

NAME  
SCHOOL

INDEX NUMBER  
DATE

## CELL PHYSIOLOGY

### 1. 1989 Q14 P1

The table below shows the concentration of some ions in pond water and in the cell sap of an aquatic plant growing in the pond.

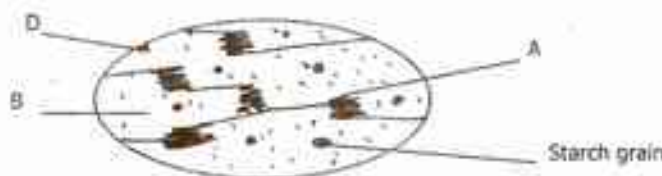
Ions	Concentration in pond water	Concentration in cell
Sodium	50	30
Potassium	2	
Calcium	15	1
Chloride	180	200

- (a) Name the process by which the following ions could have been taken up by this plant
- (i) Sodium ions.....
- (ii) Potassium ions.....
- (b) For each processes named in (a) (i) and (ii) above, state one condition necessary for the process to take place.

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### 2. 1990 Q4 P1

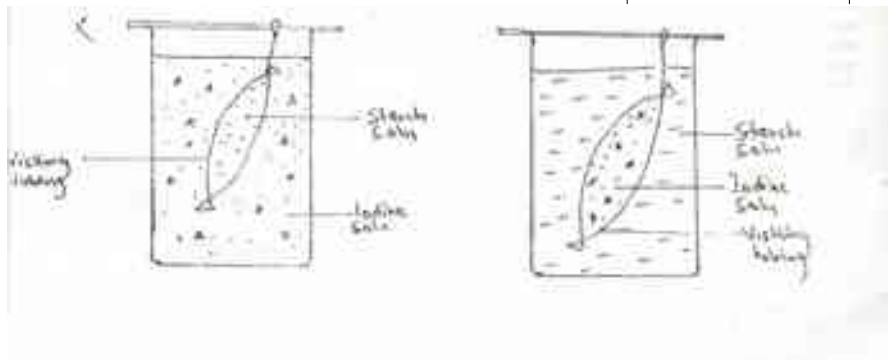
The diagram below represents a section through a chloroplast as seen under the electron microscope.



- a) Name the structure labeled D
- .....
- b) In which labeled structure would you expect to find chlorophyll molecules?
- .....
- c) In which of the labeled structures does carbon dioxide fixation occurs?

3. 1991 Q14 P1

A group of students set up an experiment to demonstrate a certain process. The experiment was set up as shown in the diagram below.



After 10 minutes the students recorded their observation in a table as shown below.

SET UP	Observation inside the tube	Outside the tube
I	Blue and Black colour	No colour change
II	No colour change	Blue

(a) State the process being demonstrated in this experiment.

(b) Explain the result in experiment set up

(c) What results would be expected if the experiment was repeated using starch solution which had been boiled with dilute hydrochloric acid for 5 minutes?

4. 1993 Q12 P1

An experiment was carried out to investigate the effect of different concentrations of sodium chloride on human red blood cells. Equal amounts of blood were added to equal volumes of the salt solution but of different concentrations. The results are shown in the table below.

Set up	sodium Chloride concentration	Number of red blood cells	
		At start of experiment	At end of experiment
A	0.9%	Normal	No change in number

B	0.3%	Normal	Fewer in Number
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(a) Account for the results set up in A and B

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(b) If the experiment was repeated using 1.4% sodium chloride solution state the expected results with reference to

(i) The number of red blood cells

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(ii) The appearance of red blood cell if viewed under the microscope

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**5. 1994 Q6 P1**

Give a reason for each of the following

a) A mature plant cell does not lose its shape even after losing water.

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b) Xylem vessels do not collapse even when they do not contain water.

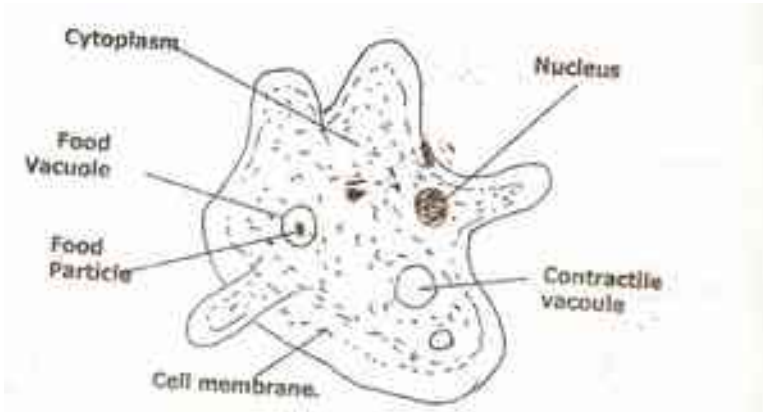
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**6. 1994 Q12 P1**

Below is a diagram of an organism



(a) (i) Name the phylum to which the organism belong

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(ii) Give reasons for your answer in a (i) above

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(b) Outline the process by which the food particles got into the organism.

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(c) Describe what happens to the food particles eventually.

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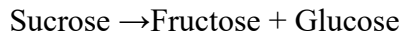
**7. 1995 Q4 P1**

Explain what would happen to red blood cells if they are placed in a concentrated salt solution ( 2 marks)

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**8. 1995 Q10 P1**

An experiment was carried out to investigate the rate of reaction shown below



For the products fructose and glucose to be formed, it was found that substance K was to be added and the temperature maintained at 37°C. When another substance L was added, the reaction slowed down and eventually stopped.

(a) Suggest the identify of substances K and L (2 marks)

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(b) Other than temperature state three ways by which the rate of reaction could be increased (3 marks)

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(c) Explain how substance L slowed down the reaction (2 marks)

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**9. 1999 Q15 P1**

An experiment was carried out to investigate haemolysis of human red blood cells. The red blood cells were placed in different concentrations of sodium chloride solution. The percentage of haemolysed cells was determined. The results were as shown in the table below.

Salt concentration g/100cm <sup>3</sup> (%)	0.33	0.36	0.38	0.39	0.42	0.44	0.48
Red blood cells Haemolysed (%)	100	91	82	69	30	15	0

- a) i) On the grid provided, plot a graph of haemolysed red blood cells against salt concentration.  
ii) At what concentration of salt solution was the proportion of haemolysed cells equal to non-haemolysed cells?  
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iii) State the percentage of cells haemolysed at salt concentration of 0.45%  
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b) Account for the results obtained at:

- i) 0.33 percent salt concentration.  
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- ii) 0.48 percent salt concentration.  
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c) What would happen to the red blood cells if they were placed in 0.50 percent salt solution?  
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- d) Explain what would happen to onion epidermal cells if they were placed in distilled water.

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**10. 2000 Q8 P1**

Why is oxygen important in the process of active transport in cells?

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**11. 2004 Q16 P1**

a) What is diffusion (2 marks)

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b) How do the following factors affect the rate of diffusion?

i) Diffusion gradient (1 mark)

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ii) Surface area volume ratio (1 mark)

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iii) Temperature (1 mark)

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c) Outline three roles of active transport in the human body (3 marks)

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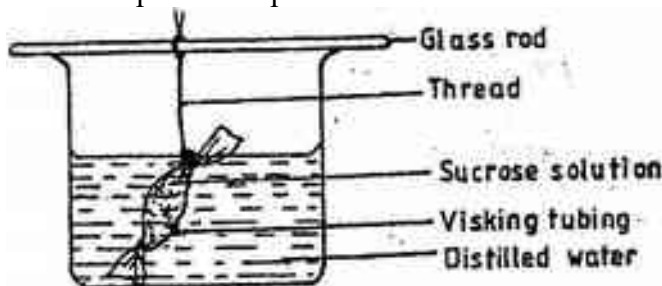
**12. 2005 Q7 P1**

State the importance of osmosis in plants. (3 marks)

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**13. 2006 Q12 P1**

An experiment was set up in the experiment as show below.



The set up was left for 30 minutes.

a) State the expected results. (1 mark)

b) Explain your answer in (a) above (3 marks)

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**14. 2007 Q3 P1**

Plant cells do not burst when immersed in distilled water. Explain (2 marks)

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**15. 2007 Q5 P1**

Distinguish between diffusion and osmosis (2 marks)

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**16. 2008 Q4 P1**

The diagrams below show a red blood cell that was subjected to a certain treatment



(a) Account for shape of the cell at the end of the experiment (2 marks)

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(b) Draw a diagram to illustrate how a plant cell would appear if subjected to the same treatment (1 mark)

**17. 2008 Q5 P2**

A freshly obtained dandelion stem measuring 5 cm long was split lengthwise to obtain two similar pieces.

The pieces were placed in solutions of different concentrations in Petri dishes for 20 minutes.

The appearance after 20 minutes is as shown



(a) Account for the appearance of the pieces in solutions L<sub>1</sub> and L<sub>2</sub> (6 marks)

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(b) State the significance of the biological process involved in the experiment (2 marks)



18. 2009 Q13 P1

(a) Distinguish between diffusion and active transport (2 marks)

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(b) State one role that is played by osmosis in (1 mark)  
(i) Plants

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(ii) Animals

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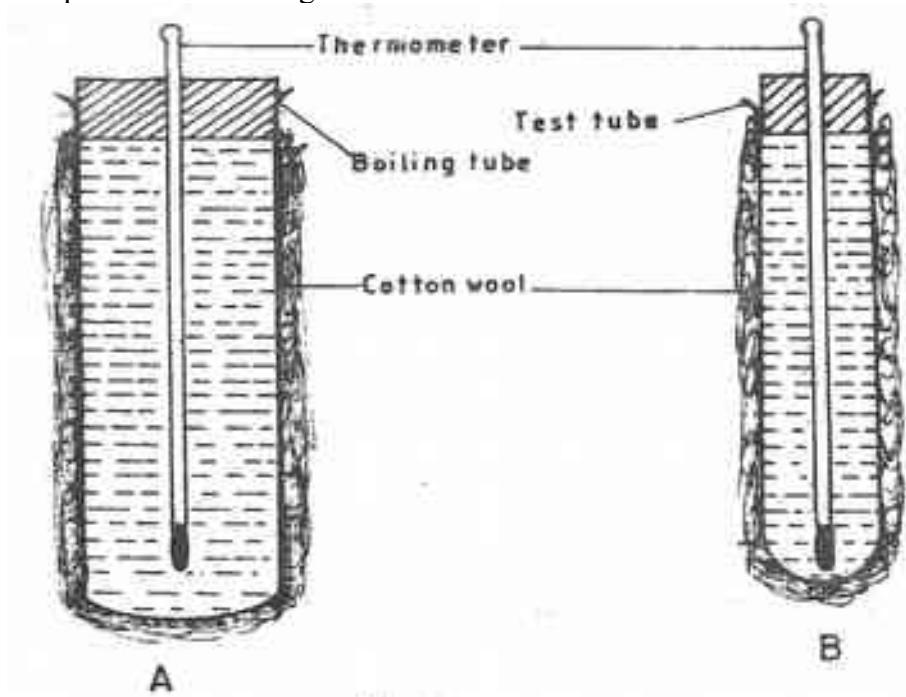
19. 2010 Q7 P1

Distinguish between haemolysis and plasmolysis. (2 marks)

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20. 2010 Q6 P2

In an experiment to investigate a certain physiological process, a boiling tube labeled **A** and a test tube labeled **B** were covered with cotton wool. The two tubes were simultaneously filled with hot water and fitted with thermometers. The experimental set-up was as in the diagrams below.



The temperatures reading were taken at the start and after every two minutes for twenty minutes. The results were as shown in the table below.

Time (minutes)	Temperature ( $^{\circ}\text{C}$ )	
	Boiling tube A	Test tube B
0	60	60
2	59	54
4	57	50
6	55	46
8	53	43
10	52	40
12	51	37
14	49	35
16	48	33
18	47	32
20	46	30

a) Using the same axes, draw graphs of temperature against time. (6 marks)

b) i) Work out the rate of heat in the boiling tube labeled **A** and test tube labeled **B** between the 5<sup>th</sup> and 15<sup>th</sup> minutes.

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ii) Account for the answers in (b) (i) above. (2 marks)

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iii) How does the explanation in (b) (ii) above apply to an elephant and a rat? (2 marks)

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c) i) State the role of the cotton wool in this experiment. (1 mark)

ii) Name **two** structures in mammals that play the role stated in (c) (i) above

(2 marks)

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d) State **three** advantage of having constant body temperature in mammals. (3 marks)

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**21. 2011 Q6 P2**

(a) An experiment was carried out to investigate the population of a certain micro-organism. Two Petri-dishes were used. Into the Petri – dish labeled M, 60cm<sup>3</sup> of a culture medium was placed while 30cm<sup>3</sup> of the same culture medium was placed in Petri-dish labeled N. Equal numbers of the micro-organisms were introduced in both Petri-dishes. The set-ups were then incubated at 35<sup>0</sup>C. The number of micro-organisms in each Petri-dish was determined at irregular intervals for a period of 60hours. The results were as shown in the table below.

M	40	40	180	280	120	172	160	184	156	600
Relative number of micro-organisms					0	0	0	0	0	0
N	40	40	120	200	680	560	560	600	600	400
Time in hours	0	5	10	15	23	30	35	42	45	60

i) On the same axis, draw the graphs of relative number of micro-organisms against time on the grid provided.

ii) After how many hours was the difference between the two populations greatest?

(1mark)

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iii) Work out the difference between the two populations at 50 hours.

(2marks)

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iv) With a reason state the effect on the population of micro-organisms in Petri – dish M if the temperature was raised at 60<sup>0</sup>C after 20 hours.

(2marks)

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v) Account for the shape of the curve for population in petri-dish N between 46 hours and 59 hours

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(b) Explain how the osmotic pressure in the human blood is maintained at normal level

(5 marks)

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**22. 2012 Q4 P1**

In an investigation, a student extracted three pieces of pawpaw cylinders using a cork borer. The cylinders were cut back to 50mm length and placed in a beaker containing a solution. The results after 40mins were as shown in the table below.

<b>Feature</b>	<b>Result</b>
Average length of cylinders (mm)	56mm
Stiffness of cylinders	stiff

(a) Account for results in the table above. (3 marks)

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(b) What would be a suitable control set-up for the investigation? (2 marks)

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**23. 2012 Q13 P1**

State three factors that affect the rate of diffusion (3 marks)

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