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 — **2021**

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 **11** printed pages and **1** blank page.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

[Turn over

1 (a) Fig. 1.1 shows two different sized potato chips cut from a potato.

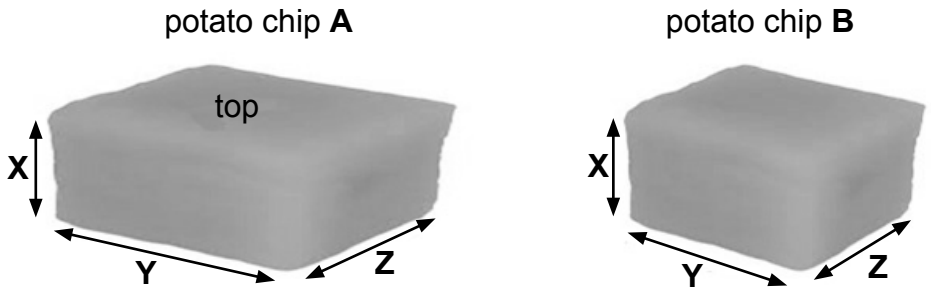

Fig. 1.1

The lengths of the different sides are shown in Table 1.1.

Table 1.1

potato chip	length of X/cm	length of Y/cm	length of Z/cm	total surface area of top and bottom/cm²	total surface area of four sides/cm²	total surface area of chip/cm²
A	2	4	2.5	20	26	46
B	2	3	2			

(i) Calculate the total surface area of chip **B** using the formula

Total surface area = 2YZ + 2XY + 2XZ

Show your working.

Total surface area of **B** = ……..cm² [2]

(ii) Complete the Table1.1 for chip **B**. [1]

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(b) A learner weighed the two potato chips and then put them in distilled water for thirty minutes as shown in Fig. 1.2.

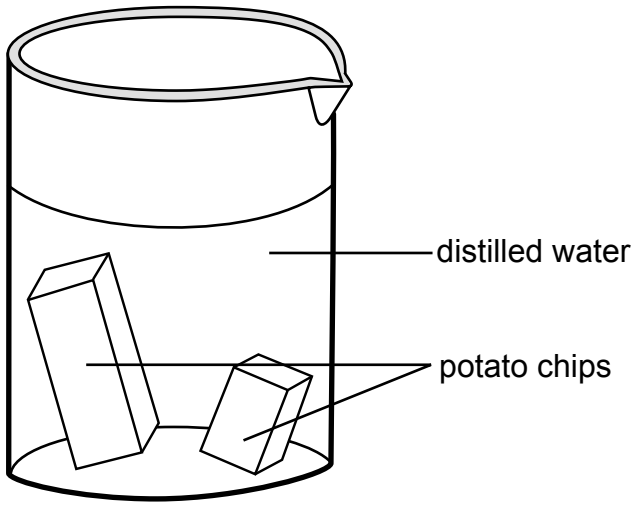

Fig. 1.2

Table 1.2 shows the increase in mass of each potato chip after thirty minutes.

Table 1.2

potato chip	increase in mass/grams
A	0.4
B	0.2

(i) Explain why potato chip **A** has a greater increase in mass than potato chip **B**.

.....

.....

.....

..... [2]

(ii) Explain what will happen to the cells in potato chip **B** if it is moved from the distilled water into a concentrated salt solution.

.....

.....

.....

.....

.....

..... [3]

For Examiner's Use

(c) Potato plants provide a source of energy in the form of carbohydrates such as starch.

Describe the test for starch and the positive result obtained if starch is present.

test .....

.....

.....

positive result .....

..... [2]

[10]

For Examiner's Use

2 **(a)** Fig. 2.1 shows an investigation of the relative number of stomata found on the upper and lower epidermis of a leaf.

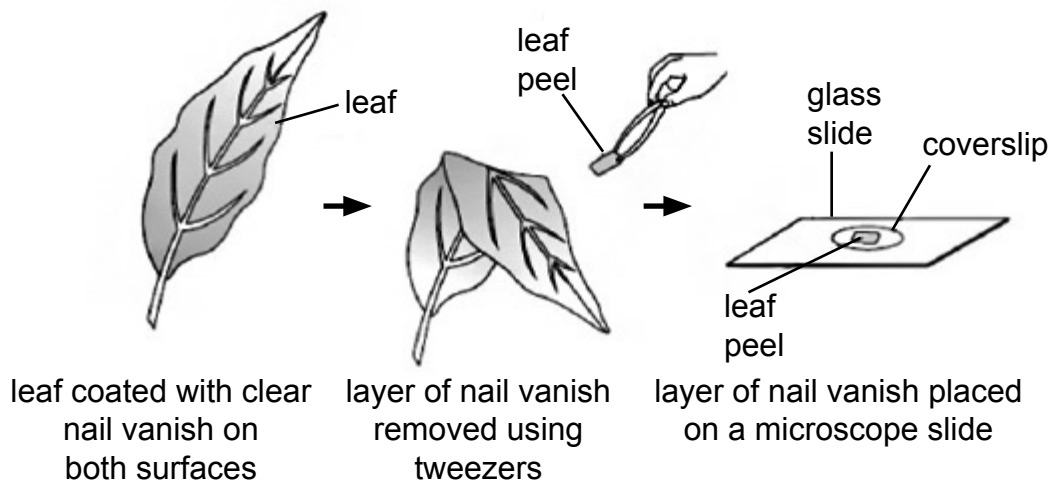

Fig. 2.1

(i) State why a coverslip is placed on top of the leaf peel.

.....

..... [1]

(ii) Explain why the leaf peel rather than the whole leaf was viewed with a microscope.

.....

..... [1]

(b) When the slide was placed on the stage of the light microscope and viewed through the eyepiece, the cells could not be seen clearly.

Explain **two** ways in which this method could be improved in order to see details of the epidermis of the leaf.

.....

.....

.....

.....

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.....

..... [4]

(c) Fig. 2.2 shows a micrograph of the underside of the leaf.

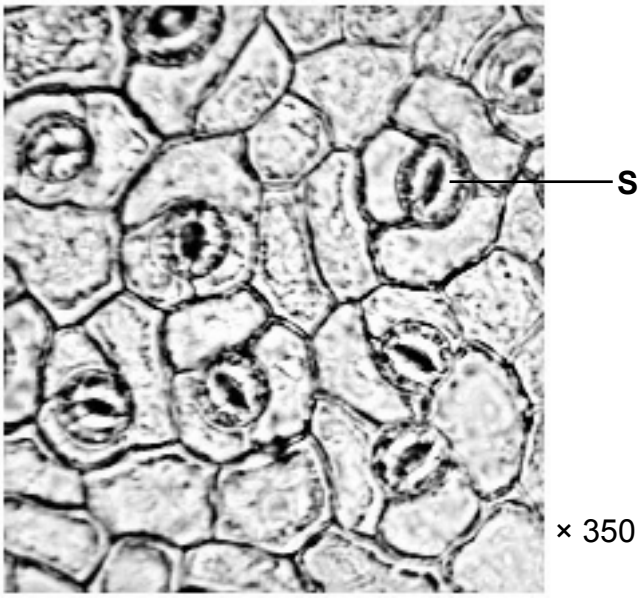

Fig. 2.2

(i) How many stomata are visible in Fig.2.2?

..... [1]

(ii) Calculate the actual length of the structure labelled **S** in Fig.2.2.

Give your answer in micrometer (μm).

1 millimeter = 1000 μm.

Length of structure **S** = ……. μm [3]

[10]

3 An experiment was carried out to investigate the action of enzyme amylase on starch. Fig.3.1 shows how the apparatus was set up.

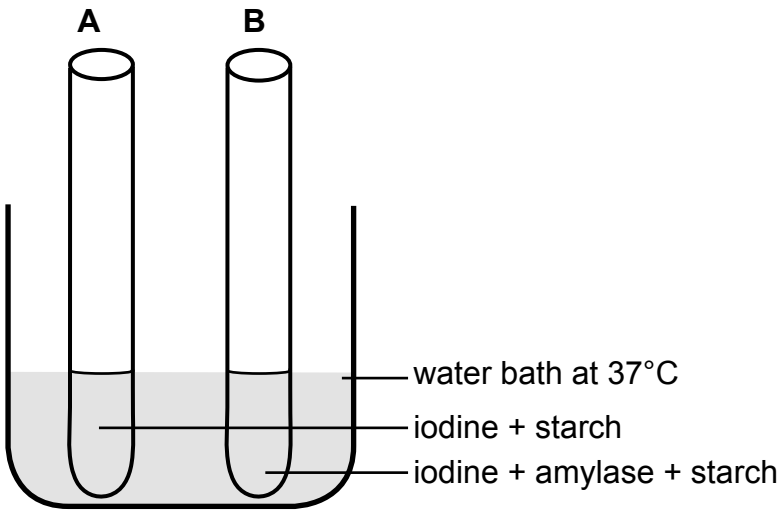

Fig. 3.1

Test-tubes **A** and **B** were left in a water bath for 10 minutes at 37°C.

Fig. 3.2 shows the colour of the solutions after 10 minutes.

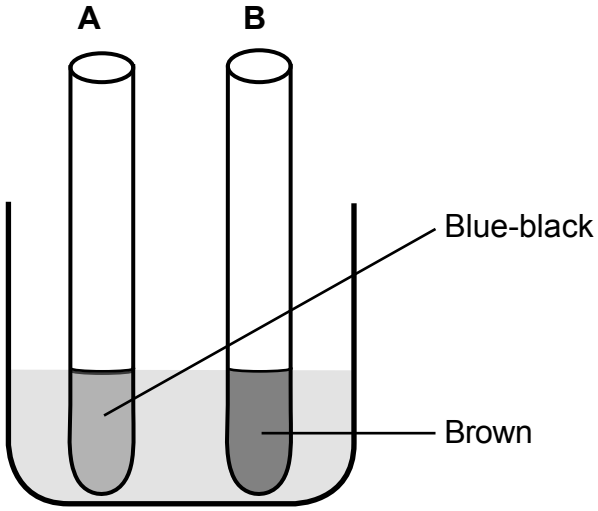

Fig. 3.2

(a) Complete Table 3.1

Table 3.1

test-tube	colour observed	explanation
A	blue-black	....
B	brown	....

[2]

(b) In another experiment the effect of temperature on the activity of amylase was investigated.

Amylase was added to 3 different test-tubes labelled **C**, **D** and **E**. Starch solution was added to each test-tube. Test-tube C was placed in a water bath at 10°C, test-tube **D** was placed in a water bath at 40°C and test-tube E was placed in a water bath at 70°C as shown in Fig.3.3.

The test-tubes were left for 10 minutes and then the contents were tested for the presence of starch.

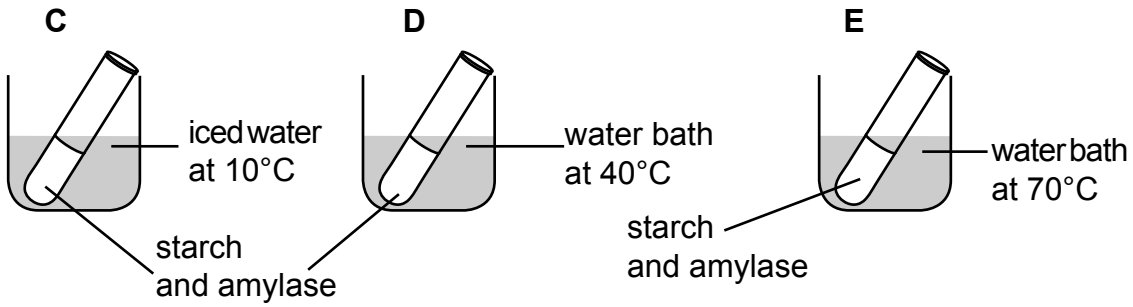

Fig. 3.3

(i) Name **two** variables that should be controlled to ensure that the results are valid.

1 .....

2 ..... [2]

After 10 minutes iodine was used to test for the presence of starch in each test tube.

(ii) The contents of test-tube **C** turns blue-black. Give a reason for this observation.

.....

..... [1]

(iii) Describe and explain the result that will be expected in test-tube **E**.

Result .....

Explanation .....

.....

..... [2]

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(iv) Describe how you will test for the presence of reducing sugar in test-tube **D**.

.....

.....

.....

.....

.....

..... [3]

[10]

4 Fig. 4.1 shows part of a food chain from a seashore.

The photographs are not to the same scale.

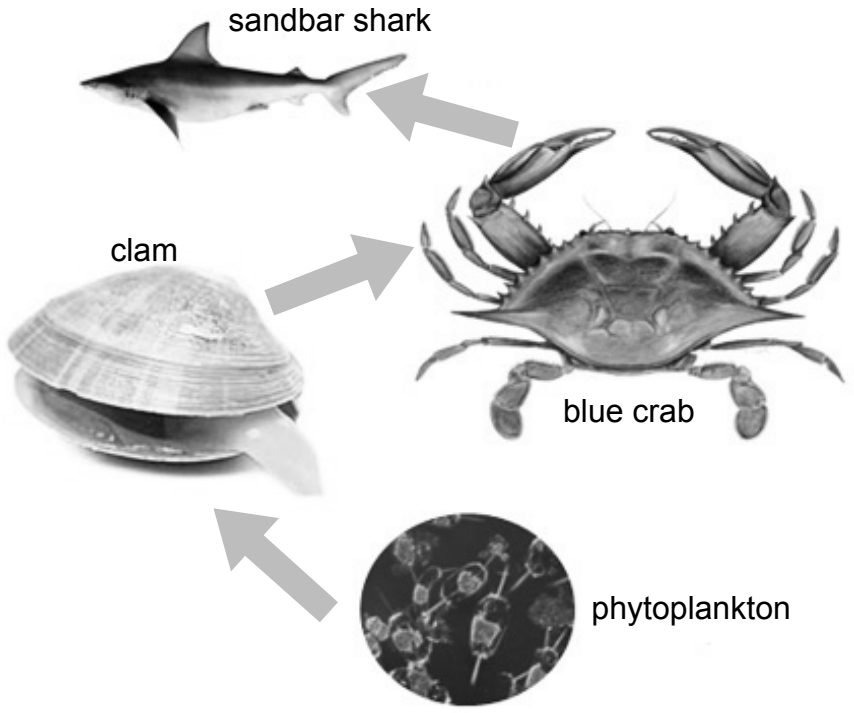

Fig. 4.1

Students estimated the population and biomass of each of the organisms on the part of the seashore.

Table 4.1 shows the results.

Table 4.1

organism	population in 1 km^3 of water	mean mass of one organism/kg	biomass of population/kg
phytoplankton	13505	2.5	33763
clams	3965	0.85	3370
blue crabs	125	0.64	
sandbar shark	1	59	59

(a) (i) Use the data in the table to calculate the total biomass of the blue crab population.

Total biomass = ... kg [1]

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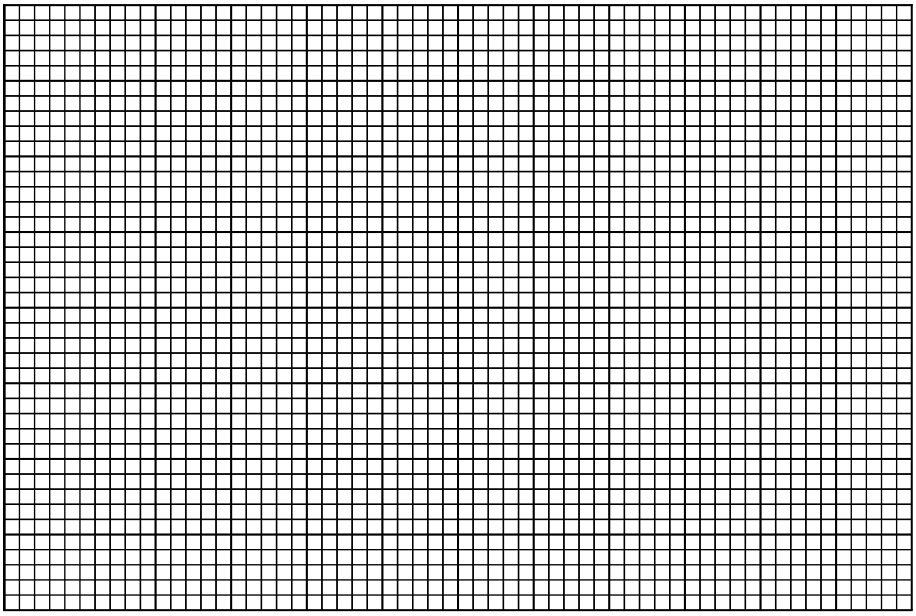
(ii) On the grid below, draw a pyramid of biomass for this food chain.
Label the pyramid.



[3]

(iii) The percentage of energy transferred from the phytoplankton to the clams is 9.5%.

The energy contained in the phytoplankton is 423 780 kJ.

Calculate the amount of energy transferred to the clams.
Give your answer to the nearest whole number.

…….. kJ [3]

(b) Crabs are crustaceans.
Describe **three** diagnostic features of crustaceans which are visible in Fig. 4.1.

1 .....

2 .....

3 ..... [3]

[10]

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