INFORMATION FOR THE CANDIDATES

1. *This question paper consists of two questions. Attemp all the questions.*

2. *Answers for question 1 must be written in the spaces provided in the question paper.*

3. *Write down the answers for question 2 in a separate answer sheets. You can also include in your answers , where ever possible the chemical equations, diagrams, table , graph or any other means of communication which are suitable .*

4. *Show your working where ever possible to help you get more marks*

5. *Diagrams which accompany the questions are not drawn to scale, or otherwise stated.*

6. *Time suggested for each question is 45 minutes.*

7. *You are allowed to use a nonprogrammable calculator.*

Allocation of maks:

Score	Description
3	Excellent : The best possible responses
2	Good : Average responses
1	Week : Inaccurate responses
0	The responses are wrong or no response at all

Answer **all** questions

1. A group of students carried out an experiment to study the effect of the concentration of sucrose solution on pieces of cut potatoes.

They prepared 40 potato discs with a cork borer and separated them into 4 groups P,Q,R and S with 10 discs in each group.These potato discs were then soaked in petri dishes labeled P, Q, R and S each containing sucrose solutions of concentrations 0%, 3%, 5% and 15% respectively.

Figure 1 shows the arrangement of 10 pieces of potato discs for each group from one end to the other end at the beginning of the experiment.

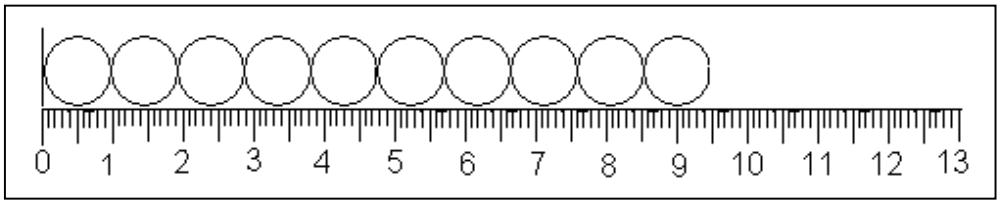
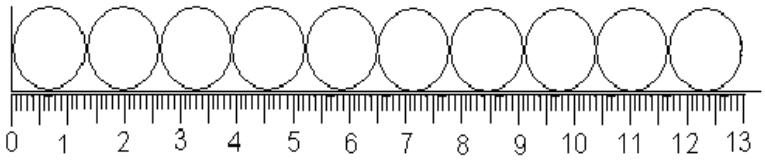
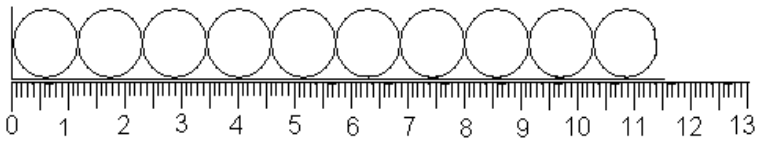
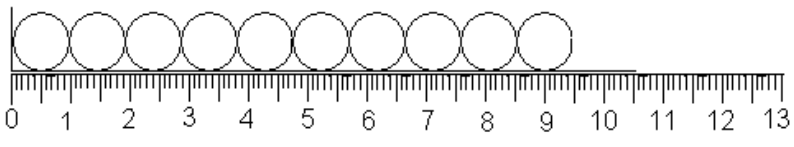


FIGURE 1

Table 1 shows the results of the total length of the 10 potato discs immersed in the respective sucrose concentrations after 30 minutes.

Group	Concentration of sucrose solution(%)	Arrangement of 10 potato discs	Final Total Length (cm)
P	0		
Q	3		
R	5		

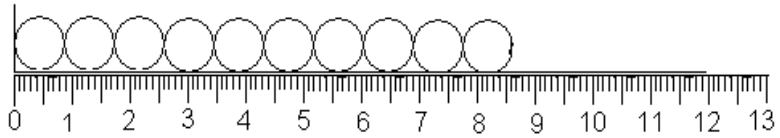
S	15		

TABLE 1

(a) (i) Based on Table 1, state two observations.

1……..

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2. ……....

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[3 marks]

(ii) State the inference which corresponds to the observations in 1(a)(i)

1…….....

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2. ……

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[3 marks]

(b) Complete Table 1 by recording the final total length of the potato discs

[3 marks]

(c)(i) Complete Table 1.1 based on this experiment

Variable	Method to operate the variable
Manipulated variable …… …… ……	 …….. …….. ……
Responding variable …… …… ……	 …….. …….. ……..
Controlled variable …… …… ……	 …… …… ……

TABLE 1.1

[3 marks]

(ii) State the hypothesis for this experiment.

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[3 marks]

(d)(i) Based on Table 1, construct a table and record the results of the experiment which includes the following aspects:
* concentrations of sucrose solutions
* original length (cm)
* final length (cm)
* change in length (cm)
* percentage change in length (%)

(ii) On the graph paper provided, draw the graph of the percentage change in length of the potato discs against the concentration of the sucrose solutions.

[3 marks]

(iii) Based on the graph in (d)(ii), state the concentration of the sucrose solution which is isotonic to the concentration of the cell sap of the potatoes. Explain your answer.

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[3 marks]

(e) The experiment using 15 % sucrose solution was repeated with spinach stem strips. Predict the changes that occur to the strips?

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[3 marks]

(f) If the change in length of the potato discs in group P is measured every minute, state the relationship between the length of the potato discs with time?

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[3 marks]

(g) Based on this experiment , define osmosis operationally.

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[3 marks]

(h) Classify the various sucrose concentrations used in this experiment by comparing with the osmotic concentration of the cell sap.

Sucrose concentrations (%)	**Types of sucrose solution compared to the osmotic concentration of cell sap**
0	
3	
5	
15	

[3 marks]

2. Figure 2 shows a map of the Gelam river running through several areas where there are human activities going on.You are required to investigate the level of water pollution in the river at the locations X,Y and Z.

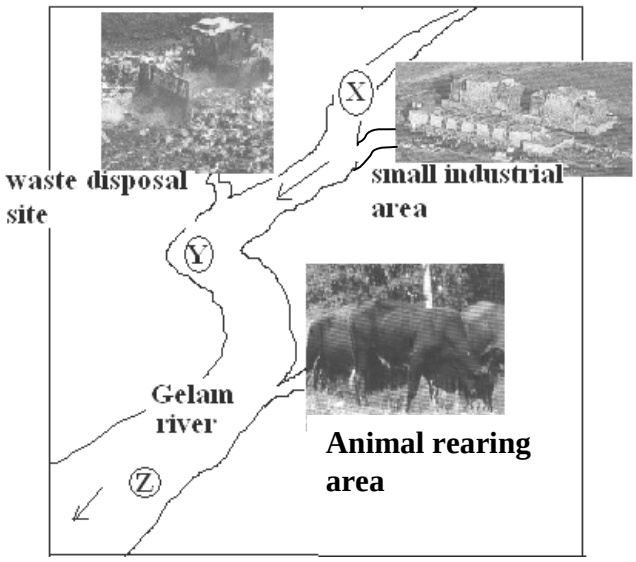

FIGURE 2

Design an experiment to compare the level of water pollution at the three locations .

[17 marks]

END OF QUESTION PAPER