NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – OCTOBER 2016

LIFE SCIENCES: PAPER III

EXAMINATION NUMBER												

Time: 1½ hours 50 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. Write your examination number in the space above.
2. This question paper consists of 8 pages and an Information Sheet of 1 page. Please make sure that your question paper is complete.
3. You have 10 minutes reading time before you begin. You are advised to read carefully and spend time planning your work.
4. Perform the tasks with care. You will be assessed on your ability to follow instructions.
5. Standard time concessions will apply to this examination.
6. Please answer the questions in the spaces provided. Should you need more space for answering, use the last page in this question paper only. DO NOT use any additional paper.
7. The Information Sheet is printed on separate yellow paper. Please read it **carefully** before you begin and **refer to it during the course of this examination**.

Invigilators are asked to please complete this grid after the examination.

Criteria		
Following instructions	0	1
Test tube contents	0	1
Manipulation	0	1
TOTAL		**3**

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Procedure							**Total**

Please read the Information Sheet carefully before you start. There are two parts to this question paper: Part 1 – The Investigation and Part 2 – Experimental design.

You will be determining the effect of temperature on the enzyme bromelain.

Before you begin with your investigation, make sure that you have the following equipment at your workstation:

- test tube rack
- three identical test tubes
- gelatine powder in a container
- three 5 ml measuring spoons
- two wooden kebab sticks
- sharp vegetable knife/steak knife
- piece of fresh pineapple in a container
- pieces of tinned pineapple in a container
- cutting tile/surface
- permanent marking pen
- 10 ml syringe
- tap water
- access to boiling water in an urn or kettle
- access to ice
- 2 beakers/suitable containers
- piece of paper towel
- timing device/clock on the wall

PART 1 INVESTIGATION

1. Use your knife and cutting tile/surface to carefully cut your tinned pineapple into small pieces. The pieces should be small enough to fit easily into a test tube.
   Do not spend too much time on this activity. Return the chopped tinned pineapple pieces to the original container.
2. Clean your knife and cutting tile/surface **very well**.
3. Repeat the steps above using the fresh pineapple.
4. Using a clean spoon, prepare a gelatine solution by dissolving 15 ml of gelatine powder into 50 ml of boiled water.
   - Sprinkle the gelatine powder on the boiled water.
   - Stir gently until all of the gelatine powder has dissolved.
   - Add 50 ml cold water to this solution and stir again.
   - Set this solution to one side.
5. Label your test tubes A, B and C.
6. Using your syringe, put 20 ml of gelatine solution into each of the three test tubes.

NOW CALL THE INVIGILATOR BEFORE YOU PROCEED ANY FURTHER.

7. Once your work has been checked, using a clean spoon, measure 5 ml of chopped tinned pineapple into test tube A. Mix gently so that the pineapple is covered with gelatine solution in the bottom of the test tube.
8. Repeat step 7 with the fresh pineapple. Place in test tube B.
9. Leave test tube C as it is.

10. Place all three tubes in ice in a container provided in the venue for at least 20 minutes.

    AT THIS POINT CONTINUE WITH THE INVESTIGATION AND DESIGN WHILE YOU WAIT.

11. Draw up a suitable table in the space below and record your observations. In the table you will need to describe the appearance of the contents and the degree of gelatinisation once the test tubes have been removed from the ice.

(6)

12. Write a conclusion for this investigation based on your observations.

_____

_____

_____ (2)

13. What is the independent variable for this investigation?

_____

_____ (2)

14. What is the dependent variable for this investigation?

_____

_____ (2)

15. Discuss TWO precautions that are very necessary to follow when setting up this investigation to ensure the outcome is valid. In your discussion of the precautions give the reasons why the investigator needs to be cautious.

(4)

16. If the stock gelatine solution prepared in Step 4 above is regarded as a 100% gelatine solution, complete the table below and describe what you would do to prepare a 50% and a 25% gelatine solution.

% Concentration	**Preparation**
100	Described in the method given above. (Step 4)
50	
25	

(4)

17. Identify TWO safety precautions that are needed to be followed when carrying out this investigation.

(2)

18. How could the reliability of this investigation be tested?

(1)

19. What is the role of test tube C?

_____

_____ (2)

20. List any TWO controlled/fixed variables and state precisely how they will be controlled to ensure fair testing.

_____

_____

_____

_____ (4)

21. Ask the invigilator for a fresh piece of pineapple. Make a biological drawing of the piece of pineapple in the space below. You do not need to label any of the parts of your drawing. Make sure that your drawing is larger than the piece of pineapple in order to show some of the detail* in your item. Give your drawing a suitable heading and give some indication of scale or magnification.

*Detail you see with your naked eye (5)

PART 2 EXPERIMENTAL DESIGN

Using equipment that you would find in a school laboratory, design an experiment in which you determine the length of time required to destroy (denature) the enzyme bromelain using heat. You must use a stock gelatine solution such as the one prepared in the investigation you carried out in Part 1 – Step 4.

1.1 Formulate a hypothesis for this experiment that you are designing.

(3)

1.2 State the aim of the experiment.

(2)

1.3 Outline your own method using numbered points.

(8)

Total: 50 marks

ADDITIONAL PAGE (if needed)