**, and **G** which you recorded in Fig. 2.2. You may wish to refer to the structure of glucose, lactose and starch as shown in Fig. 2.3.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) Apart from temperature, the rate of respiration is also influenced by pH. In a similar experiment to the one you did with test-tube **E** and **H**, describe how you would investigate the effect that pH has on respiration.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

[20]

BLANK PAGE

BLANK PAGE

BLANK PAGE