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

2022

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 **9** printed pages and **3** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

For Examiner's Use

1 Fig. 1.1 shows a photograph of an insect. The actual length of this insect is 1.3 cm.

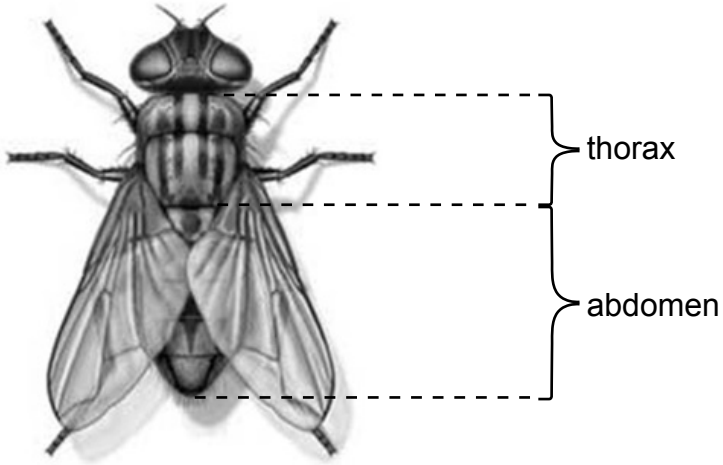

Fig. 1.1

(a) (i) Make a large labelled drawing of the head of this insect.

[4]

(ii) Calculate the ratio of the length of the thorax to the length of the abdomen in Fig. 1.1.

length of thorax .....

length of abdomen .....

ratio ..... [2]

(iii) Calculate the magnification of the photograph of the insect in Fig.1.1. Include the formula used.

magnification ..... [3]

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(b) Identify **one** feature of arthropods in Fig. 1.1 which helps prevent water loss from an insect body.

..... [1]

[10]

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2 Fig. 2.1 shows an apparatus that was set up by groups of students.

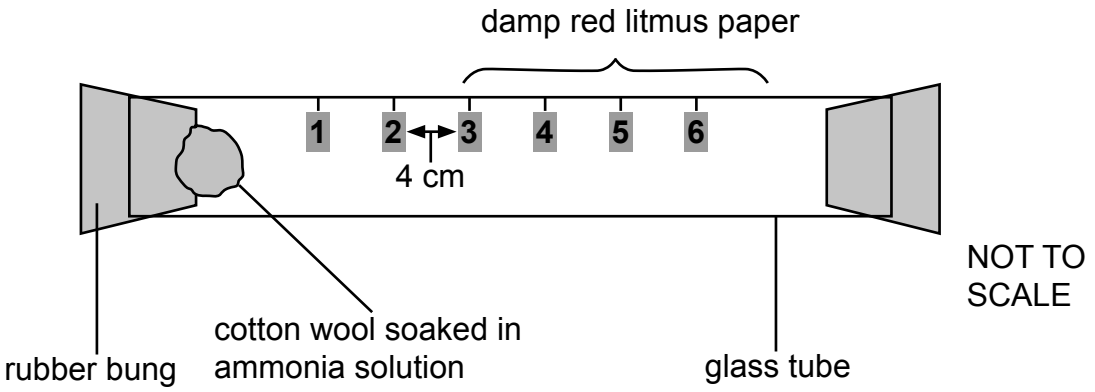

Fig. 2.1

A glass tube was set up by some students with small squares of damp red litmus paper spaced at 4 cm intervals along its length as shown in Fig. 2.1. Ammonia solution was added to some cotton wool and a pin was used to place the cotton wool on a rubber bung which was placed at one end of the glass tube. The other end was already closed by a rubber bung.

Ammonia solution gives off ammonia gas which is alkaline. This changes the colour of the litmus paper to blue. The time taken for each of the pieces of red litmus papers 1 to 6, to go blue after the cotton wool was placed into the tube was recorded.

The experiment was carried out three times using separate tubes and three different concentrations of ammonia. The results are shown in Table 2.1.

Table 2.1

concentration of ammonia solution	**time taken for the litmus paper to change colour/seconds**					
	4 cm	8 cm	12 cm	16 cm	20 cm	24 cm
low	7	13	19	26	32	37
medium	3	7	10	13	16	20
high	1	5	7	9	11	13

(a) Explain why the pieces of litmus paper changed one after another along the tube.

.....

.....

.....

..... [2]

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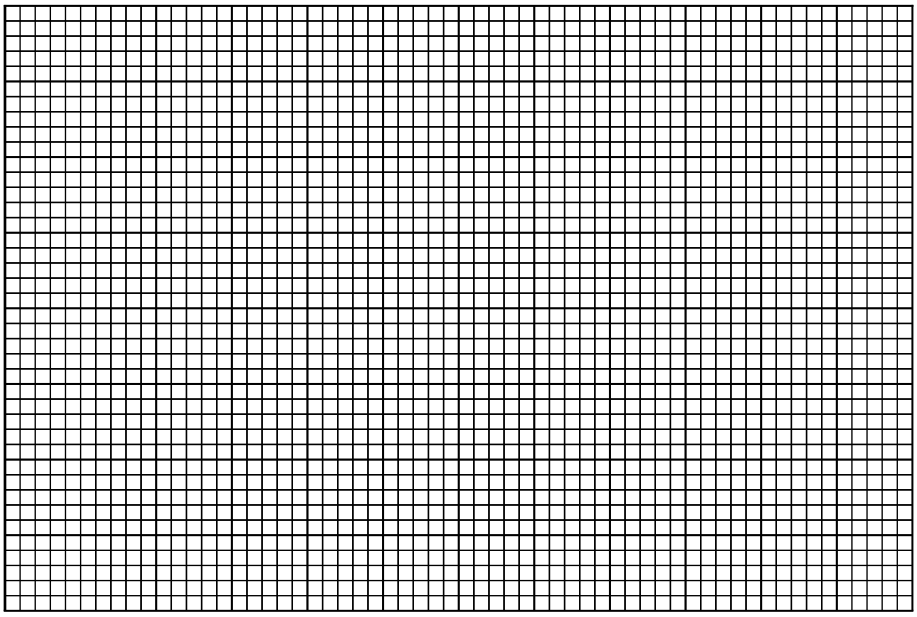
(b) On the grid below, plot the data shown in Table 2.1 for the **low** and **high** concentrations of ammonia, as two curves on one set of axes.



[5]

(c) Describe the results shown by the graph.

.....

..... [1]

(d) Use the results for the medium concentration of ammonia to calculate the rate of diffusion of the ammonia as it travels between litmus papers at 4 cm and 24 cm. Show your working.

Answer ..... cm/s [2]

[10]

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3 The apparatus shown in Fig. 3.1 was used to find out if nitrate ions helped plants to grow.

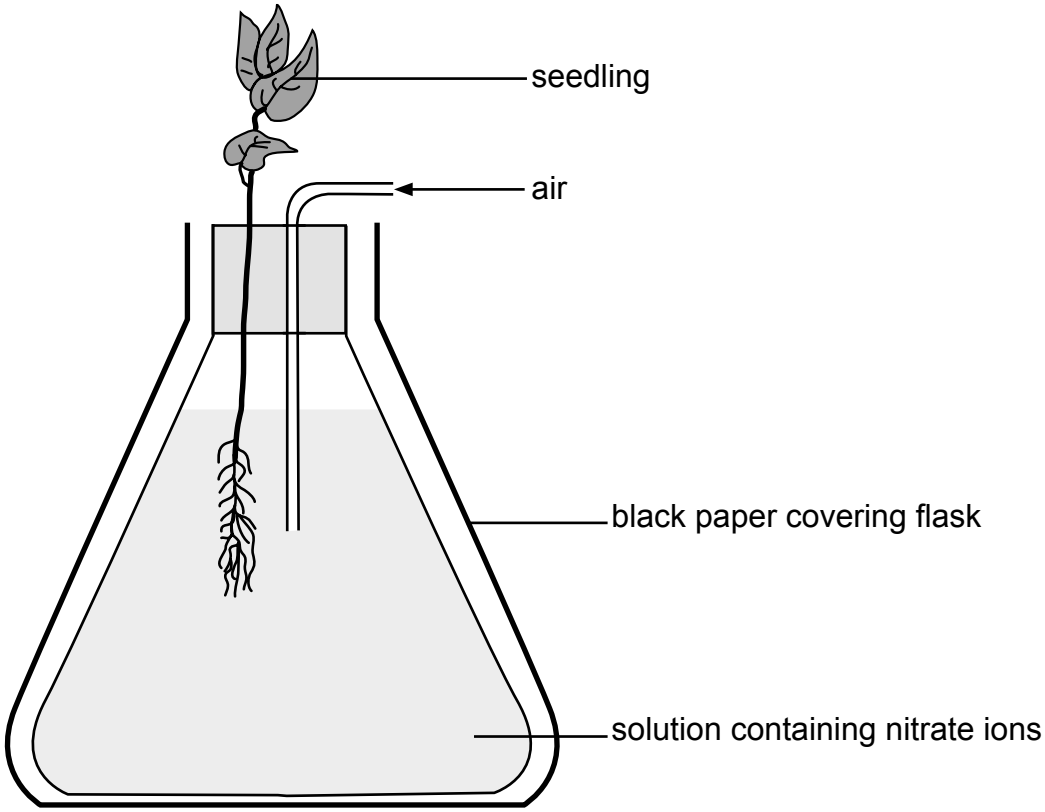

Fig. 3.1

(a) Give reasons why

(i) the solution have air bubbled through it,

.....

.....

.....

..... [2]

(ii) the apparatus was covered in black paper.

.....

.....

.....

..... [2]

A similar apparatus was set up in which distilled water was used in the place of nitrate ion solution.

(b) Fig.3.2 shows the two plants **A** and **B**. One of these plants has been grown in a solution containing nitrate ions and the other in distilled water.

Fig. 3.2

(i) Identify with reasons the plant which was grown in a solution without nitrate ions.

plant .....

reasons .....

.....

..... [3]

(ii) Suggest how the results of the investigation can be made more reliable.

.....

..... [1]

(iii) Name **two** factors that should be kept the same for both plants during the investigation.

1 .....

.....

2 .....

..... [2]

[10]

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4 Fig. 4.1 shows the apparatus used to demonstrate that carbon dioxide is necessary for photosynthesis.

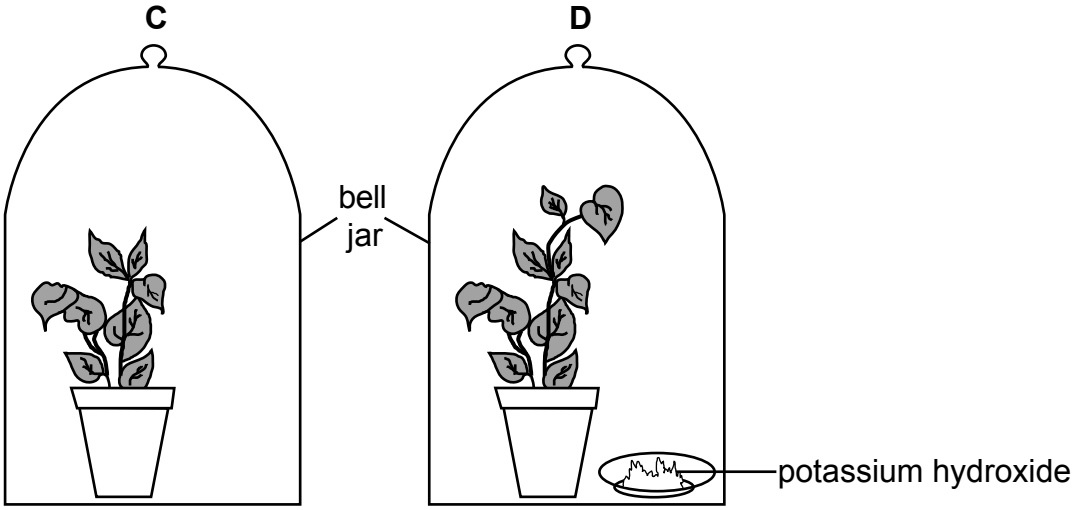

Fig. 4.1

(a) Explain why potassium hydroxide was used.

.....

..... [1]

(b) The **two** potted plants were initially placed in a dark cupboard for 24 hours before they were placed in the bell jars. Give a reason for this step.

.....

..... [1]

(c) Explain the need for a control in an experiment.

.....

..... [1]

(d) Outline the practical procedure to be followed to decide whether the leaves from plant **C** and **D** contained starch.

.....

.....

.....

..... [2]

For Examiner's Use

(e) Suggest the results, explanation and conclusion for this experiment.

result .....

.....

.....

..... [2]

explanation .....

.....

.....

..... [2]

conclusion .....

..... [1]

[10]

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