Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

BIOLOGY ORDINARY LEVEL

6116/3

PAPER 3 Alternative to Practical

1 hour 15 minutes

Marks 40

2023

Additional Material: Ruler
Non - programmable calculator

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 diagrams, graphs or rough working.
- 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	
3	
4	
Total	

Marker	
Checker	

This document consists of **10** printed pages and **2** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

For Examiner's Use

1 A grade 11 learner carried out an investigation to compare the rate of transpiration with the rate of water absorption in a plant.

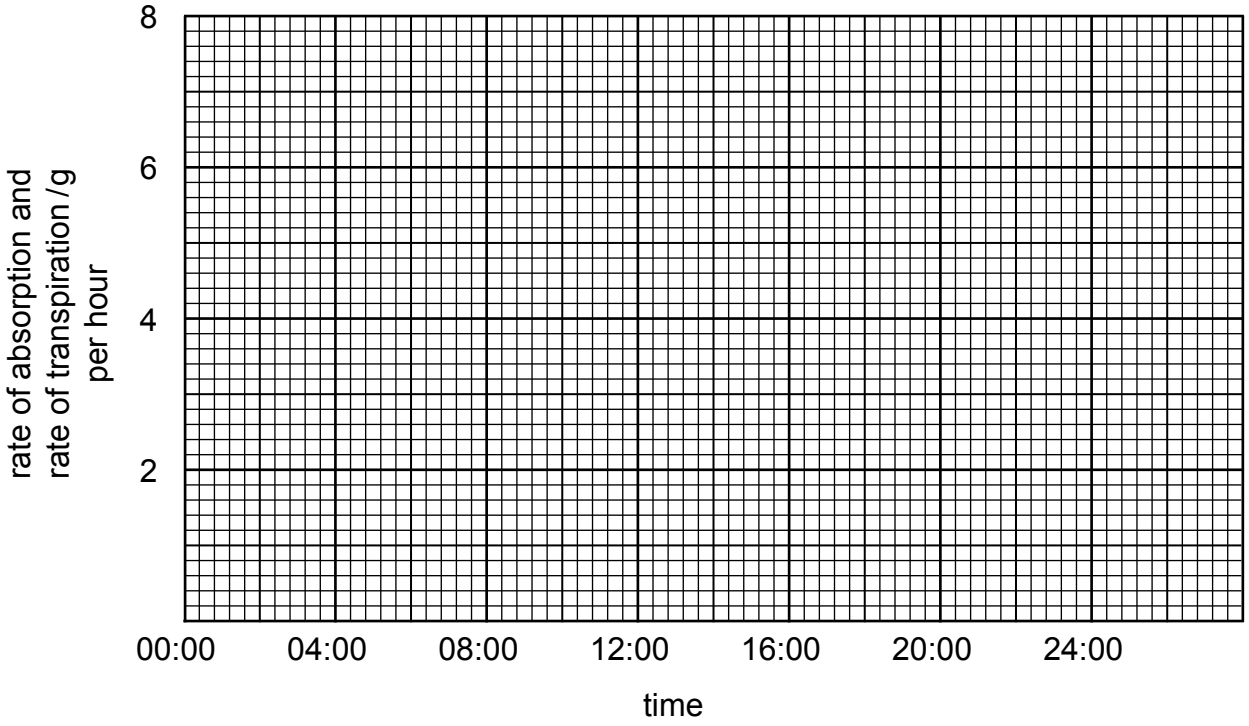
The learner took the readings at four hour intervals during a twenty-four hour period when there was little wind.

Table 1.1 shows the readings.

Table 1.1

time	rate of water absorption g / hour	rate of transpiration g / hour
00:00	2.0	0.5
04:00	1.5	0.3
08:00	1.5	2.0
12:00	3.5	5.0
16:00	5.6	7.3
20:00	3.4	0.9
24:00	2.0	0.5

(a) Plot a line graphs of both sets of data in Table 1.1 on the grid provided.



[3]

(b) (i) Estimate the time of sunrise on that day.

..... [1]

(ii) Explain your answer in **(b) (i)** using information on the graph.

.....

..... [1]

For Examiner's Use

(c) (i) For how long during the day had the water loss remained greater than water absorption?

..... [1]

(ii) Suggest what could be done to provide a better balance between water absorption and water loss from the plant.

..... [1]

(d) (i) Explain what happens in the plant to cause absorption to rise after 08:00.

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..... [2]

(ii) Suggest a reason why absorption starts to fall again after 16:00.

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..... [1]

[10]

For Examiner's Use

2 The plant growth hormone auxin is involved in tropic responses in plants such as gravitropism.

A grade 11 learner investigated the length of the roots from maize seedlings grown at different concentrations of auxins.

The root length of four seedlings were measured and the results are shown in Table 2.1.

Table 2.1

percentage concentration of auxin	**root length / mm**				**average root length / mm**
	1	2	3	4	
0.0	15	18	14	15	15.5
0.2	18	19	20	18	18.8
0.4	24	22	22	23	22.8
0.6	17	18	17	19	
0.8	13	14	5	12	13.0
1.0	12	10	12	11	11.3

(a) (i) Calculate the average root length at the concentration of 0.6%.
Show your working and give your answer to one decimal place in Table 2.1.

[2]

(ii) Identify one anomalous data in Table 2.1 and encircle it. [1]

(b) Fig. 2.1 shows the data in Table 2.1 presented in a graph showing the effect of auxin concentration on the average root length.

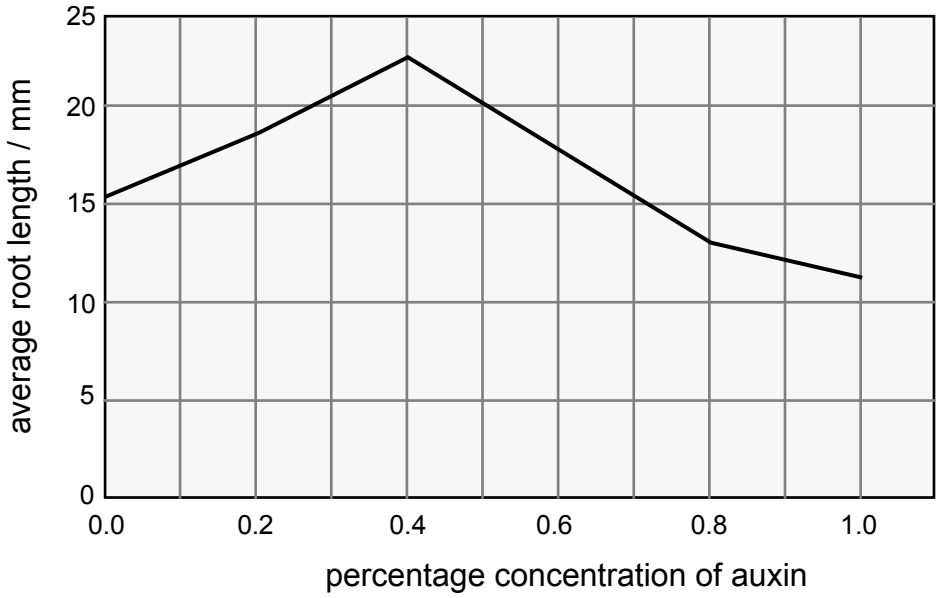

Fig. 2.1

Describe the trend shown by the data in Fig. 2.1.

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..... [3]

For Examiner's Use

(c) Fig. 2.2 show the root tip of a maize seedling.

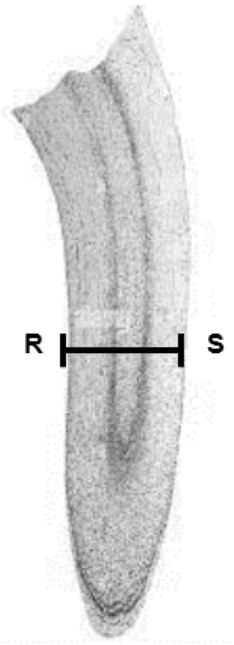

Fig. 2.2

(i) Measure the length of line **RS** on Fig. 2.2.

length of line **RS** ..... [1]

The actual length of the image along line **RS** is 280 μm.

(ii) Calculate the magnification of the root tip at **RS**. Show your working, include the formula used.

[3]

[10]

For Examiner's Use

3 (a) Fig. 3.1 shows the apparatus used to investigate anaerobic respiration in yeast.

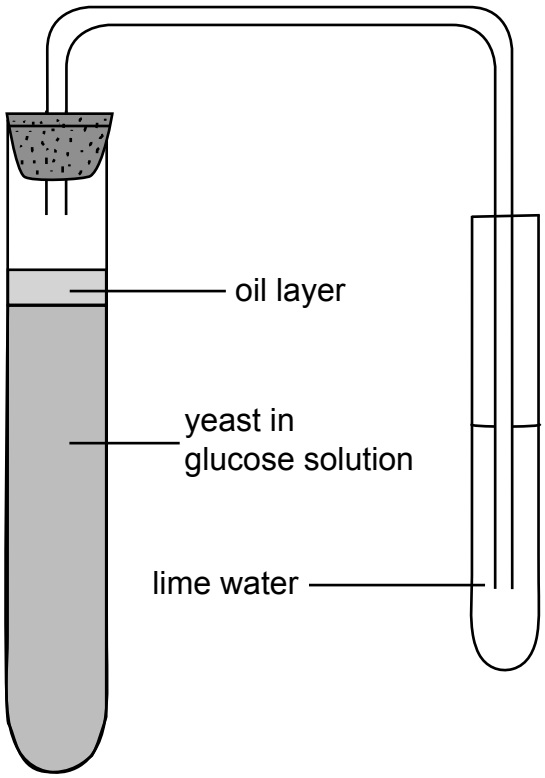

Fig. 3.1

Give a reason why each of the following procedures has to be done while setting up the apparatus such as the one in Fig. 3.1.

(i) sterilize all equipment

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..... [1]

(ii) put 5 g of glucose in warm water in a test-tube and shake

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..... [1]

(iii) cover the glucose solution with a layer of oil

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..... [1]

(iv) ensure that the rubber stopper is sealed properly

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..... [1]

(b) After a few hours the lime water turned milky. Explain a conclusion for that observation.

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..... [2]

(c) Describe how you would investigate the effect of temperature on the rate of anaerobic respiration in yeast using similar apparatus to that in Fig. 3.1.

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..... [4]

[10]

4 (a) Peeled apples turn brown when exposed to air as shown in Fig. 4.1.

This browning is caused by an enzyme called polyphenol oxidase which acts on phenol compounds in the apple. This causes the apple to change from a white to a light brown and then to a dark brown colour. Similar to other enzymes, polyphenol oxidase can be affected by temperature and pH.

Fig. 4.1

Table 4.1 shows results obtained from an investigation into how apples turn brown. Apples were crushed and then an apple extract was produced from this which contains the enzyme polyphenol oxidase.

Table 4.1

test-tube	contents of test-tubes				appearance of contents of tubes after 12 minutes
	phenol / cm^3	apple extract with enzyme / cm^3	diluted acid / cm^3	diluted alkali / cm^3	
1	2.5	2.5	-	-	dark brown
2	2.5	2.5	3	-	white
3	2.5	2.5	-	3	light brown
4	2.5	2.5	5.5	-	white
5	2.5	2.5 boiled	3	-	white

(i) Name the substrate in this investigation.

..... [1]

(ii) Give an explanation for the observed results in test-tube 5.

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..... [2]

(iii) Suggest **one** way in which apples, once peeled, can be prevented from turning brown.

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..... [1]

(iv) Under which pH conditions does the enzyme works the best?

..... [1]

For Examiner's Use

(b) Potatoes and peppers are good sources of vitamin C.

Describe how you will investigate which of these two food substances contain the most vitamin C. You should use the DCPIP test for vitamin C.

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..... [5]

[10]

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