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

2017

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.

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

[Turn over

1 In this experiment you are going to compare the properties of Visking tubing with those of the small intestine of a multicellular organism.

Assemble the "model gut" as follows:

- Take the sawn-off syringe barrel and Visking tubing that has been soaked in water. Rub the Visking tubing at one end between your fingers to open it, and then attach it to the syringe barrel with an elastic band as shown in Fig. 1.1.
- Tightly tie a knot at the end of the tubing using the Visking tubing itself to form a knot.

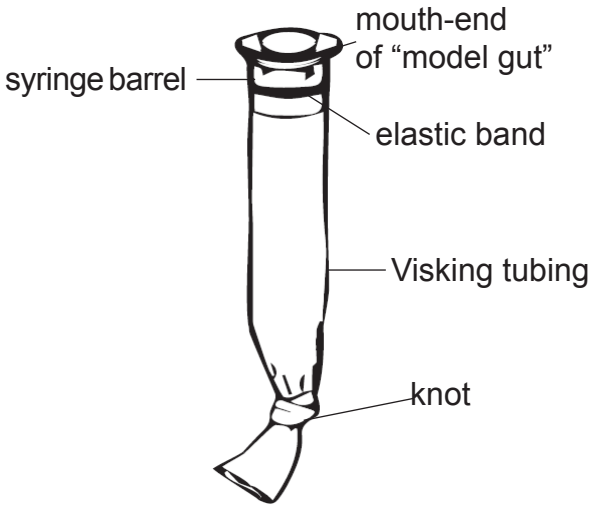

Fig. 1.1

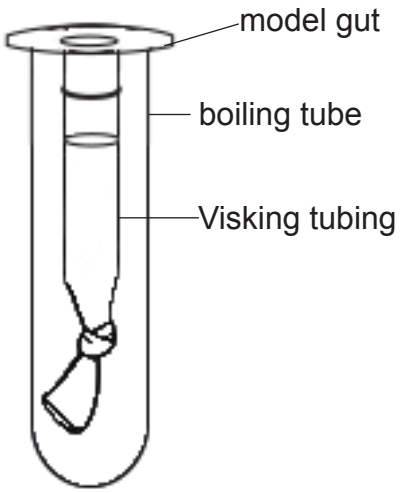

Fig. 1.2

Proceed with the practical investigation as follows:

1 Using different syringes, add 5 cm^3 of solution **S** and 5 cm^3 of solution **T** into the Visking tubing. This is now your model gut.

2 Rinse the outside of the Visking tubing using water from the "for washing" container.

3 Suspend the model gut in the boiling tube labelled "Model gut" as shown in Fig. 1.2.

4 Using the plastic pipette dropper remove about 1 cm^3 of the "gut" contents. Put one drop of the solution onto the white tile and place the rest of the solution in a test-tube. Label both the test-tube and the drop on the tile **G1**.

5 Using a syringe, add water to the boiling tube around the model gut until it is the same level as the top of the gut contents as shown in Fig. 1.3.

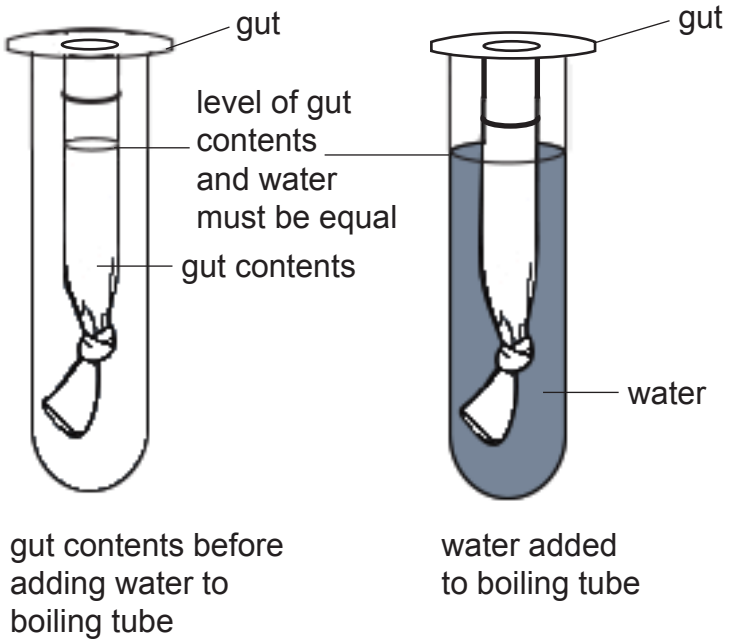

Fig. 1.3

6 Using a different plastic pipette dropper, immediately remove about 1 cm^3 of the water surrounding the Visking tubing in the boiling tube. Put 1 drop onto the white tile and the rest into another test-tube. Label both the test-tube and the drop on the tile **W1**.

7 Start timing 20 minutes and continue onto steps 8 and 9.

8 Test the drops of liquid on the white tile by adding one drop of iodine solution from the dropper bottle. Record your results in the correct space in Table 1.1.

9 Add 1 cm^3 of Benedict's reagent to test-tubes labelled **G1** and **W1**. Set up a water bath as shown in Fig. 1.4. Be careful not to overfill the water bath. Heat for 5 minutes at 80°C. Carefully remove your test-tubes and record your results in Table 1.1.

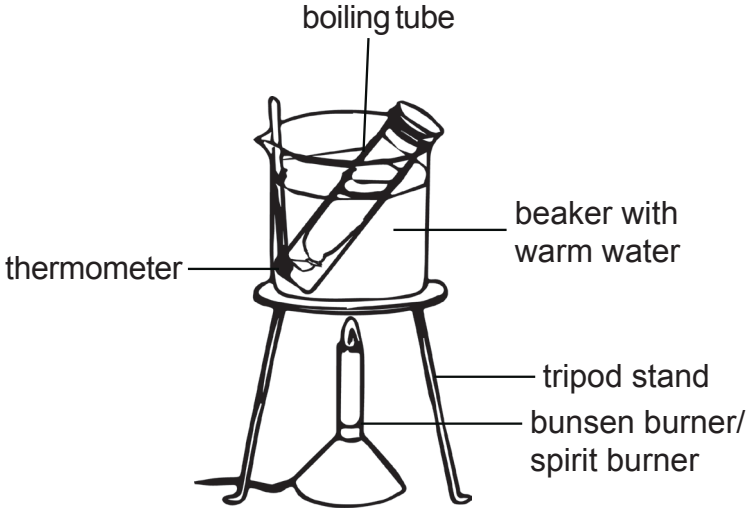

Fig. 1.4

10 After 20 minutes repeat steps 4, 6, 8 and 9. This time label the relevant tests **G2** and **W2**. These results also need to be recorded onto Table 1.1.

(a) (i) Complete Table 1.1.

Table 1.1

	observation of test with iodine solution	**observation of test with Benedict's reagent**	**food substance(s) present**
gut contents at beginning **(G1)**			
water around gut at beginning **(W1)**			
gut contents after 20 minutes **(G2)**			
water around gut after 20 minutes **(W2)**			

[4]

(ii) Name the process by which food substances cross the Visking tubing.

..... [1]

(iii) Using your results from Table 1.1, describe and explain the presence or absence of the food substances in **W2** after 20 minutes.

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..... [3]

(b) (i) How is the Visking tubing similar to the gut of a multicellular organism?

.....

..... [1]

(ii) Refer to **two** features linked to digestion that a real gut has, that are missing in this model.

1 .....

.....

2 .....

..... [2]

For Examiner's Use

(c) (i) This apparatus can also be used to show the action of the enzyme amylase in the digestive system.

Describe an experiment you could carry out to show its effect inside the digestive system.

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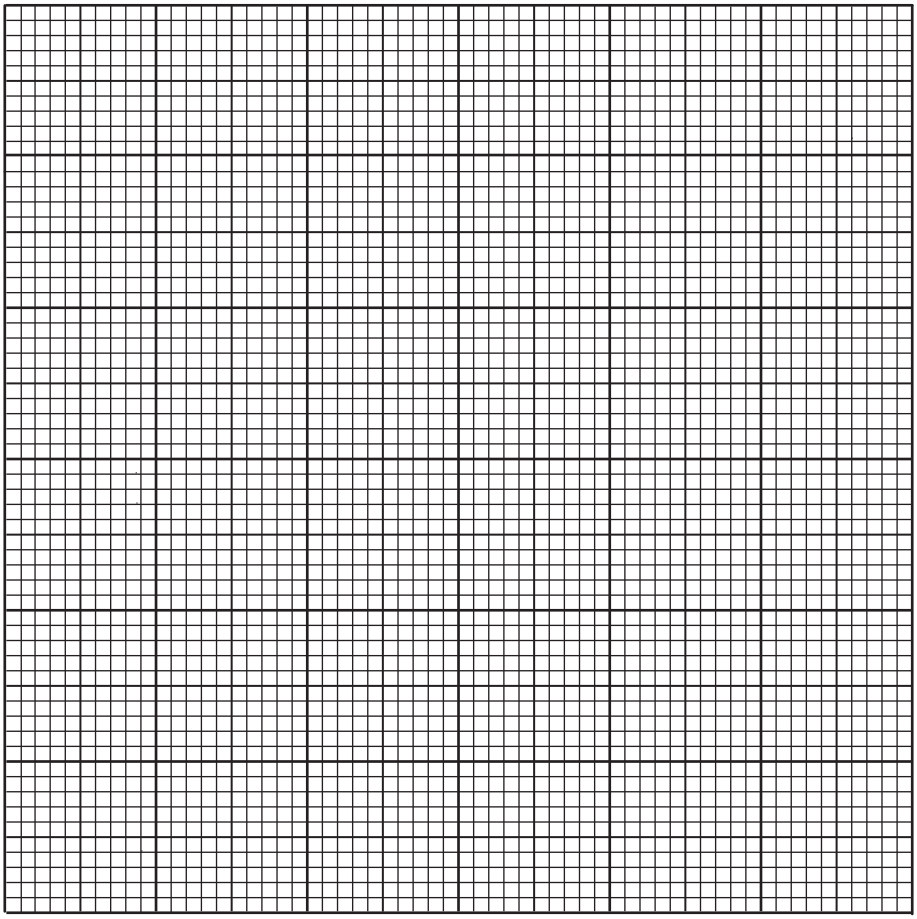
..... [4]

(ii) Table 1.2 shows the breakdown of a substrate into product by amylase at different temperatures.

Table 1.2

temperature (°C)	conversion of substrate to product (mol/sec)
34.5	60
35.5	145
37.0	240
41.5	80

Plot a line graph of the data in Table 1.2.



[4]

(iii) Using data from the graph, describe the changes in the conversion of substrate to product from 37.0°C to 41.5°C.

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..... [2]

[21]

For Examiner's Use

2 In this experiment you are provided with half an onion and half a potato.

(a) (i) Describe **one** visible **similarity** between the onion and the potato.

.....

..... [1]

(ii) In the space below, draw a table to compare **three** visible **differences** between the onion and the potato.

[5]

(b) Place the onion with its cut surface facing you. Make a labelled drawing of the onion in the space below.

[4]

(c) Fig. 2.1 shows onion cells as seen under a microscope.

(i) **On Fig. 2.1** label a nucleus. [1]

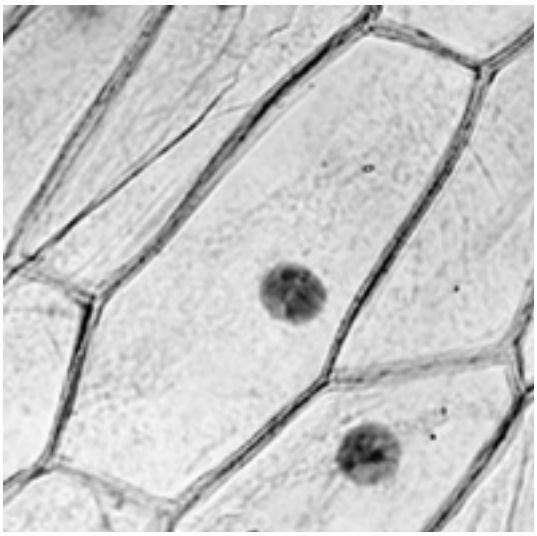

Fig. 2.1

(ii) Name the genetic material found inside the nucleus of an onion cell.

..... [1]

(iii) The real size of the nucleus is 25 μm. Calculate the magnification of the micrograph. Show your working.

Magnification..... [2]

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(d) Both the onion and the potato are tubers which are grown to provide us with carbohydrate. Take a sample from both the onion and the potato and carry out the reducing sugar test on them to compare their sugar content.

(i) Record your results in Table 2.2.

Table 2.2

	onion	**potato**
observation	....	....
conclusion	....	....

[2]

(ii) Describe **three** steps that you should take when carrying out the reducing sugar test to ensure that your results are reliable and valid.

1 .....

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2 .....

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3 .....

..... [3]

[19]

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