NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – MARCH 2018

LIFE SCIENCES: PAPER III

EXAMINATION NUMBER												

Time: 1½ hours 50 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. Write your examination number in the blocks above.
2. This question paper consists of 9 pages and a yellow Information Sheet. Please check that your question paper is complete.
3. You have ten 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 your responses, use the last page in this question paper ONLY. No additional paper or a second graph grid can be supplied. Anything included with this booklet as you have received it will not be marked.
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 the examination**.

Invigilators are asked to please complete this after the examination.

CRITERIA		
Following instructions	0	1
Test tube contents	0	1
Recording	0	1
TOTAL		**3**

(3)

For Markers' USE ONLY

Procedure							Total

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

Osmosis is the movement of water in cells and across membranes.
The length and firmness of a cylinder of potato placed in different salt concentrations will change over time. We will investigate and determine the salt concentration that closely matches the internal water potential of the potato cells.

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

- 150 ml of 40% salt solution in a container
- six cylinders of potato with the same diameter
- 300 ml beaker of distilled water
- 10 ml syringe for transferring salt solution
- 10 ml syringe for transferring distilled water
- six small, clear plastic party cups
- permanent marking pen
- ruler
- sharp vegetable knife and cutting surface
- forceps
- access to timing device
- additional distilled water should be available
- paper towel
- thermometer

PART 1 INVESTIGATION

1. Label the six empty cups A to F.
2. Using a syringe, add 100 ml of 40% salt solution into cup A.
3. Using a syringe, remove 50 ml of solution from cup A and add to cup B.
4. Then add 50 ml of distilled water to cup B.
5. Using a syringe, remove 50 ml of solution from cup B and add to cup C.
6. Then add 50 ml of distilled water to cup C.
7. Using a syringe, remove 50 ml of solution from cup C and add to cup D.
8. Then add 50 ml of distilled water to cup D.
9. Using a syringe, remove 50 ml of solution from cup D and add to cup E.
10. Then add 50 ml of distilled water to cup E.
11. Transfer 50 ml of **distilled water** to cup F.
12. Cut six potato cylinders into lengths of 20 mm each.

CALL THE INVIGILATOR TO DO AN INITIAL CHECK OF YOUR PROGRESS AT THIS POINT.

13. Make a note of the temperature of the contents of cup A here. Do this whilst the invigilator observes you recording the temperature _____ (1)
14. Using forceps, place a potato cylinder into each cup.
15. The potato cylinders need to be in the cup for a minimum of 25 minutes.
16. When the time is up gently remove the potato cylinders taking care to note which came from which cup.
17. You will need to record the texture, firmness and the length of each cylinder and transfer this information to the table you have prepared.

18. Draw up a suitable table, providing a meaningful table heading, in the space below. Record your observations of final cylinder firmness and texture, length of cylinder both BEFORE and AFTER being in the solutions of different salt concentration.
Your table needs to also indicate the % salt concentration of each test container A to F.

(8)

19. Identify the independent variable in this investigation.

_____

(2)

20. Identify the dependent variable in this investigation.

_____

(2)

21. Identify TWO controlled or fixed variables in this investigation and state how these variables were controlled.

_____

_____

_____

_____

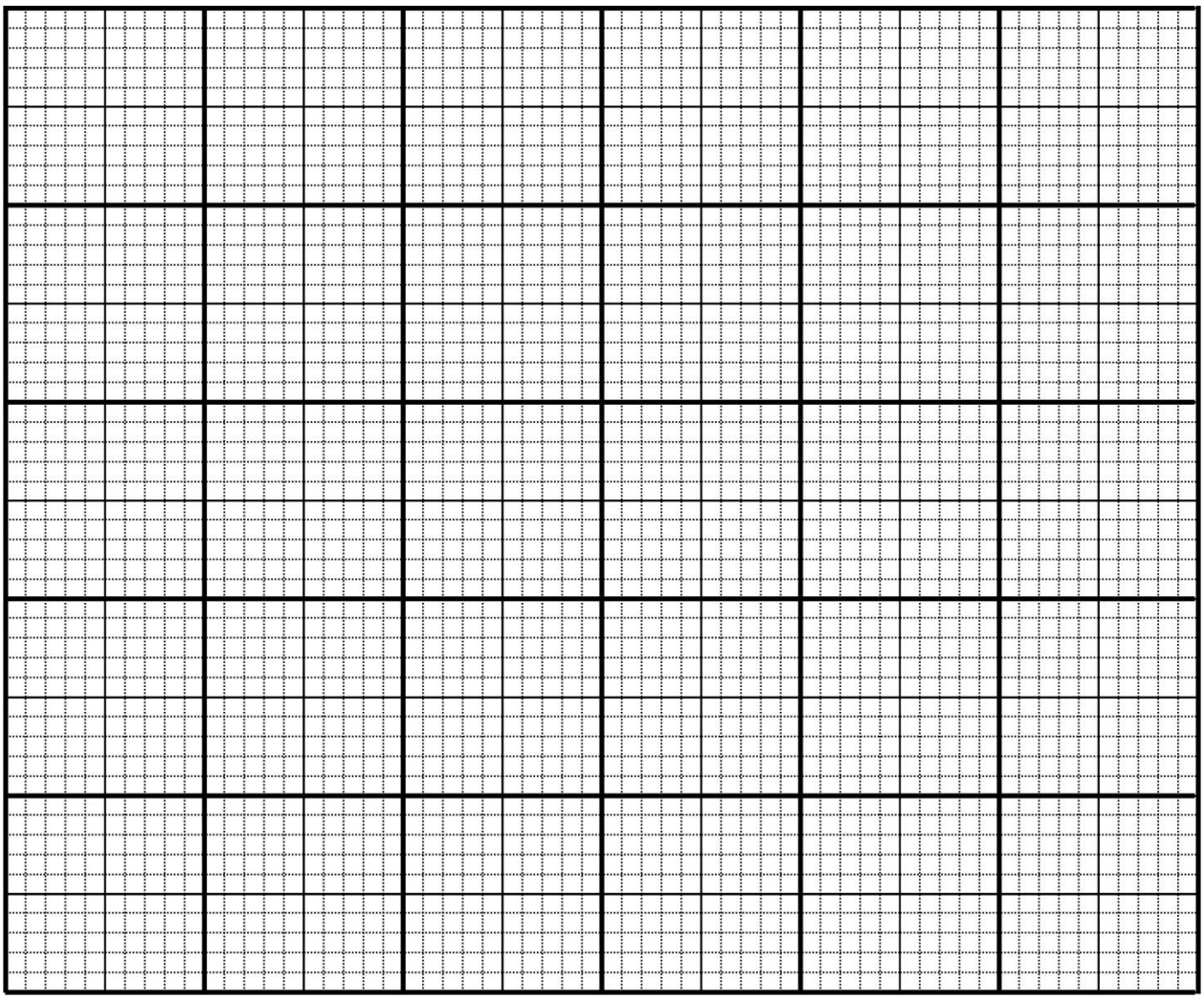
(4)

22. Write a conclusion to explain your observations recorded in your table. Relate this to the salt concentration that closely matches that of the water potential in the vacuoles of potato cells.

(4)

23. On the graph paper below, on a single set of axes, draw a bar graph to show **both** the initial and final cylinder lengths of **only A, C and F**. Supply a suitable heading to the graph.

Heading:



(10)

24. In order to plot the graph above, was **qualitative** or **quantitative** data collected? Explain.

(2)

25. Suggest ONE way in which the reliability of this investigation could be tested.

(1)

PART 2 EXPERIMENTAL DESIGN

It has been shown that potato cylinders of the same length and diameter placed in different salt concentrations will change in length to different degrees.

Now design an experiment to show how potato cylinders of different diameters but the same length will change if placed in the same salt concentration.

Use ordinary laboratory equipment and chemicals that you would find in the school laboratory.

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

_____

_____

_____ (3)

1.2 State the aim of this experiment.

_____

_____ (2)

1.3 Outline your own method below using numbered points.

(8)

Total: 50 marks

ADDITIONAL PAGE (use only if necessary)