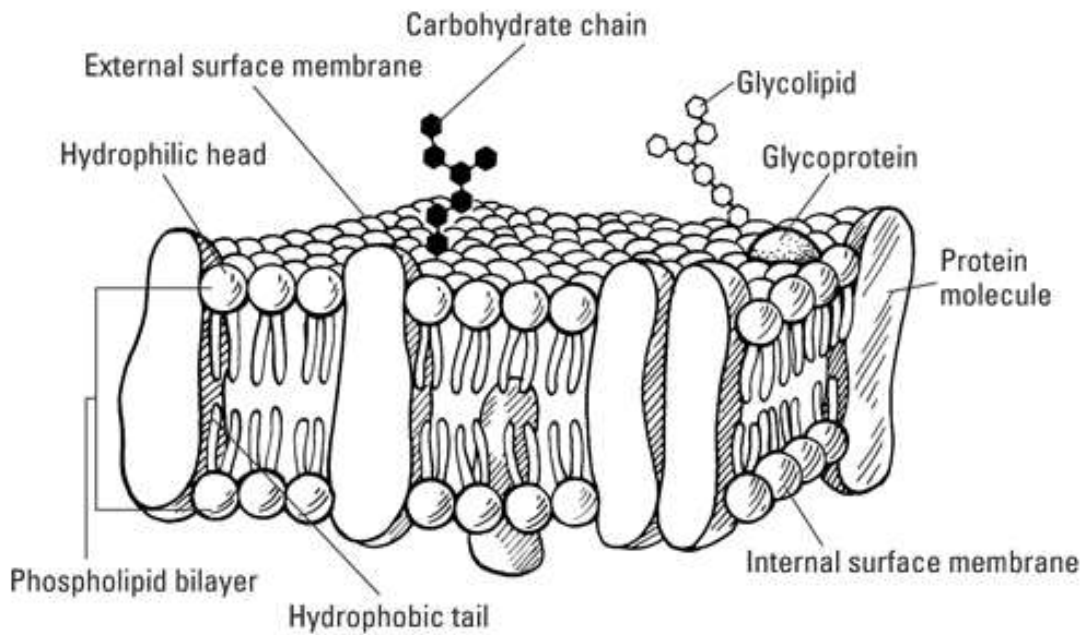




National 5 Biology

Unit 1 Cell Biology

1.2 Transport across membranes



Name _____

Class _____

Teacher _____

Transport across membranes

Living organisms exchange substances with each other and with their surroundings. This happens at cellular level and involves substances moving from one cell into or out of another cell or from the surroundings into or out of a cell. This involves different processes depending on the concentration of the solutions involved.

Learning intention

We are learning how to describe the structure of the cell membrane.

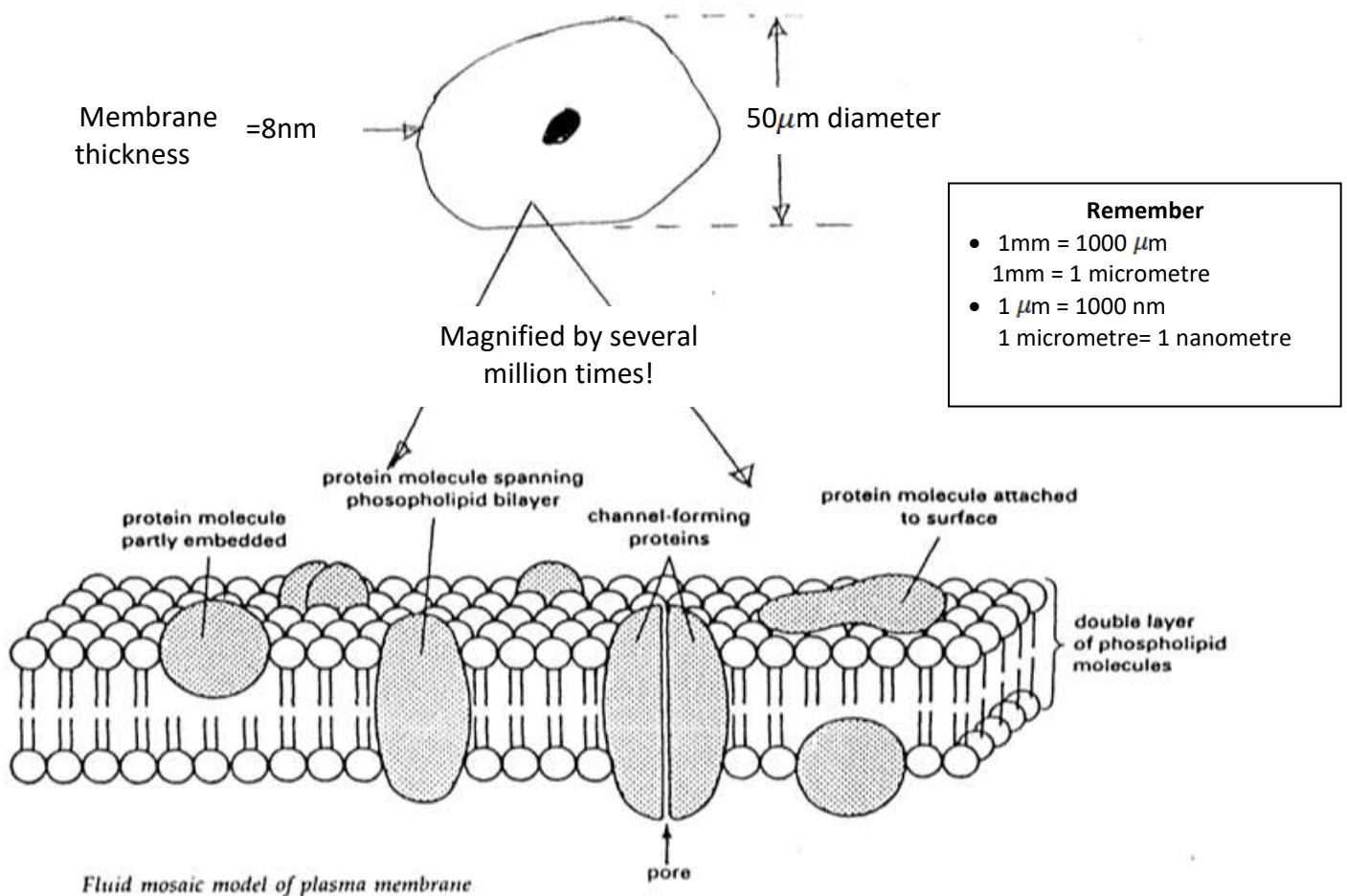
The cell membrane

The cell membrane contains:



_____ molecules, arranged in a double layer. This layer is constantly moving, allowing the cell to change shape.

A patchy mosaic of _____ molecules. Pores in the proteins form channels.



Learning intention

We are learning how to describe the properties of the cell membrane.

Membrane properties

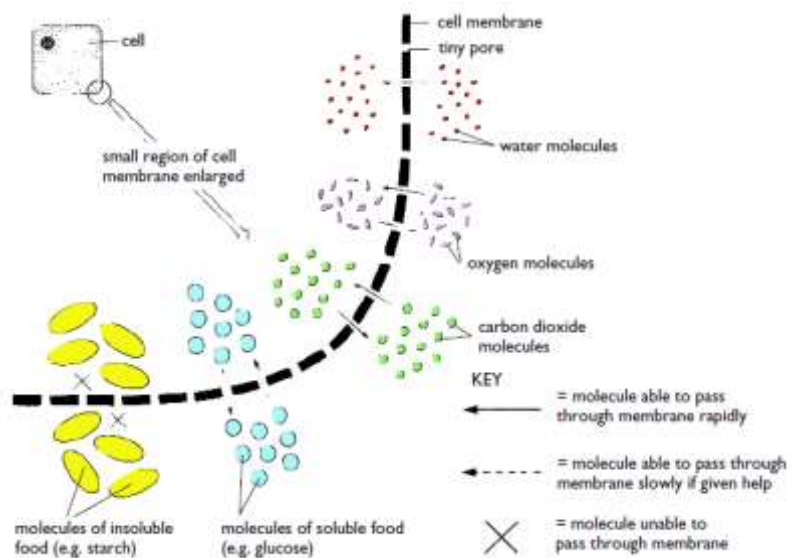
The membrane contains proteins that have channels, allowing molecules to move into and out of the cell. Very small molecules pass through freely, small molecules pass through slowly and large molecules are too big to pass through, so need to be broken down first.



For these reasons we say that the membrane is _____ permeable (only lets certain substances pass through).

Movement of substances into or out of a cell occurs by:

- D _____
- O _____
- Active transport.



Learning intention

We are learning how to define the terms concentration gradient and passive transport.

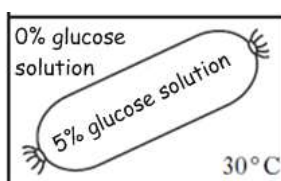
Concentration gradient



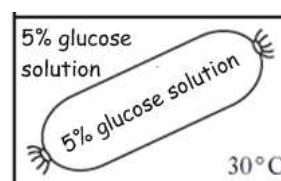
A concentration gradient is the _____ in concentration between two solutions.

This can be between two cells or between cells and their surroundings.

E.g. Difference in concentration



Same concentration

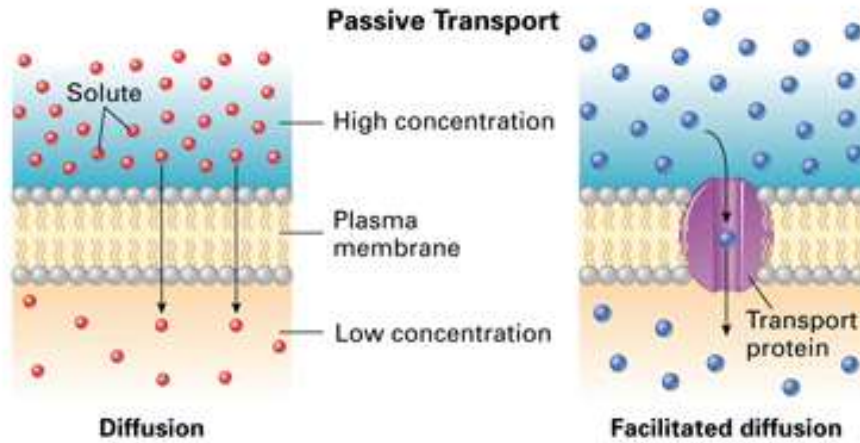


Passive transport



Passive transport is the movement of a substance _____ a concentration gradient.

This does not require _____.



Learning intention

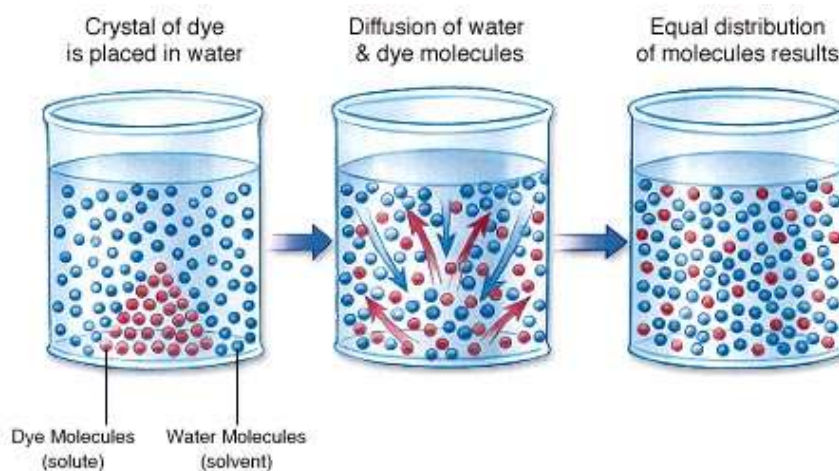
We are learning how to describe diffusion and identify examples.

The process of diffusion



Diffusion is the movement of molecules _____ a concentration gradient from a

_____ concentration to a _____ concentration.

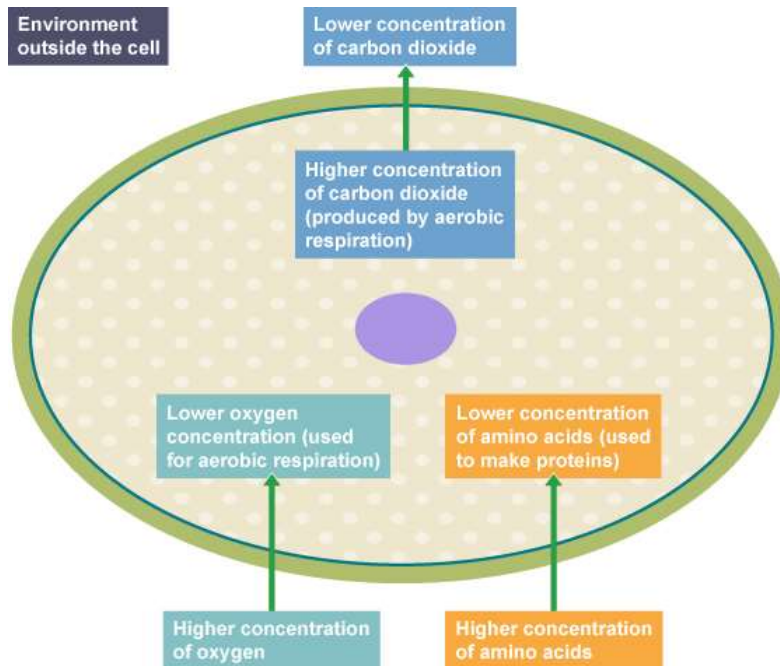


Molecules that move by diffusion do not require _____ to move. For this

reason diffusion is an example of _____ transport.

Substances that move by diffusion

Diffusion is used by cells to move useful substances into cells and waste products out.

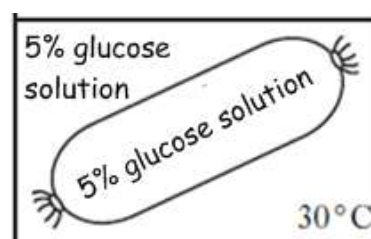
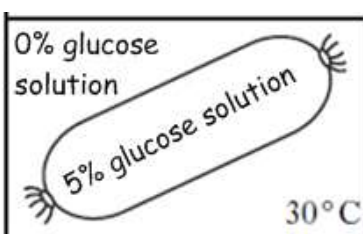


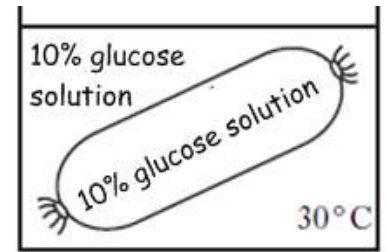
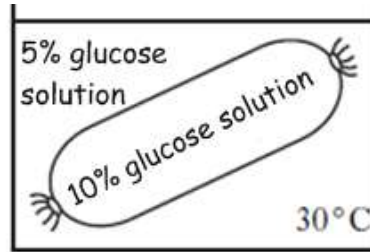
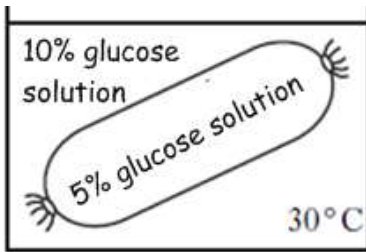
Use the information in the diagram above to complete the table below.

Useful substance needed by cells	Waste product removed from cells
Glucose	
	Urea

Diffusion practice

For each model cell consider the concentration gradient. Will **glucose** move into or out of the cell? Make notes/draw and arrow on each example to show what you think will happen.





Learning intention

We are learning how to describe osmosis and identify examples.

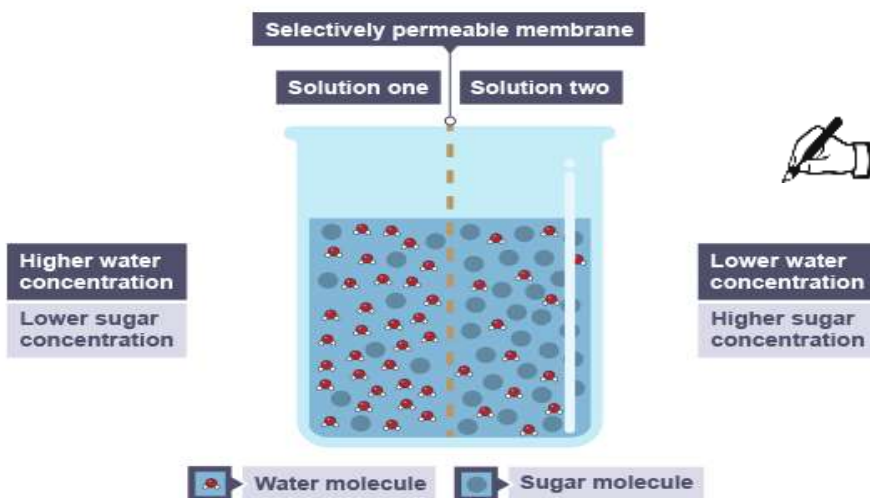
Osmosis



Osmosis is the special name given to the diffusion of water. Like diffusion, osmosis is also a passive process, so does not require energy. Therefore osmosis is also an example of _____ transport.

Cells can gain or lose water by _____, depending on the _____ concentration of the solution inside the cell compared to water concentration of the solution _____ the cell.

Consider the diagram below. The water concentration can be thought of as the proportion of a solution that is water. Solutions with a higher concentration of solute molecules, such as sugars or salts, have a lower concentration of water molecules and vice versa.



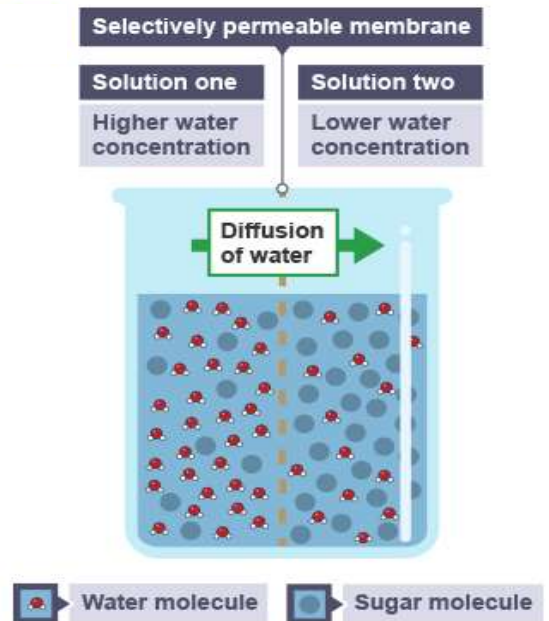
What do you expect will happen to the water molecules?

Move from solution two to solution one/ Stay where they are/ Move from solution one to solution two

Remember: Osmosis is a special case of diffusion, but always involves water passing through membranes.

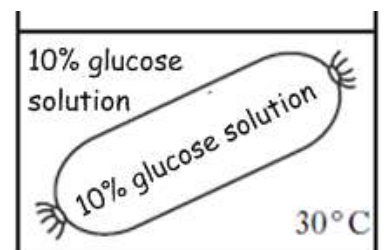
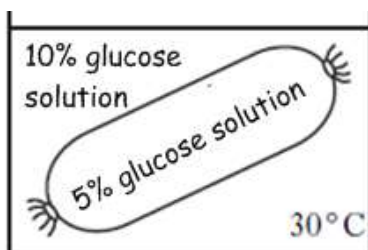
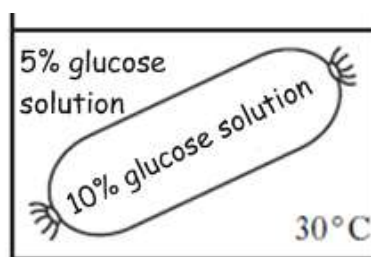
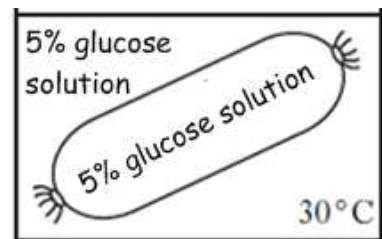
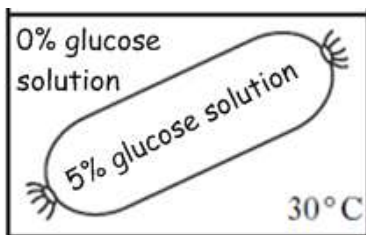
Osmosis is the movement of water molecules from a _____ water concentration to a _____ water concentration through a _____ permeable membrane.

Hint: Remember – diffusion and osmosis are passive processes – they don't require energy.



Osmosis practice

For each model cell consider the concentration gradient. Will **water** move into or out of the cell? Make notes/draw and arrow on each example to show what you think will happen.

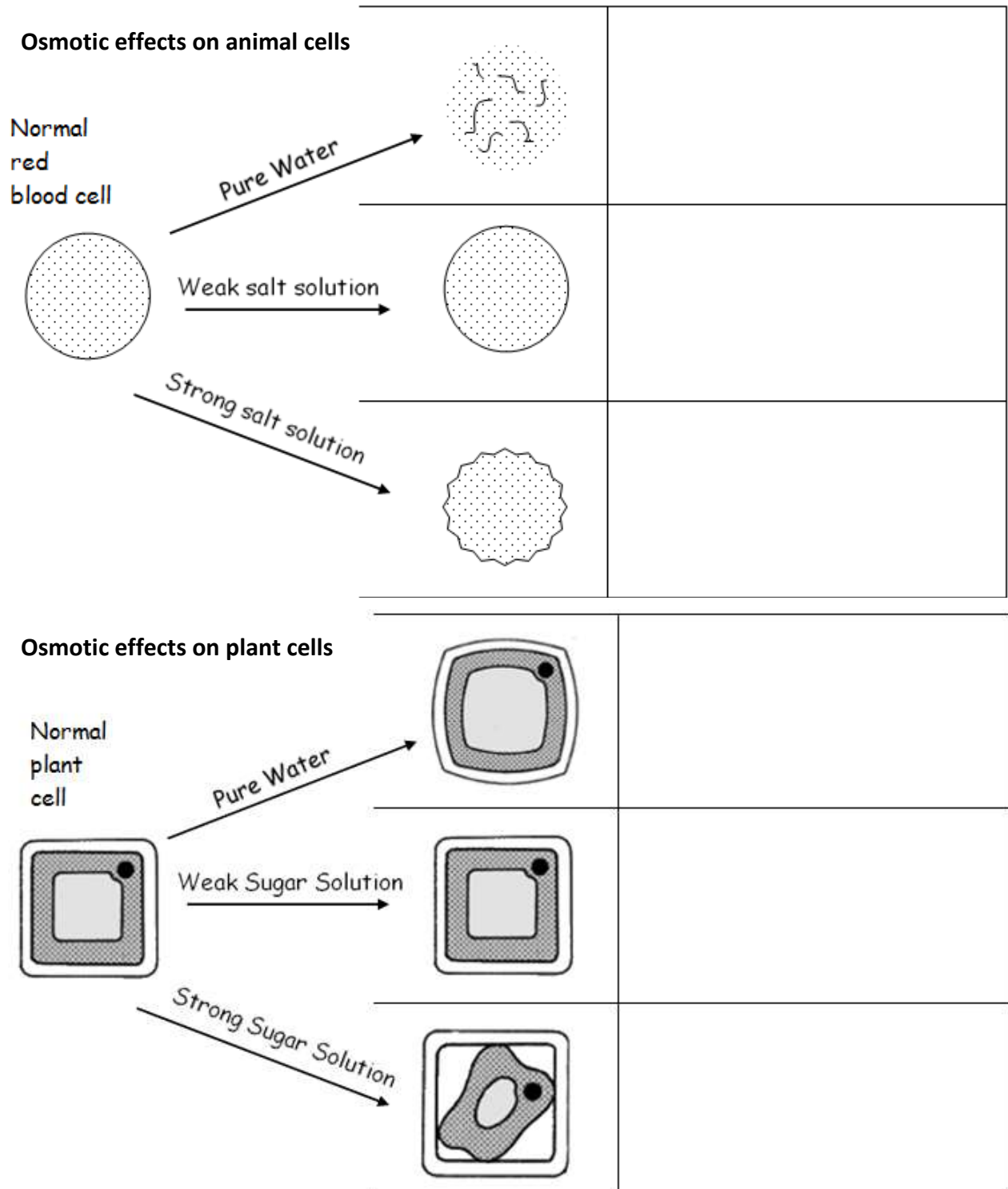


Learning intention

We are learning how to describe and explain the effects of osmosis on animal and plant cells.

Osmotic effects

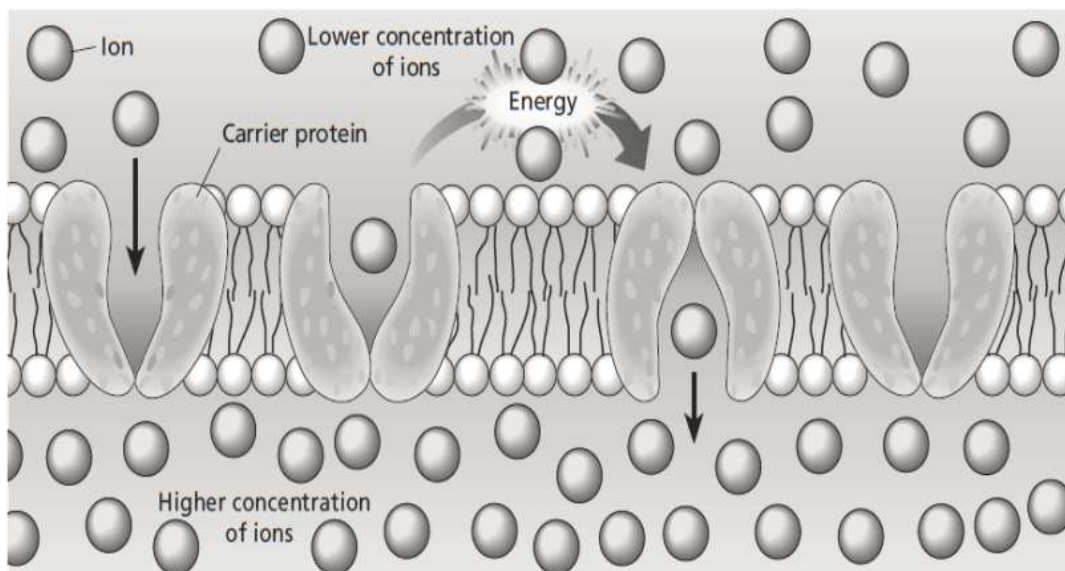
The movement of water by osmosis has different effects on animal and plant cells depending upon the concentrations of the solutions involved. We can see the effect on cells if we examine them under a microscope.



Learning intention

We are learning how to describe active transport and identify examples.

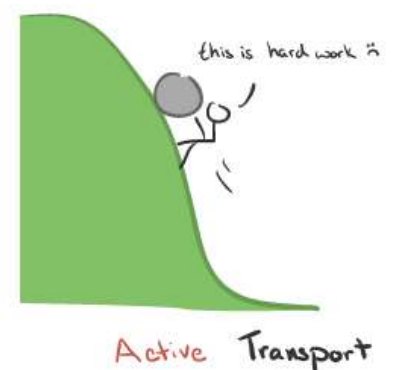
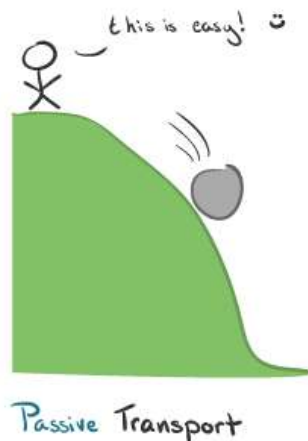
Active transport is the movement of molecules or ions from a _____ concentration to a higher concentration _____ a concentration gradient. As this process works against the concentration gradient it requires _____. Membrane proteins use this energy to move the molecules or ions.







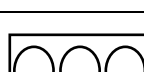
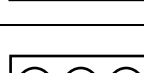





An example of active transport in the human body occurs in nerve cells. To function normally nerve cells need to maintain high concentrations of potassium ions inside and high concentrations of sodium ions outside the cells. Nerve cell membranes have special proteins called sodium-potassium pumps. These proteins use energy to pump sodium ions out of the cell and pump potassium ions into the cell.

Hint: Remember **CORE!**

To take up substances against a **C**oncentration gradient, cells use **O**xygen for **R**espiration to release **E**nergy for the process of active transport.



I can:	
State that the cell membrane is made of phospholipids and proteins.	
Identify phospholipids and proteins on a diagram of the cell membrane.	
State that the cell membrane is selectively permeable.	
State that different concentrations of substances exist between cells and their environment.	
State that passive transport is the movement of a substance down a concentration gradient and does not require energy.	
State that diffusion is the movement of molecules down a concentration gradient from a higher concentration to a lower concentration.	
Name glucose, carbon dioxide, oxygen and amino acids as examples of substances that diffuse across cell membranes.	
State that osmosis is the movement of water molecules from a higher water concentration to a lower water concentration through a selectively permeable membrane.	
State that diffusion and osmosis are examples of passive transport.	
Explain observed osmotic effects in plants and in animal cells in terms of the concentration of water in the solutions involved. E.g. Animal cells can burst or shrink and plant cells can become turgid or plasmolysed in different solutions.	
State that active transport is the movement of molecules or ions from a region of lower concentration to an area of higher concentration.	
State that active transport requires energy for membrane proteins to move molecules and ions against the concentration gradient.	