EXAMINATIONS COUNCIL OF ESWATINI
Eswatini General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **6884/04**

Paper 4 Alternative to Practical **October/November 2024**

1 hour

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces provided.
Write your answers in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do **not** use staples, paper clips, glue or correction fluid.
Do **not** write on the bar code.

Answer **all** questions.

You may use an electronic calculator.
You may lose marks if you do not show your working or if you do not use appropriate units.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
Total	

This document consists of **7** printed pages and **1** blank page.

[Turn over

Question 1

A student investigated the effect of an enzyme on a substrate.

They were provided with two test-tubes, **1** and **2**, each containing the same concentration of substrate **X** and two test-tubes, **A** and **B**, each containing 2 cm^3 of the same concentration of a solution of the enzyme amylase.

The following procedure was carried out:

1 Add the 2 cm^3 of amylase solution **A** to the substrate **X** in test-tube **1**.

2 Shake the test-tube to mix the solutions then place it in a test-tube rack.

3 Using the pipette/dropper, take a drop of the mixture from test-tube **1** and place it on a spotting tile. Add a drop of iodine solution to it.

4 Observe and record the colour of the mixture on the spotting tile after iodine solution was added to it.

5 Add the 2 cm^3 of amylase solution **B** to the substrate **X** in test-tube **2**.

Shake the test-tube to mix the solutions then place it in a test-tube rack.

Using the pipette/dropper, take a drop of the mixture from test-tube **2** and place it on a spotting tile. Add a drop of iodine solution to it. Observe and record the final colour of this drop after iodine solution was added.

(a) (i) State the colour of the iodine solution that was added to the mixtures.

..... [1]

The student recorded
colour of drop from test-tube **1** + *iodine solution* = *blue-black*
colour of drop from test-tube **2** + *iodine solution* = *blue-black*

(ii) State what this showed about substrate **X**.

..... [1]

The student then placed test-tubes **1** and **2** in a water-bath at 40 °C and left them for 15 minutes.

(b) Suggest a reason for leaving the test-tubes in the water-bath for 15 minutes.

.....

..... [1]

(c) Suggest why a temperature of 40 °C was provided for the test-tubes.

.....

..... [1]

After 15 minutes the student followed these instructions.

6 Using the pipette/dropper, take a drop of the mixture from each of the test-tubes **1** and **2** and place them separately on the spotting tile. Add a drop of iodine solution to both. Observe and record the final colours of these drops of mixture.

The student recorded
*colour of drop from test-tube **1** + iodine solution = yellow*
*colour of drop from test-tube **2** + iodine solution = blue-black*

(d) State what you can conclude about the mixtures in test-tubes **1** and **2** after 15 minutes.

test-tube **1** .....

test-tube **2** ..... [2]

The student then used the pipette/dropper to add some of the mixture from test-tube **1** to the clean test-tube **3** and some of the mixture from test-tube **2** to the clean test-tube **4**.

These samples in test-tubes **3** and **4** were tested for the presence of reducing sugars.

(e) Describe how you would carry out the tests for reducing sugars, including the colour of any test reagent used.

.....

.....

.....

..... [3]

After the reducing sugar tests, the contents of test-tube **3** were orange and the contents of test-tube **4** were blue.

(f) State what you can conclude from these colours.

test-tube **3** conclusion .....

test-tube **4** conclusion ..... [2]

(g) Suggest a reason for the results that were obtained when the amylase solution from test-tube **2** was used in this investigation.

.....

..... [1]

[Turn over

(h) The student had been provided with only one pipette/dropper for this investigation.

Describe how they should have made use of this pipette/dropper and explain why.

.....

.....

..... [2]

(i) **(i)** State the dependent variable in this investigation.

..... [1]

(ii) State **two** variables that were controlled in this investigation.

1 .....

2 ..... [2]

(iii) State **two** other variables that should have been kept constant during this investigation.

1 .....

2 ..... [2]

(j) State how the reliability of the investigation could be improved.

.....

..... [2]

(k) Design an investigation into the effect of pH on the action of amylase using similar laboratory apparatus to that used in this investigation.

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..... [6]

[Total: 27]

Question 2

Fig.2.1 shows photographs of specimens **W1** and **W2**.

W1 is a broad bean seed that has been soaked in water for 24 hours.

W2 shows a whole fruit of a green bean and a fruit that has been opened to show the seeds.

magnification ×1 **W1**

magnification ×0.2 **W2**

Fig. 2.1

(a) Complete Table 2.1 by stating **two** visible differences between **W1** and the seed from **W2**.

Table 2.1

	W1	**seed from W2**
difference 1		
difference 2		

[2]

Fig. 2.2 shows seed **W1** from which the testa (outer covering) has been removed. The seed has then been separated into its two halves.

Fig. 2.2

(b) (i) In the space below, make a large drawing of the half of the seed which has the embryo attached.

[4]

(ii) The distance between **Y** and **Z** on the seed **W1** in **Fig. 2.2** is its length.

Measure this length and record it.

length of seed **W1** .....

On your drawing, draw a line from one end to the other of its length.

Measure and record this length of the drawn seed **W1**.

length of drawn seed ..... [3]

(iii) Use your measurements to calculate the magnification of your drawing compared to the seed **W1**. Give your answer to two decimal places.

magnification ..... [2]

(c) Suggest a method by which the seeds in **W2** may be dispersed, giving a reason for your suggestion.

method .....

reason ..... [2]

[Total: 13]

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