

NAME: .....

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**S.5 TOPICAL TEST ON MOVT IN & OUT OF CELLS 2023****DURATION: 90 minutes**

INSTRUCTIONS: Attempt all questions in the spaces provided

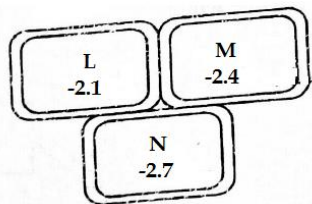
**SECTION A**

- The component of water potential which is due to presence of solute molecules is called  
 A. Turgor potential  
 B. Osmotic pressure  
 C. Osmotic potential  
 D. Turgor pressure ☐
- Which one of the processes aids the absorption of amino acids after eating a heavy proteineous meal?  
 A. Active transport and diffusion  
 B. Diffusion and Osmosis  
 C. Diffusion and pinocytosis  
 D. Active transport only ☐
- Two cells A and B have water potential of -2000Kpa and -1000Kpa respectively. Which one of the following statements is true about the cells?  
 A. Cell A has a higher concentration of water molecules than cell B  
 B. Cell A has a higher solute potential than Cell B  
 C. There is a net movement of water from Cell A to Cell B  
 D. Cell A has a less solute concentration than cell B ☐
- Figure 1 represents the osmotic pressure of two adjacent plant cells A and B

Cell A	Cell B
$\Psi_{\text{cell}} = -4.0\text{Kpa}$	$\Psi_{\text{cell}} = -0.8\text{Kpa}$
$\Psi_p = 0.8\text{Kpa}$	$\Psi_p = 0.4\text{Kpa}$
$\Psi_s = -1.2\text{Kpa}$	$\Psi_s = -1.2\text{Kpa}$

In which direction will water move by osmosis?

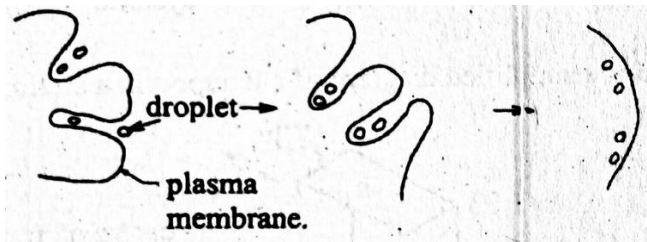
- Both directions until equilibrium is established.  
 B. Both directions even when equilibrium is established  
 C. From A to B until equilibrium is established  
 D. From B to A until equilibrium is established ☐
- Which one of the following changes in a cell would increase its water potential?  
 A. Decrease in turgor pressure  
 B. Decrease in osmotic potential  
 C. Increase in solute potential  
 D. Increase in pressure potential ☐
- Which of the following figures represents the highest water potential?  
 A. -240  
 B. 0  
 C. -200  
 D. 1 ☐
- Figure below represents plant cells L, M and N, with their respective water potentials in (Kpa) indicated.



Which one of the following is the correct direction of water movement between cells?

- N to L  
 B. L to M  
 C. N to M  
 D. M to L ☐
- Large steroid molecules diffuse quickly through cell surface membrane suggesting that the membranes.  
 A. Consist of non-polar molecules  
 B. Are semi-permeable  
 C. Are freely permeable  
 D. Are made of polysaccharides. ☐

9. Potassium cyanide is known with the formation and use of ATP in cell metabolism. If the use of potassium cyanide resulted in an accumulation of a solute in a cell, it may be deduced that the solute enters by;
- A. Active transport      B. Diffusion      C. Osmosis      D. Pinocytosis
10. The type of feeding mechanism shown in figure 2 is.



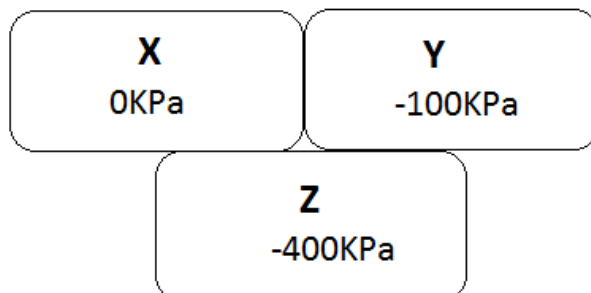
- A. Pinocytosis  
B. Filter feeding  
C. Phagocytosis  
D. Predation.

11. Facilitated diffusion and active transport both require....
- A. Adenosine triphosphate      C. Unidirectional movement of solutes  
B. Protein carriers      D. That the solutes moved be soluble in lipids.
12. An invagination of the cell surface membrane facilitates.
- A. Osmosis      B. Endocytosis      C. Diffusion      D. Active transport
13. The table below shows a system of two cells separated by a semi-permeable membrane.

Cell X	Cell Y
$\Psi_s = -700\text{Kpa}$	$\Psi_s = -900\text{Kpa}$
$\Psi_p = -500\text{Kpa}$	$\Psi_p = -400\text{Kpa}$

Which one of the following statements is correct about the movement of water in the system?

- A. No water moves out of both cells X and Y  
B. There is net movement of water from cell Y to cell X  
C. There is no net movement of water between the cells  
D. There is net movement water from cell X to cell Y
14. The water potential of three adjacent cells is shown below.



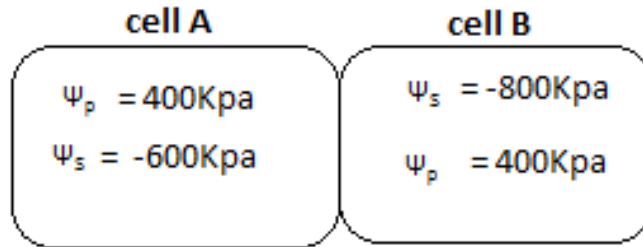
Water molecules are likely to move from;

- A. Cell X to cells Y and Z  
B. Cell Z to cell X  
C. Cell Y to cells X and Z  
D. Cell Z to cell Y

15. Which one of the following is true about turgid cells?
- A. Water potential is less negative  
B. Water potential equals to solute potential  
C. Solute potential equals but opposite to pressure potential  
D. Pressure potential is zero

## SECTION B

16. The diagram below shows two adjacent plant cells, A and B. The values of their pressure potential and solute potential are given in kilo Pascals.



- (a) Find out in which direction would water flow between the two cells. Give a reason for your answer. (02 marks)

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- (b) Assume that the changes in the value of solute potential are negligible. Work out the values of pressure potential and water potential of each cell when equilibrium is reached (i.e. when the cells have equal water potentials) (04 marks)

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- (c) The cells are then immersed in distilled water and again allowed to reach equilibrium, assume that the changes in solute potential are negligible. Find the new values of
- (i) the water potential of the two cells. (01 mark)

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- (ii) the pressure potential of cell A. (01 mark)

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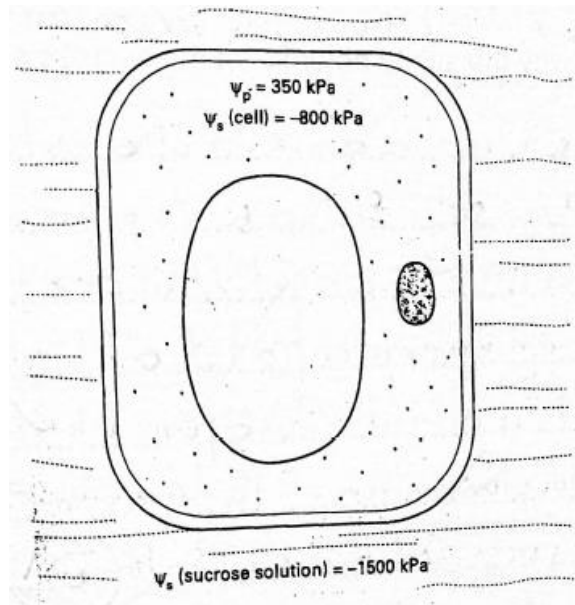
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(d) Under what conditions does osmosis take place?

(02 marks)

17. The diagram below shows a plant cell, immersed in a sucrose solution. The pressure potential ( $\Psi_p$ ) of the cell and the solute potential ( $\Psi_s$ ) of the cell and the sucrose concentration are shown in the diagram.



(a) Define the terms:

(i) Water potential

(01 mark)

(ii) Pressure potential

(01 mark)

(iii) Osmotic pressure

(01mark)

(iv) Turgor pressure

(01 mark)

(b) Calculate the water potential of this cell. ( $\Psi_{\text{cell}}$ )

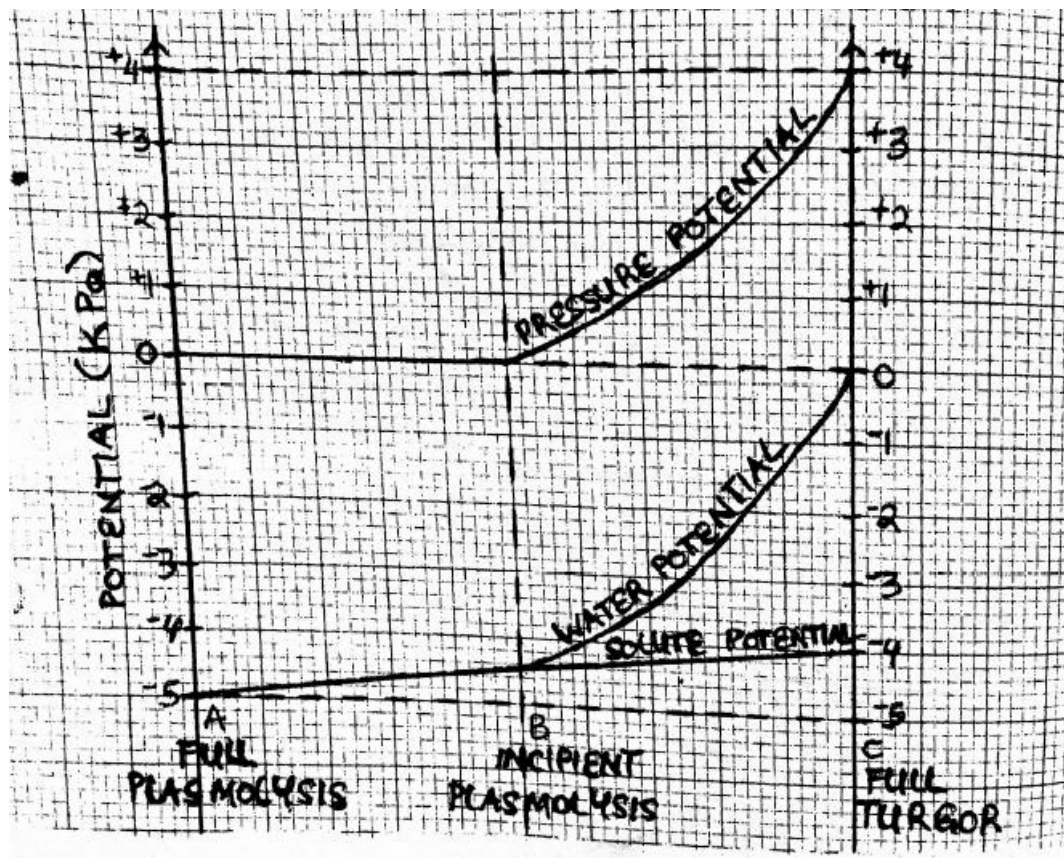
(c) Giving a reason, state whether water will move into or out of the cell.

(02 marks)

(d) Explain why the solute potential of the sucrose solution has a negative value.

(03 marks)

18. The graphs below show changes in the different potentials of a fully plasmolysed plant cell when placed in a hypotonic solution.



(a) Comment on the change in the pressure potential of the cell.

(i) Between full plasmolysis and incipient plasmolysis.

(05 marks)

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(ii) Between incipient plasmolysis and full turgor.

(05 marks)

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(b) (i) Distinguish the terms turgidity and plasmolysis.

(02 marks)

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(ii). State four roles of turgidity in plants

(04 marks)

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19. (a) (i) Distinguish between Crenation and Haemolysis

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(b) A plant cell with a solute potential of  $-2360\text{Kpa}$  and a pressure potential of  $470\text{Kpa}$  was immersed in a sucrose solution whose water potential was  $-690\text{Kpa}$ .

(i). calculate the water potential gradient between the cell and the sucrose solution. (03 marks)

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(ii). State the direction in which the water will flow. (01 mark)

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(c). What is the difference between Wilting and Water stress. (02 marks)

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**END**

*“Being defeated is only a temporary condition; giving up is what makes it permanent”*