Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

BIOLOGY 6030/4

PAPER 4 Practical Test

SPECIMEN PAPER 2 hours 30 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors
Electronic calculator

TIME 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The intended number of marks is given in brackets [ ] at the end of each question or part question.
You are advised to spend the first 15 minutes carefully reading through the whole paper before starting to answer any question. These 15 minutes are included in the time allocated for the whole paper.

You are reminded of the need for good English and clear presentation in your answers.

FOR EXAMINER'S USE	
1	
2	
3	
TOTAL	

This question paper consists of 8 printed pages.

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Question 1

For Examiner's Use

You are required to investigate the effect of temperature on the rate of respiration in yeast.

You are provided with:

- yeast suspension to which a fixed concentration of glucose has already been added
- triphenyl tetrazolium chloride (TTC) solution

[TTC solution is colourless. It can be reduced to form an insoluble pink compound.]

NB. TTC is corrosive and toxic. Do not get it on your skin. If you should do so, wash it off immediately with cold water.

Procedure:

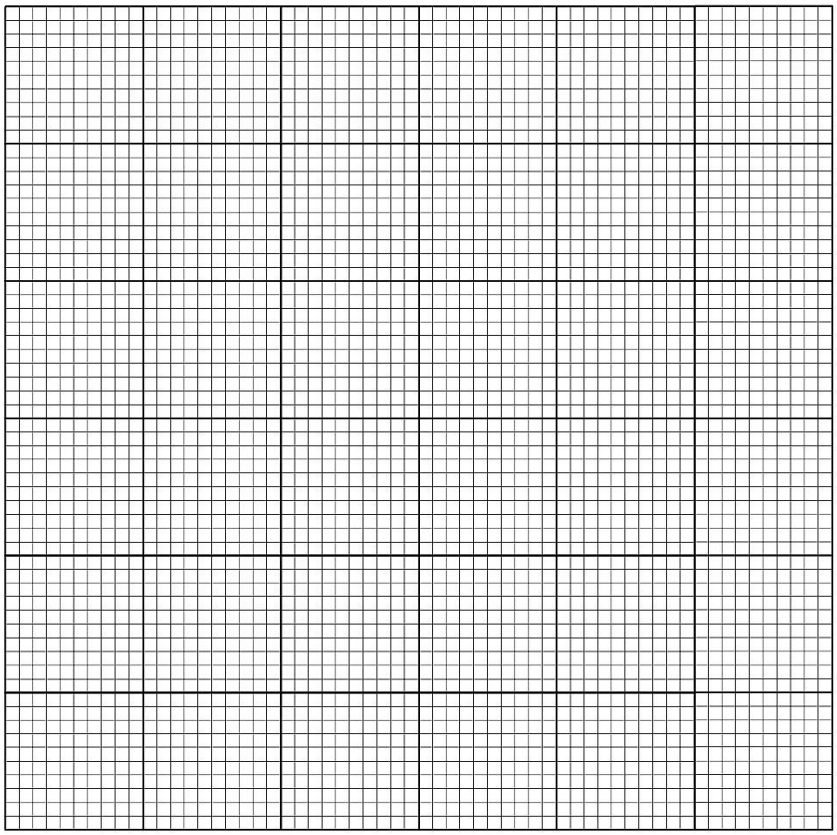
- Prepare a water bath by half filling a 400 cm^3 beaker with water and maintain the temperature of the water at about 65 ºC.
- Label a test tube A and another one B.
- Using a 10 cm^3 syringe, transfer 10 cm^3 of yeast suspension to test tube **A**.
- Using a 2 cm^3 syringe, transfer 1 cm^3 of TTC solution to test tube **B**.
- Place both test tubes in the water bath for five minutes.
- After the five minutes, add the yeast in test tube A to the TTC solution in test tube B.
- Gently mix the contents using a glass rod and return the test tube to the water bath.
- Start a stopwatch immediately and record the time, t, for the appearance of a pink colour.
- Reduce the temperature of the water bath to about 55 ºC.
- Repeat the procedures in steps 2 to 7 at about 55 ºC.
- Repeat steps 2 to 7 at three more temperatures of about 45 ºC, 35 ºC and 25 ºC.

(a) **(i)** Record the results in a table.

[4]

(ii) Plot a graph of the results in the grid.

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[4]

(iii) Explain the pattern of the results.

_____

_____

_____

_____

_____ [3]

(iv) Calculate the temperature coefficient, Q_{10}, for the reaction using the formula:

$$Q_{10} = \frac{\text{rate of reaction at 35 °C}}{\text{rate of reaction at 25 °C}}$$

Show your working.

[Note: rate of reaction = $\frac{1000}{t}$]

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Q_{10} = _____ [2]

(b) Describe the role of TTC in yeast respiration, stating its most likely site within the yeast cells.

_____

_____

_____ [2]

(c) State any **three** possible sources of error in the investigation.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

[Total: 18]

Question 2

For Examiner's Use

You are required to compare the amounts of reducing sugars in three different fruits.

You are provided with:

- a solution of tomato juice labelled **S1**.
- a solution of grape juice labelled **S2**.
- a solution of lemon juice labelled **S3**.
- a 5% solution of glucose labelled **S4**.

Proceed as follows:

Label four test tubes **W1**, **W2**, **W3** and **W4**.

Using a clean 1 cm^3 syringe, take 0.5 cm^3 of **S1** and place it into test tube **W1**, 0.5 cm^3 of **S2** into **W2**, 0.5 cm^3 of **S3** into **W3** and 0.5 cm^3 of **S4** into **W4**.

(a) **(i)** Describe the test for reducing sugars.

_____

_____

_____

_____

_____

_____ [3]

(ii) Test for reducing sugars in **W1** to **W4** and record the results in **Table 2.2**.

Table 2.2

test tube	observation
W1	
W2	
W3	
W4	

[4]

(iii) State the conclusions from the results about the concentrations of reducing sugars in the three test tubes, **W1**, **W2** and **W3** compared to **W4**.

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_____

_____

_____

_____

_____ [4]

(b) Describe how the reliability of the reducing sugar test is ensured.

_____

_____

_____

_____ [2]

(c) Suggest any **two** improvements that could be made in order to get more accurate results of the sugar content of these fruits.

1. _____

_____

2. _____

_____ [2]

[Total: 15]

Question 3

For Examiner's Use

Slide **Z1** is a stained transverse section through a dicotyledonous plant organ.
Examine **Z1** carefully using the low power of your microscope.

(a) Make a large, labelled plan drawing of **Z1**.

[4]

(b) Name the part of the plant from which the section was taken.

_____ [1]

(c) Make high power drawings of **two** cells, one from a water-conducting tissue and the other from a storage tissue, of **Z1**.
Identify these tissues and **annotate** your drawings.

water conducting tissue:	storage tissue

[6]

(d) Specimen **Z2** is a common organism found in Zimbabwe.
Examine **Z2** using the hand lens provided.

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(i) List **three** visible diagnostic features of **Z2** which will enable you to place it into its appropriate phylum.

1. _____

2. _____

3. _____ [3]

(ii) State the phylum to which **Z2** belongs.

_____ [1]

(iii) State any **two** roles played by **Z2** in the ecosystem.

1. _____

2. _____ [2]

[Total: 17]