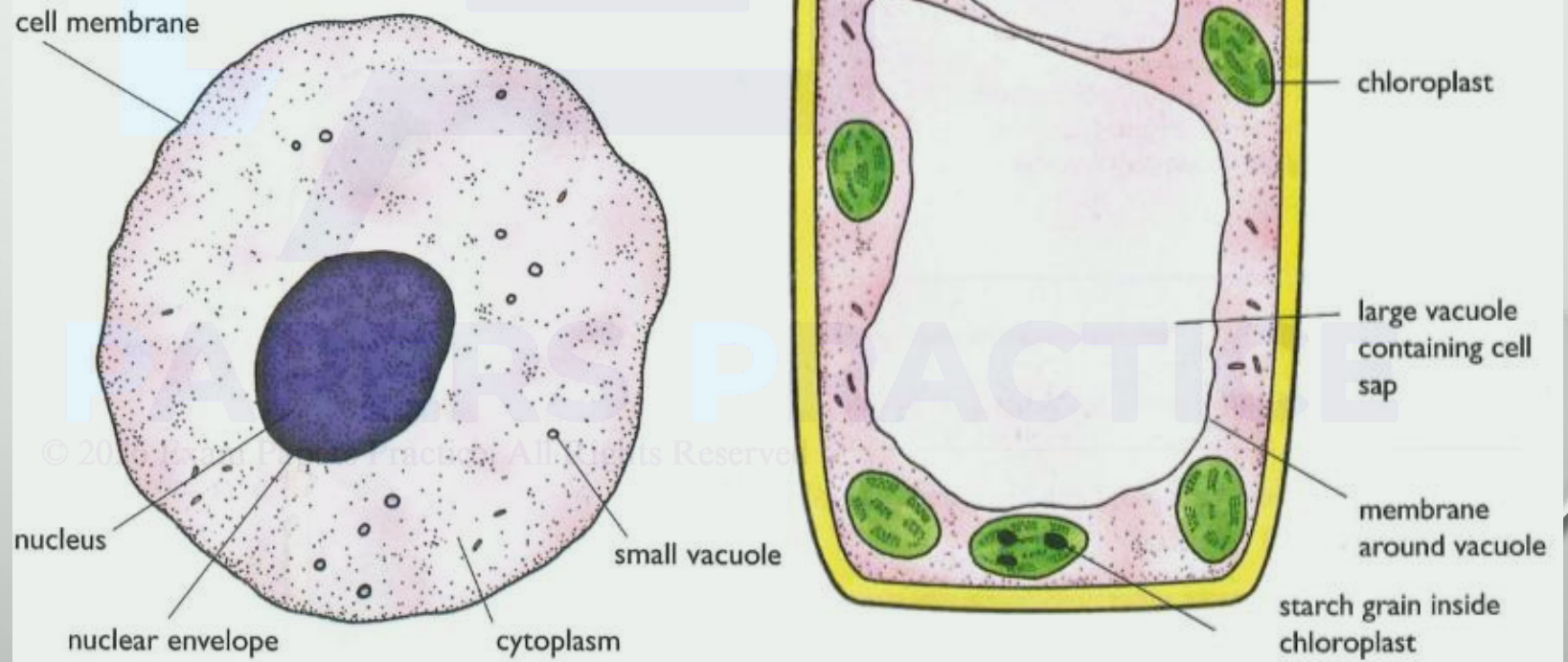
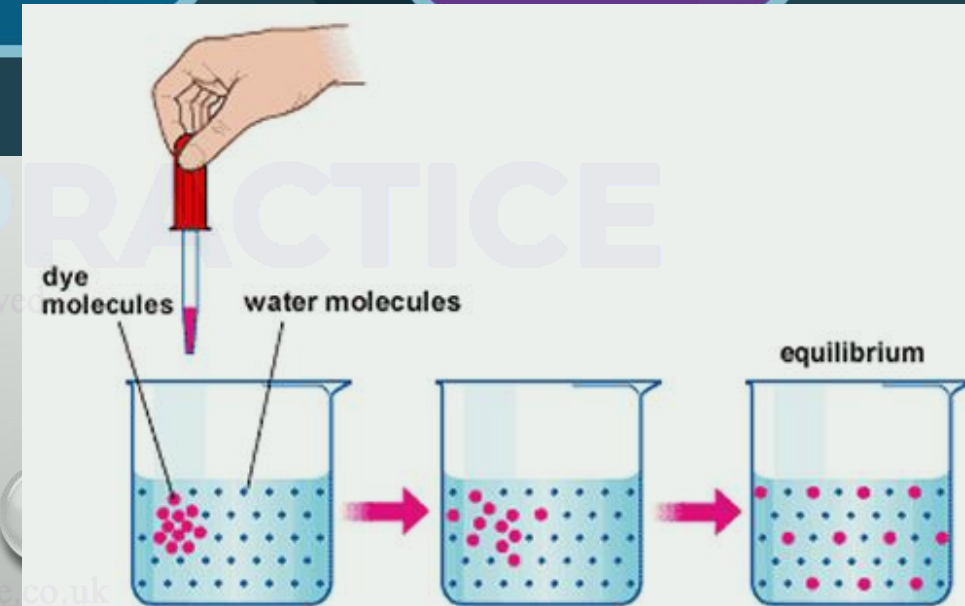
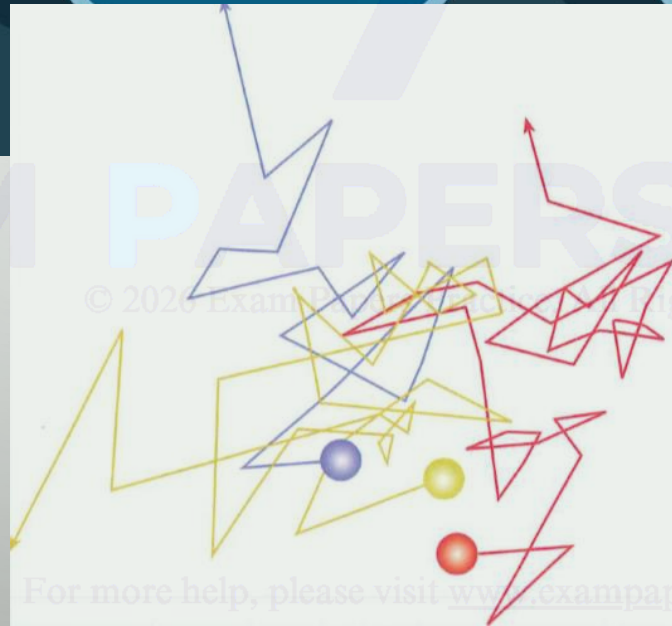
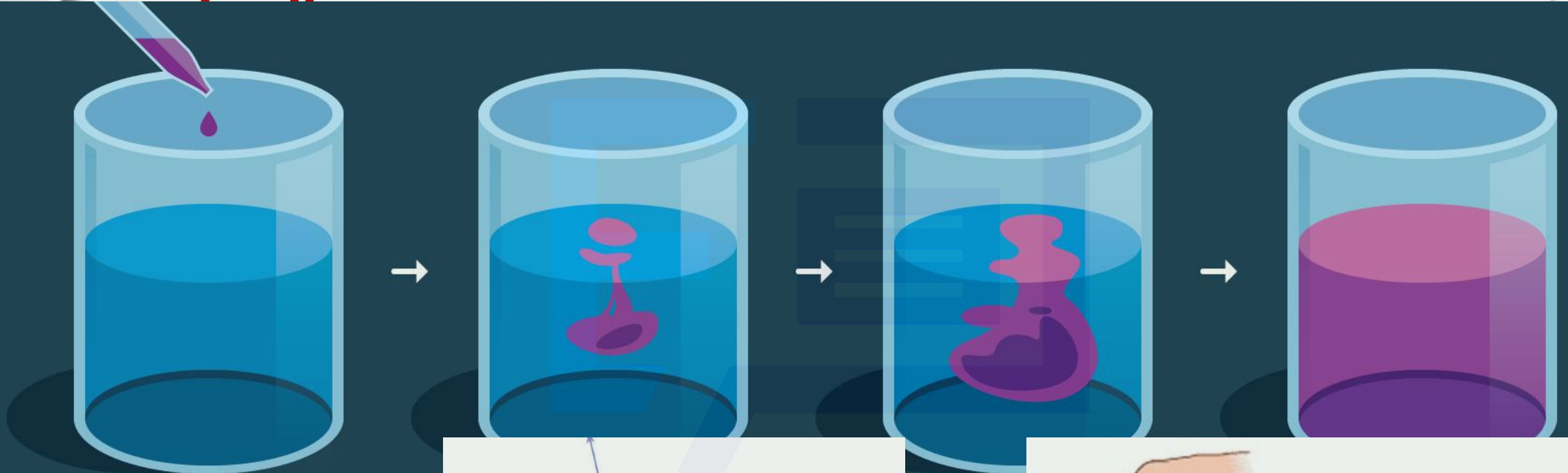


Movement in and out of cells



Movement in and out

diffusion



solution 溶液
solvent 溶剂
solute 溶质
concentration 浓度

Movement in and out of cells

diffusion

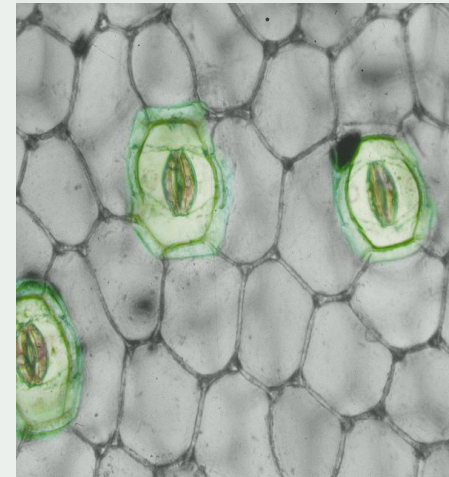
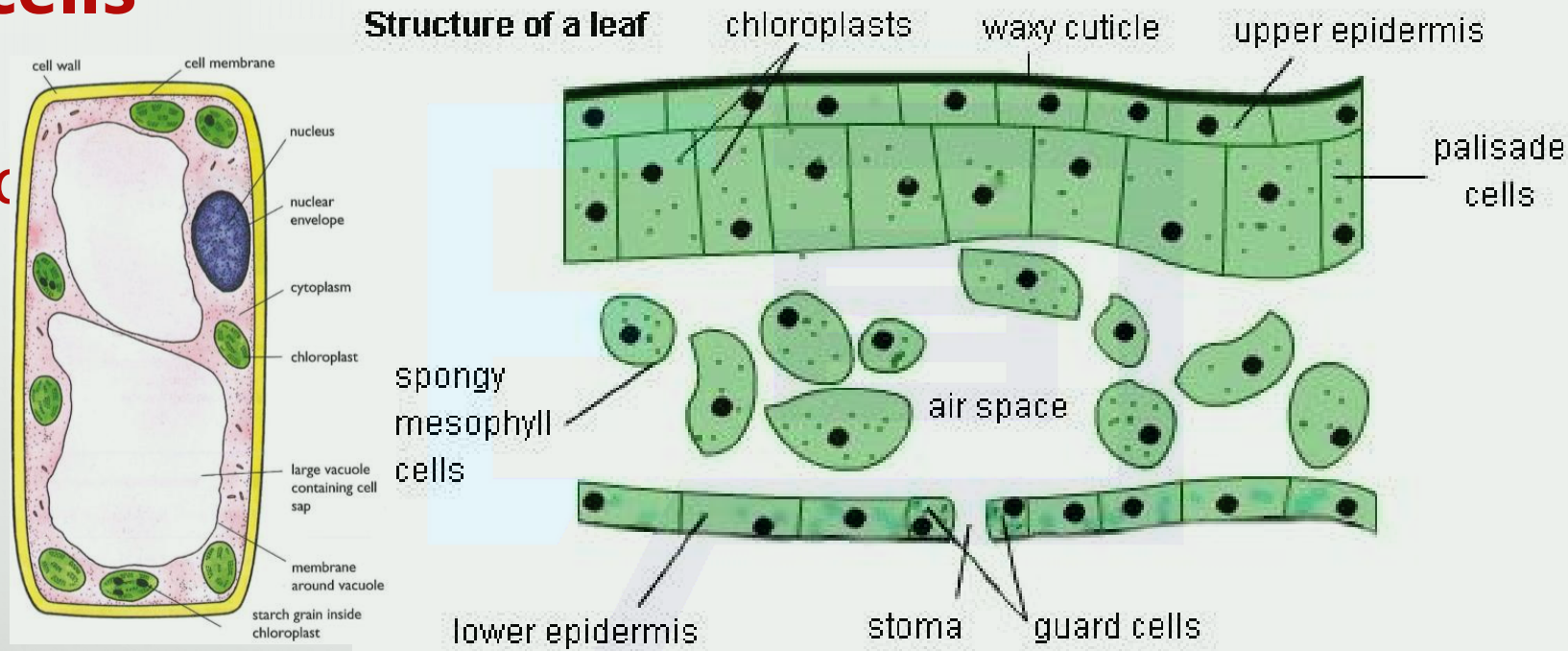
Diffusion: the net movement of molecules and ions from a region of their higher concentration to a region of their lower concentration down a concentration gradient, as a result of their random movement.

Movement in and out of cells

Diffusion and living organisms

Carbon dioxide

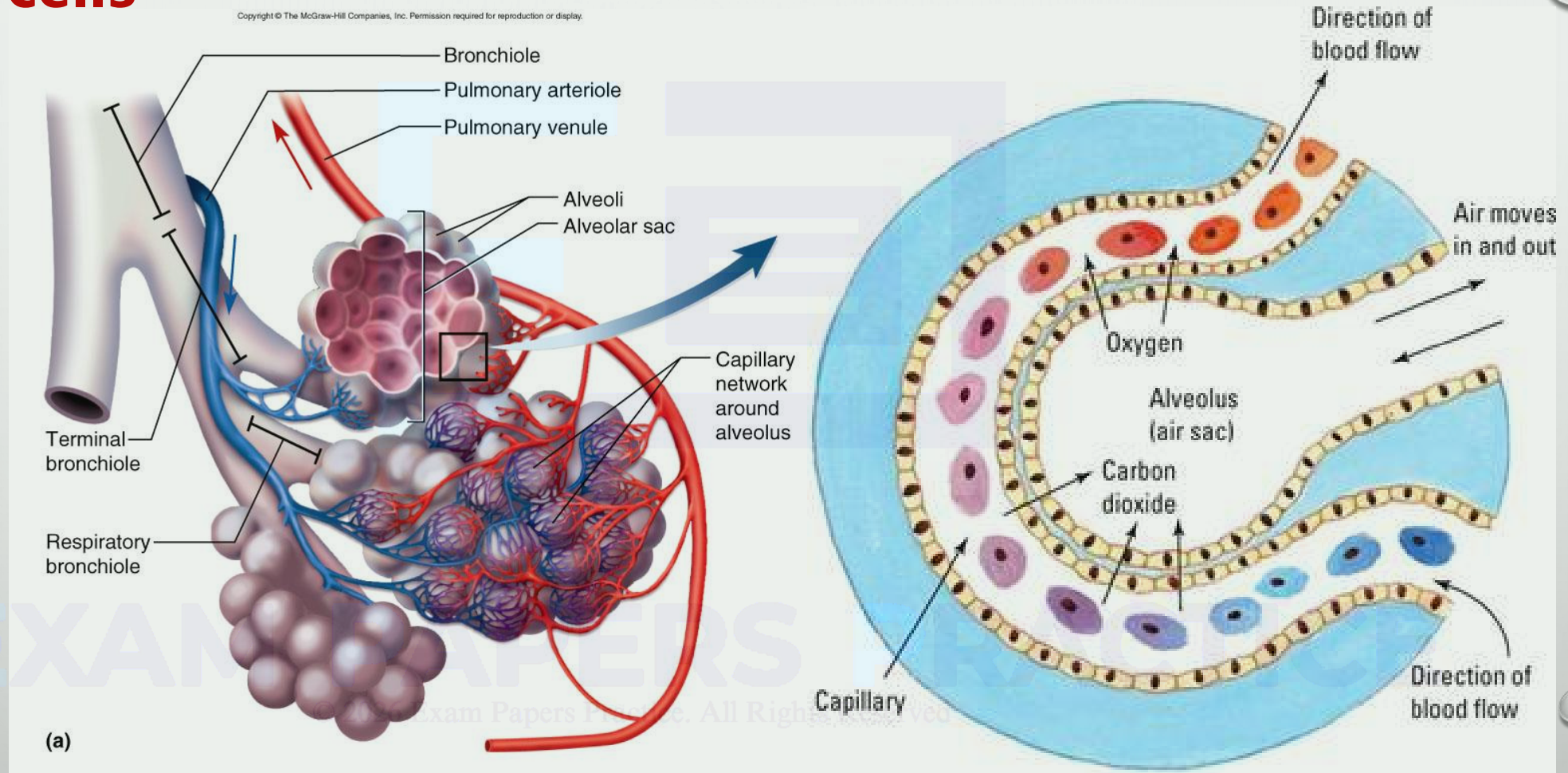
Oxygen



Cell membranes are **freely permeable** to oxygen and carbon dioxide, so these **easily diffuse into and out of cells**.

Movement in and out of cells

diffusion



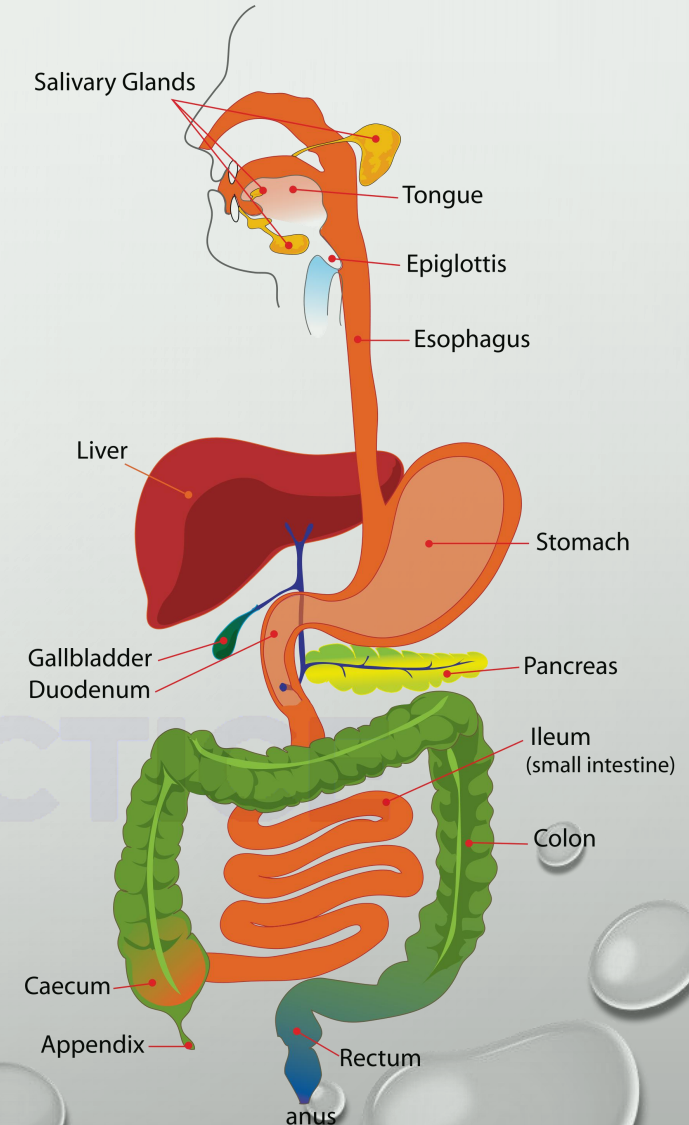
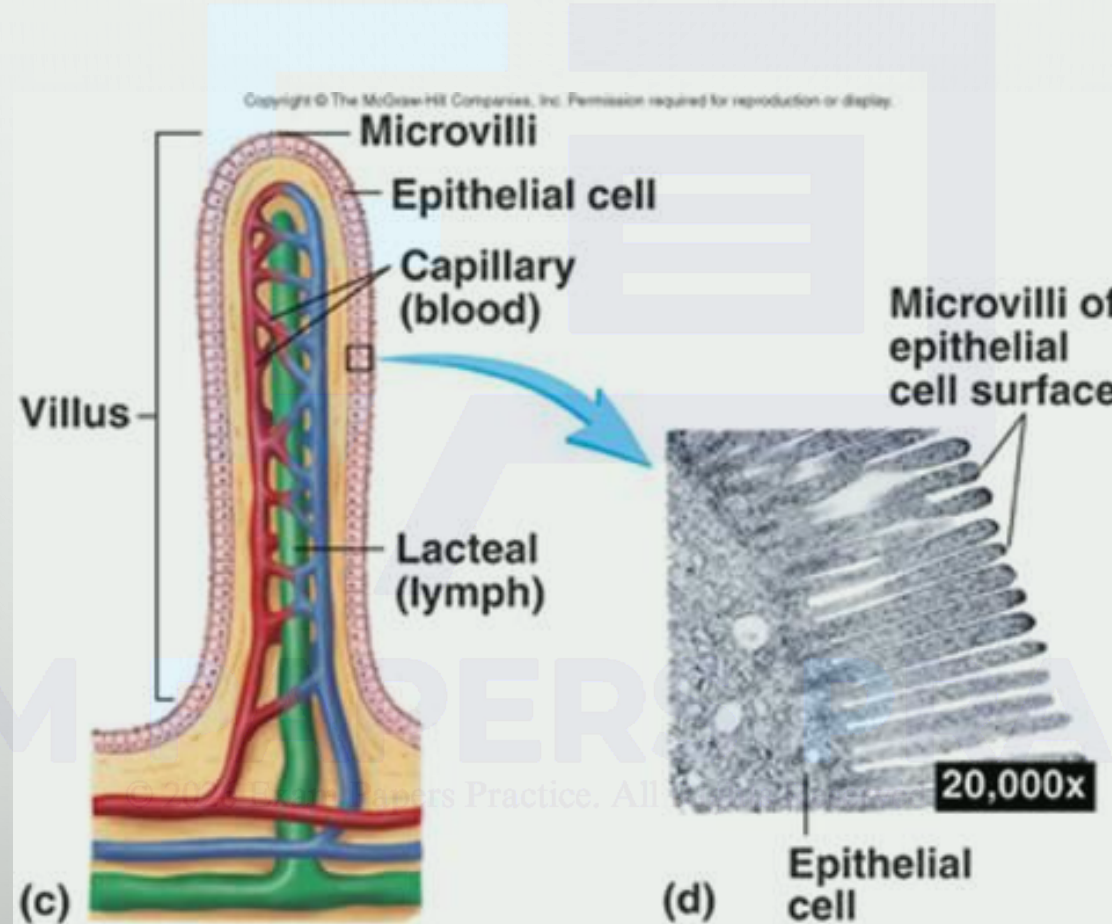
alveoli

alveoli肺泡

Movement in and out of cells

diffusion

ileum



ileum回肠

Movement in and out of cells

diffusion

scent



scent 气味

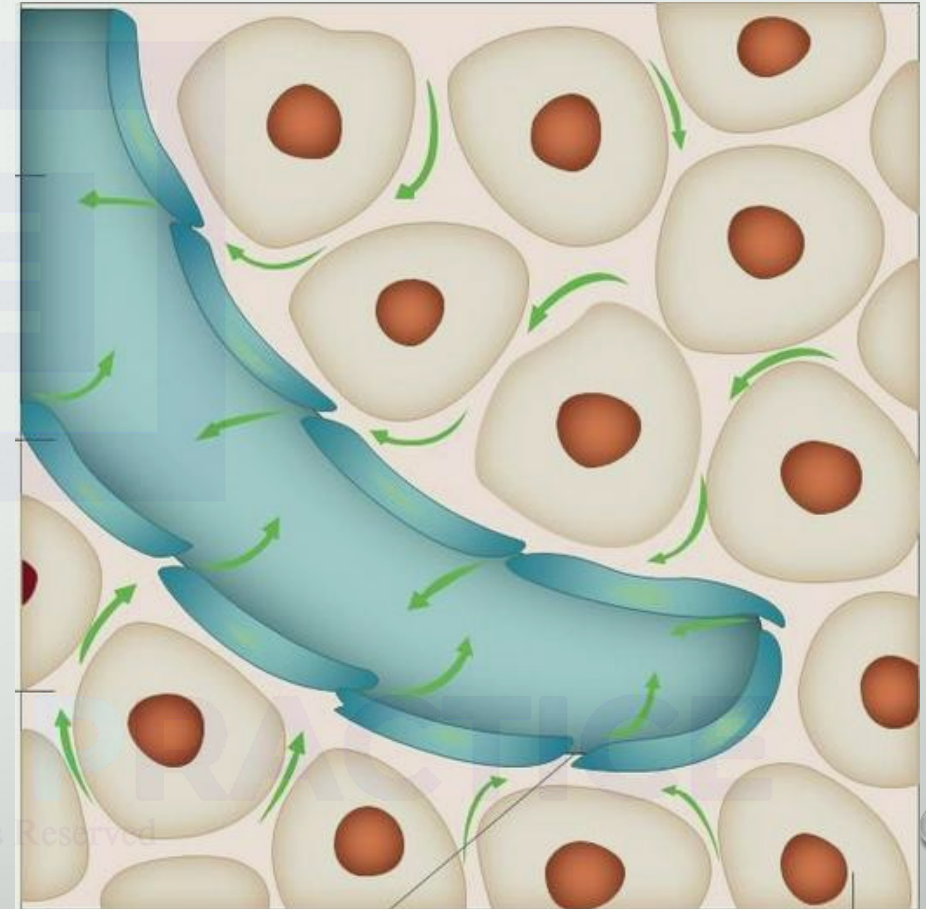
Movement in and out of cells

Factors of diffusion

- ◆ surface area
- ◆ temperature
- ◆ concentration gradient
- ◆ distance

Movement in and out of cells

osmosis



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Movement in and out of cells

Visking tubing——partially permeable membrane

Water (solvent)

High water potential → low water potential (net movement)

Osmosis

The diffusion of water molecules from a region of higher water potential (dilute solution) to a region of lower water potential (concentrated solution), through a partially permeable membrane.

visking tubing 半透膜

partially permeable membrane 半透膜

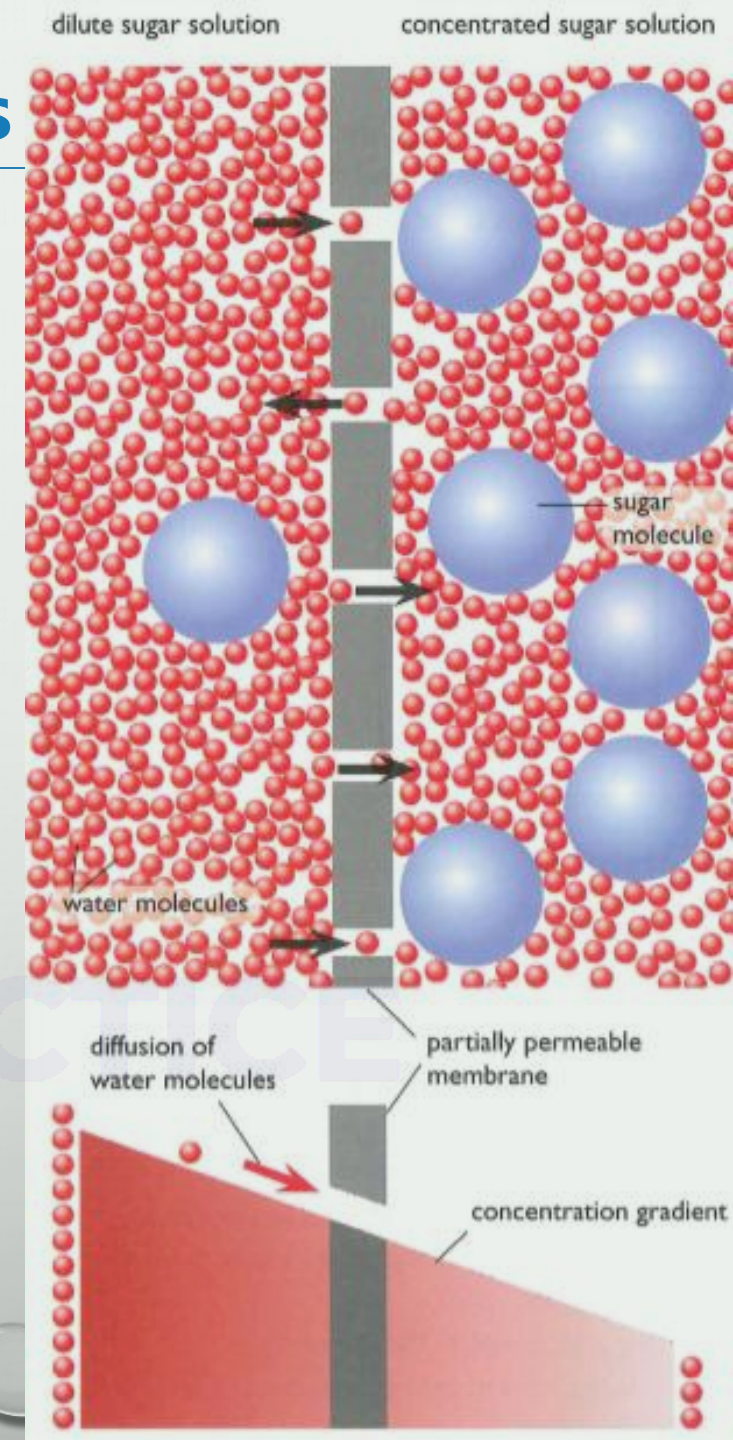
water potential 水势

dilute 稀薄的

concentrated 浓的

osmosis 渗透作用

osmosis



Movement in and out of cells

Which is larger – a water molecules or a sugar molecule ?

What is meant by a partially permeable membrane?

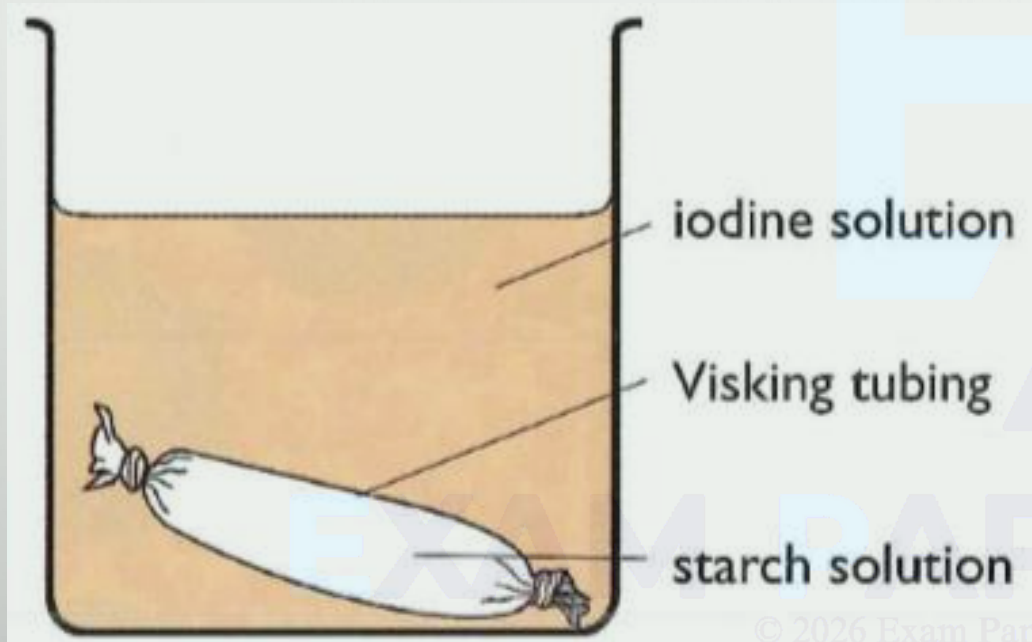
How would you describe a solution that has a high concentration of water molecules?

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Movement in and out of cells

osmosis



What colour were the liquid inside and outside the tubing at the start of the experiment ?

What colour were the liquids inside and outside the tubing at the end of the investigate?

When starch and iodine mix, a blue-black colour is produced. Where did the starch and iodine mix in you experiment?

Did either the starch particles or the iodine particles diffuse through the visking tubing ?

Movement in and out of cells

Why would plants wilt if we put too much fertilization into soil ?



Why would plants fresh again in pure water ?



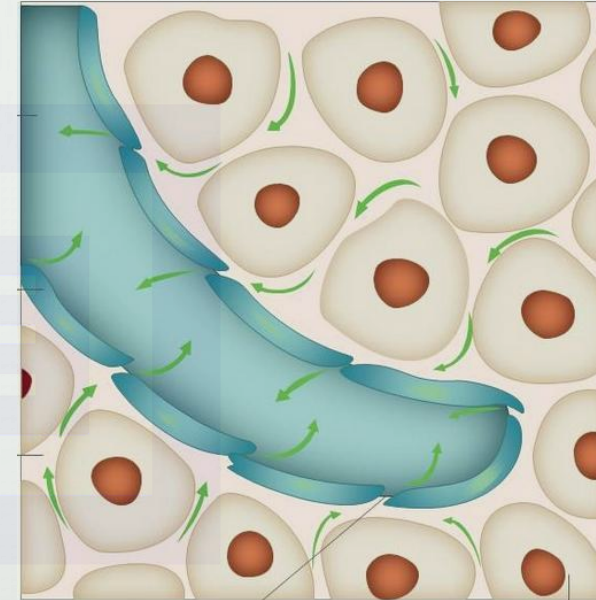
Movement in and out of cells

osmosis

Cell membrane

Partially permeable membrane

The cytoplasm inside the cell is a fairly concentrated solution. The protein and many other substances dissolved in it are too large to get through the cell membrane.



partially permeable 半透性的
fully permeable 全透性的

Movement in and out of cells

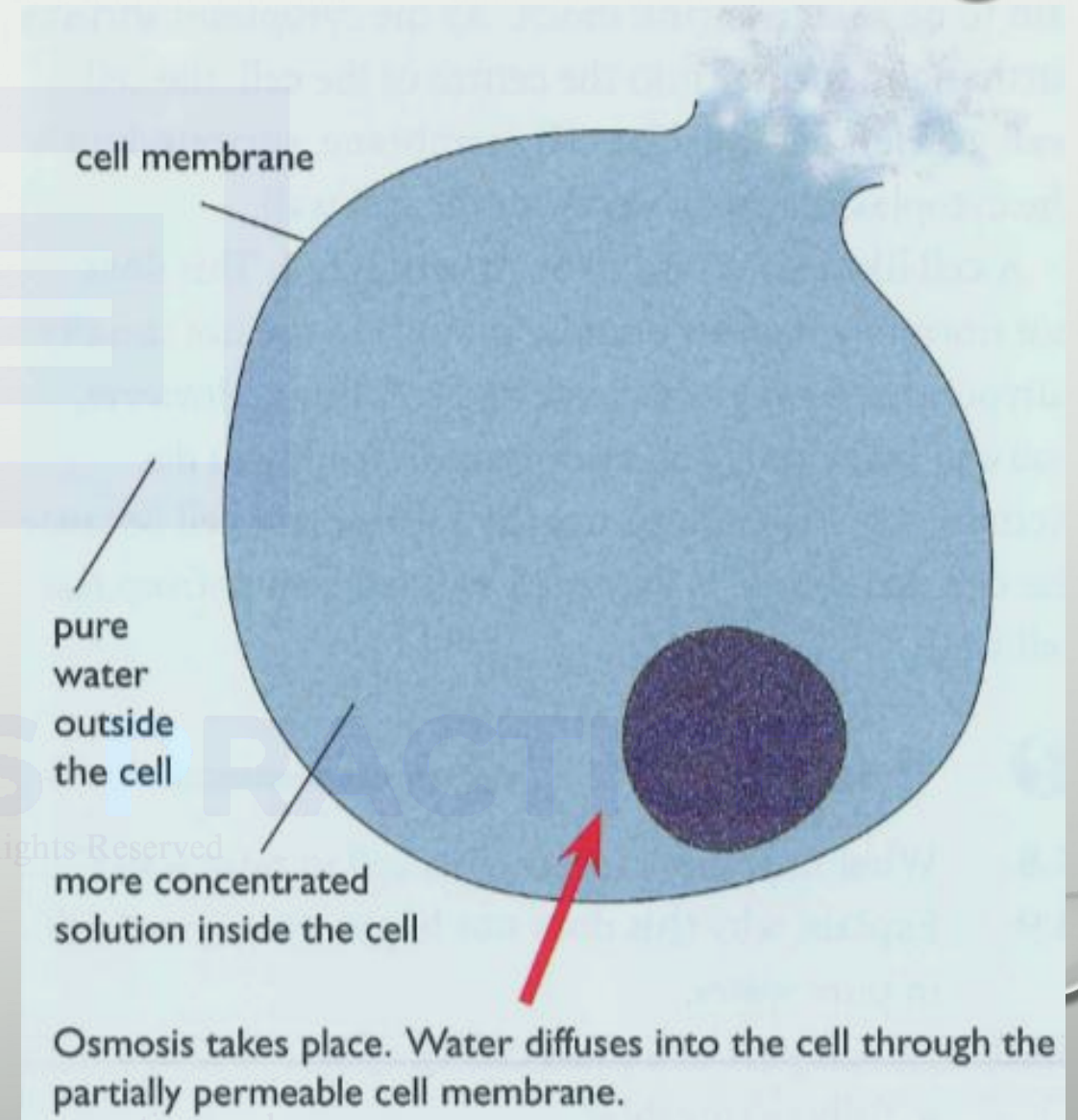
Animal cells (in pure water or dilute water)

Water diffuse into cell through permeable membrane

Cell swell → burst

swell 膨胀
burst 爆发, 爆裂

Osmosis and animal cells



Movement in and out of cells

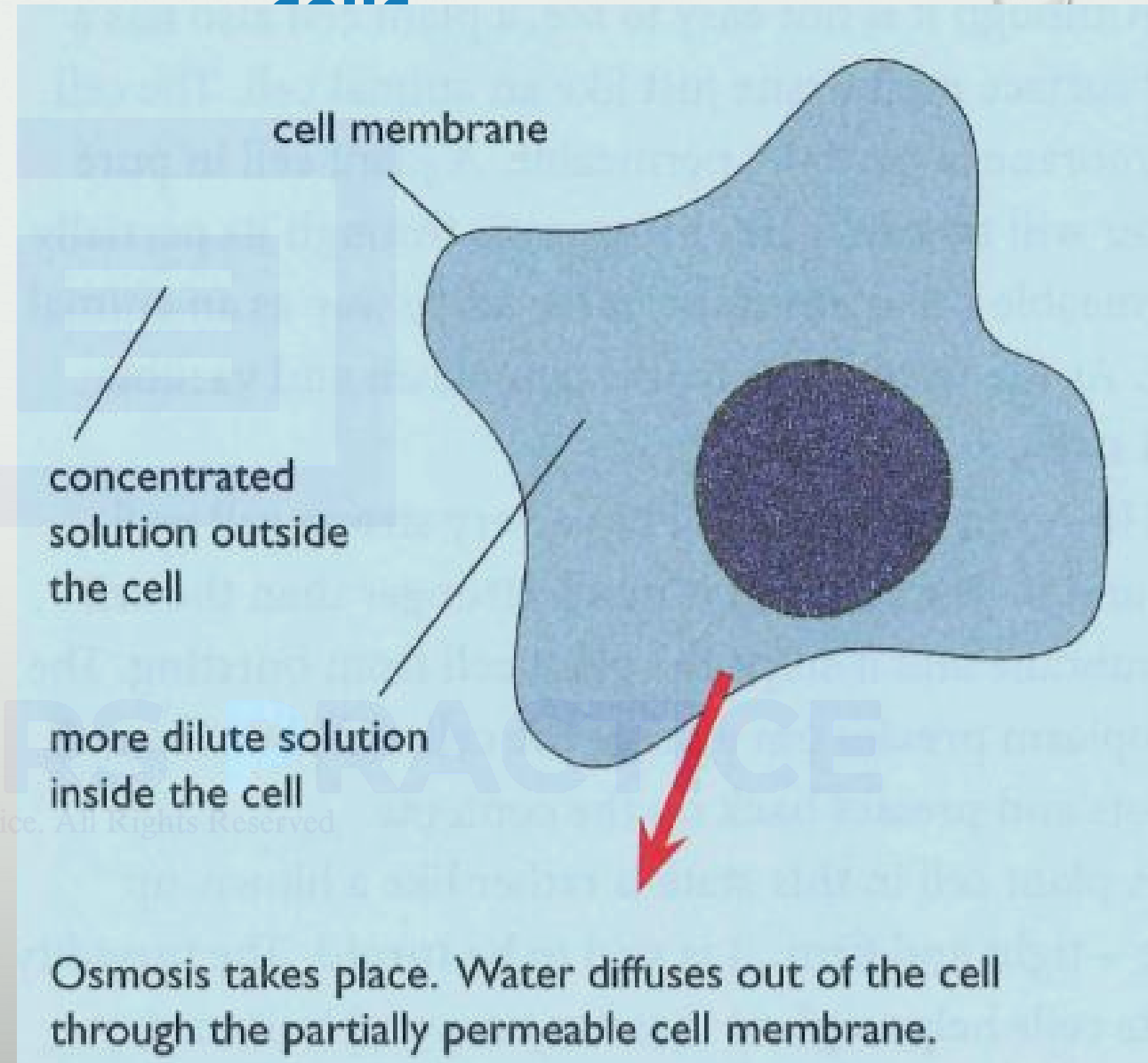
Animal cells (in concentrated water)

Water diffuse out of cell through permeable membrane

Cell shrink

shrink 收缩

Osmosis and animal cells



Movement in and out of cells

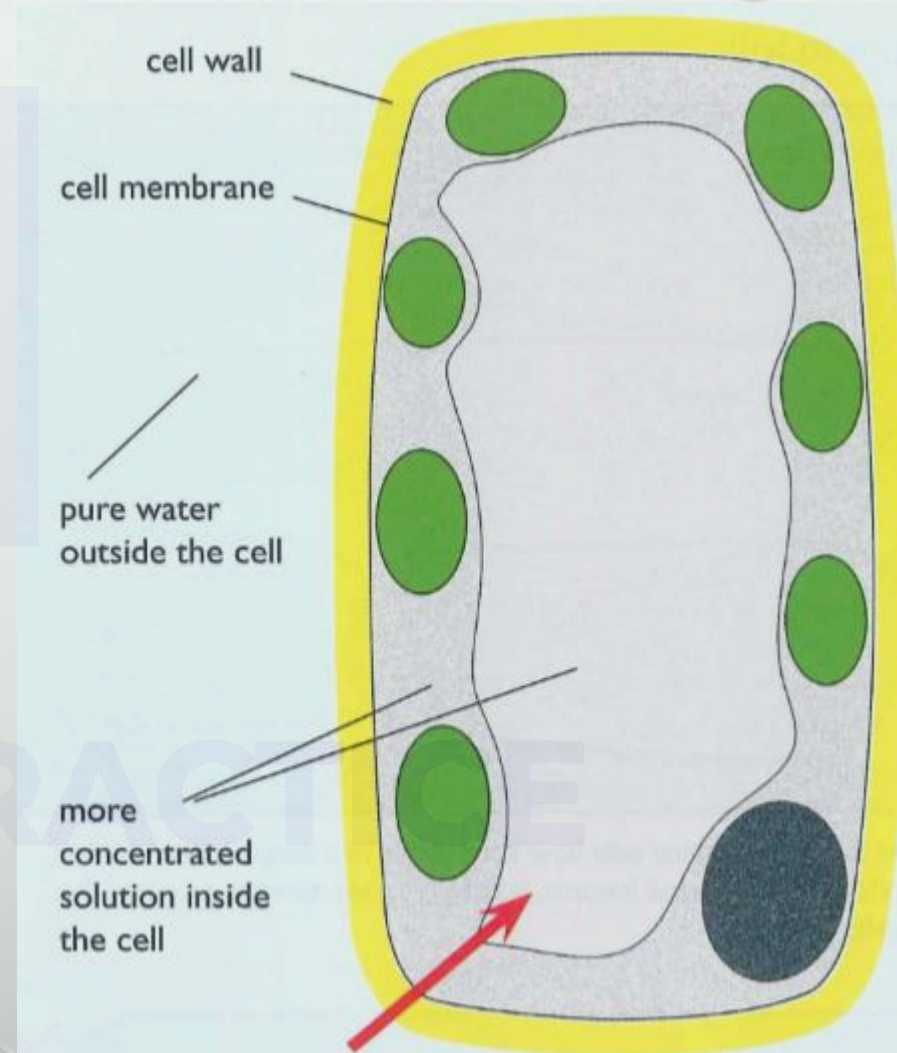
plant cells (in pure water)

Water diffuse into cell through permeable membrane, the cytoplasm pushing outwards on the cell wall.

turgid

turgid 浮肿的
turgor 肿胀
elastic 有弹性的
inelastic 缺乏弹性的

Osmosis and plant cells



Osmosis takes place. Water diffuses into the cytoplasm and vacuole through the partially permeable cell surface membrane. The cell swells and becomes firm.

Movement in and out of cells

plant cells (in concentrated water)

Water diffuses out of cell through permeable membrane, the cytoplasm stops pushing outwards on the cell wall.

flaccid (floppy)

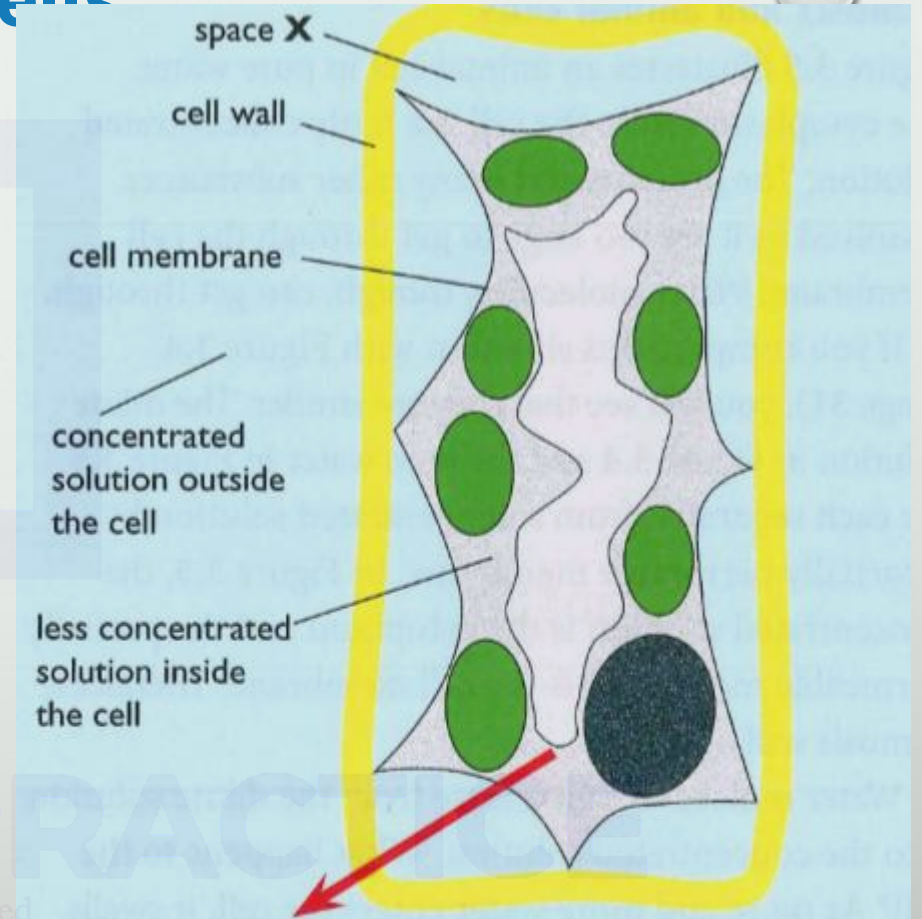
(in very concentrated water)

The cell membrane tears away from the cell wall.

plasmolysed

flaccid(floppy) 松弛的
plasmolysed 质壁分离的
plasmolysis 质壁分离

Osmosis and plant cells



Osmosis takes place. Water diffuses out of the cytoplasm and vacuole through the partially permeable cell membrane. First, the cell shrinks slightly and becomes flaccid. Then the cell membrane pulls away from the cell wall, and the cell is plasmolysed.

Movement in and out of cells

Osmosis and plant cells

What is meant by a turgid cell ?

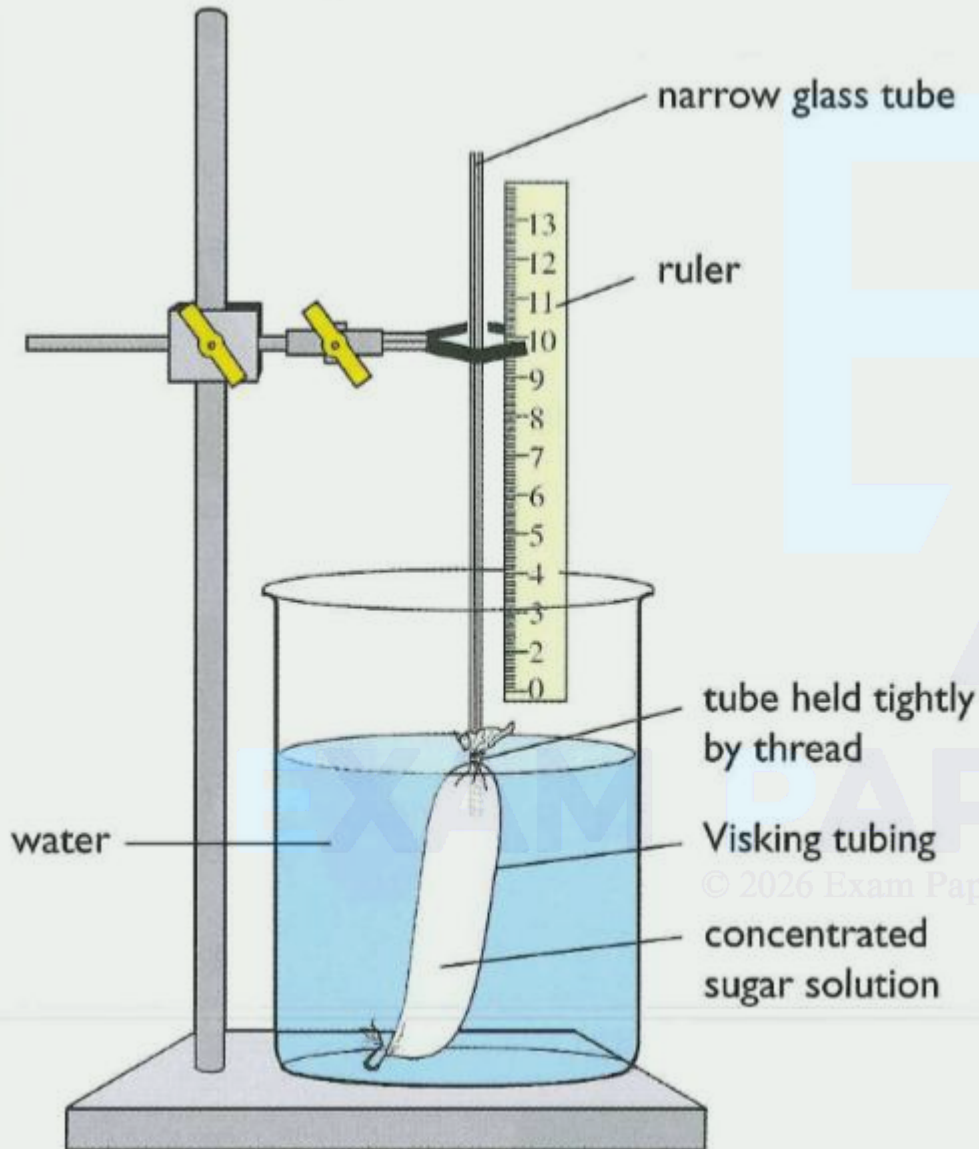
How is plasmolysis ?

How can plasmolysis be brought about?

In figure 3.9, what fills space X? explain your answer

Describe the events shown in figure 3.5 and 3.6 in terms of water potential.

Movement in and out of cells



Osmosis and plant cells

Describe what happened to the liquid level inside the glass tube?

Explain why this happens?

Predict what would have happened to the rate of osmosis in this experiment if you had used a kind of visking tubing with ridges and grooves in it, giving it a larger surface area?

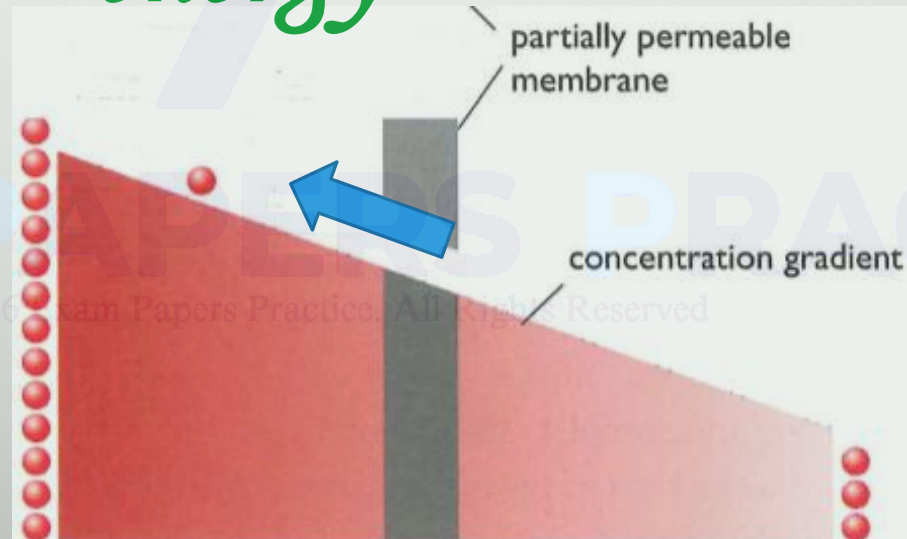
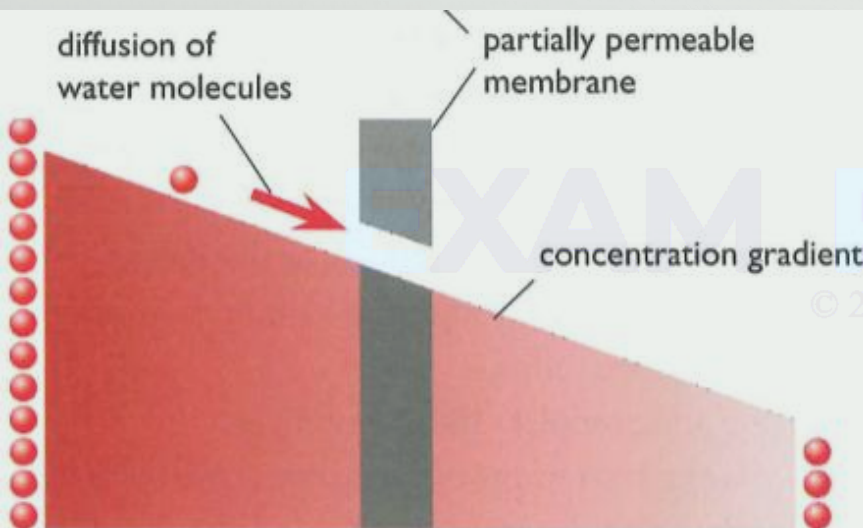
When temperature rises, particles move more quickly. Describe how you could use this apparatus to carry out an experiment to investigate the effect of temperature on the rate of osmosis.?

Movement in and out of cells

Active transport

What will happen the concentration of matter in and out of cells for long time by diffusion or osmosis?

energy



	Cell	Blood
Ion	(mM)	(mM)
SQUID AXON*		
K ⁺	400	20
Na ⁺	50	440
Cl ⁻	40 – 150	560
Ca ²⁺	0.0003	10
X ^{-†}	300 – 400	5 – 10
MAMMALIAN CELL		
K ⁺	139	4
Na ⁺	12	145
Cl ⁻	4	116
HCO ₃ ⁻	12	29
X ⁻	138	9
Mg ²⁺	0.8	1.5
Ca ²⁺	<0.0002	1.8

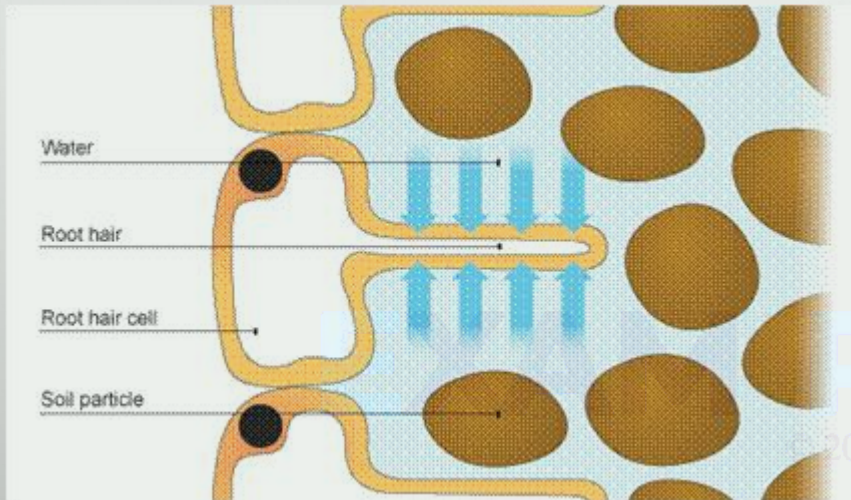
Movement in and out of cells

Active transport

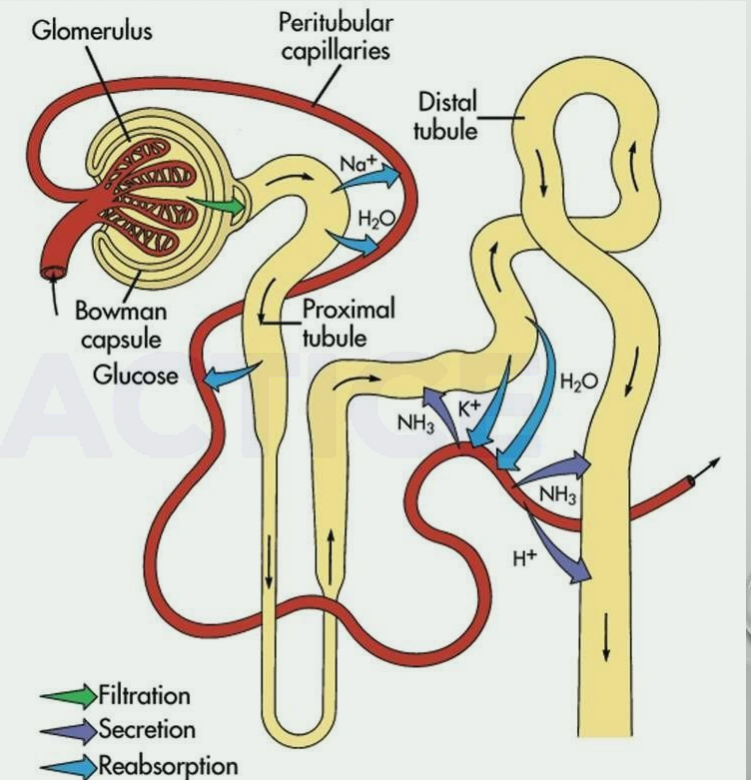
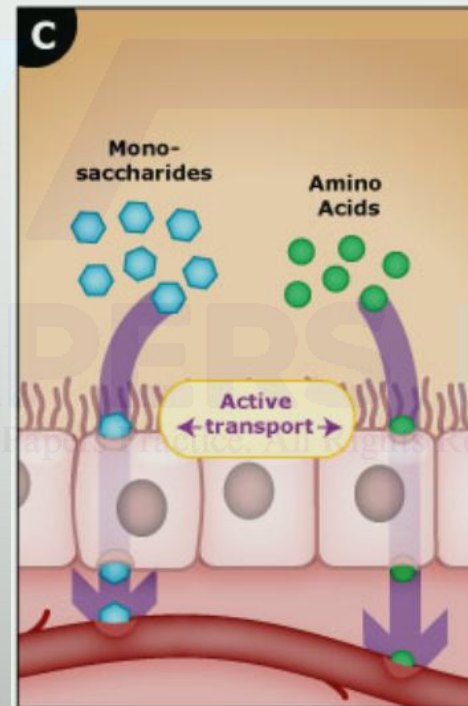
Active transport

The movement of molecules and ions in or out of a cell through the cell membrane **against a concentration gradient**, using **energy** from respiration

transport protein

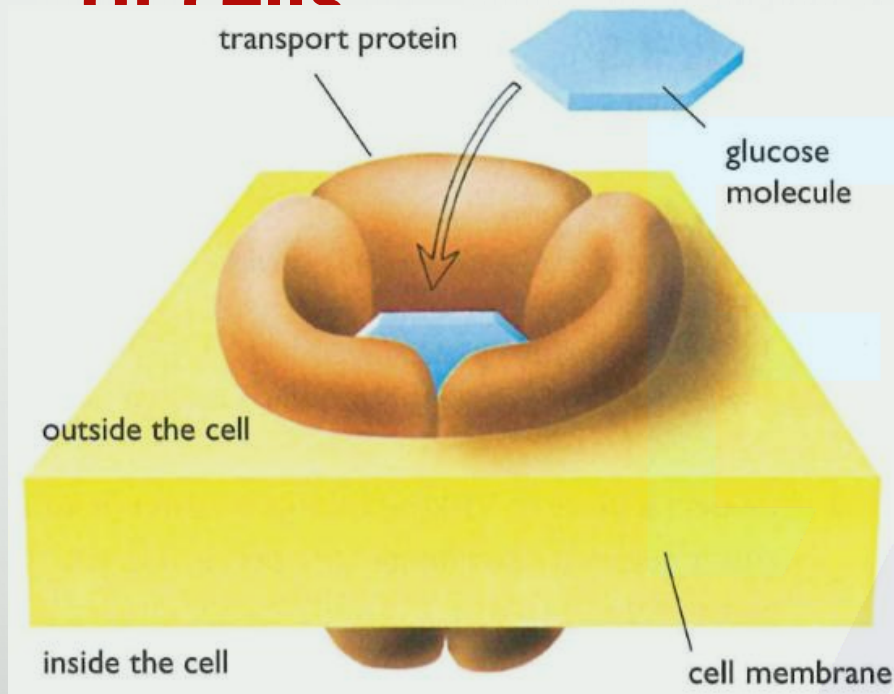


active transport 主动运输
transport protein 转运蛋白

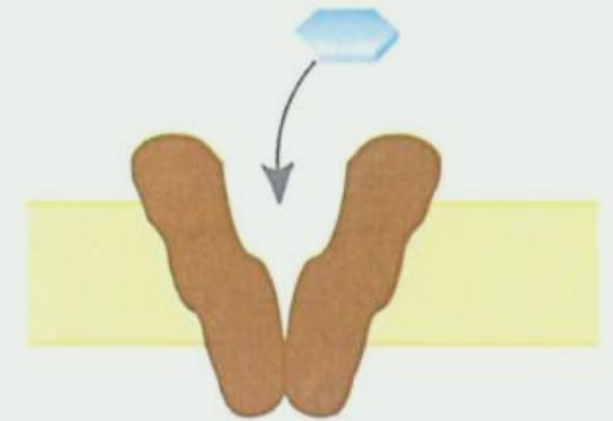


Movement in and out of cells

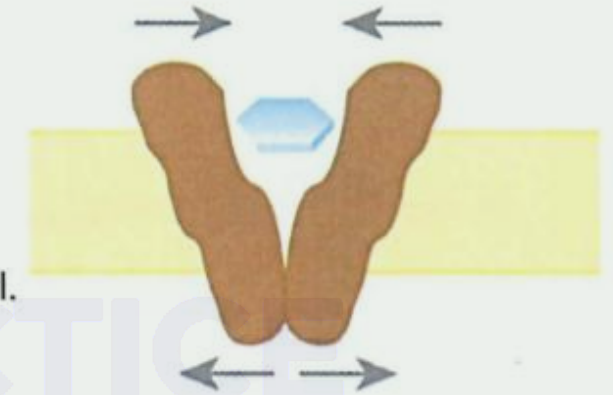
Active transport



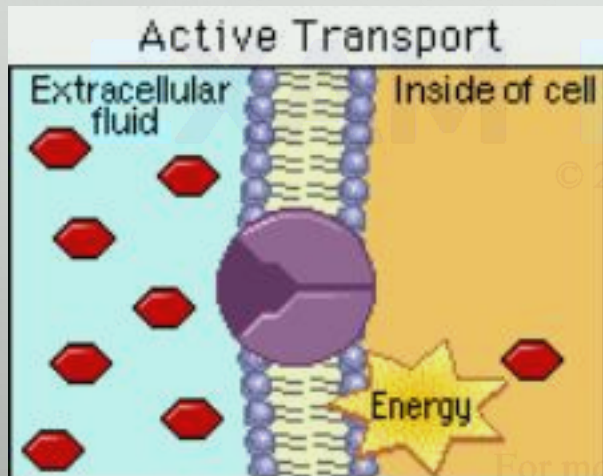
1 The glucose molecule enters the transport protein.



2 The transport protein changes shape. The energy needed for it to do this is provided by respiration in the cell.



3 The change of shape of the transport protein pushes the glucose molecule into the cell.



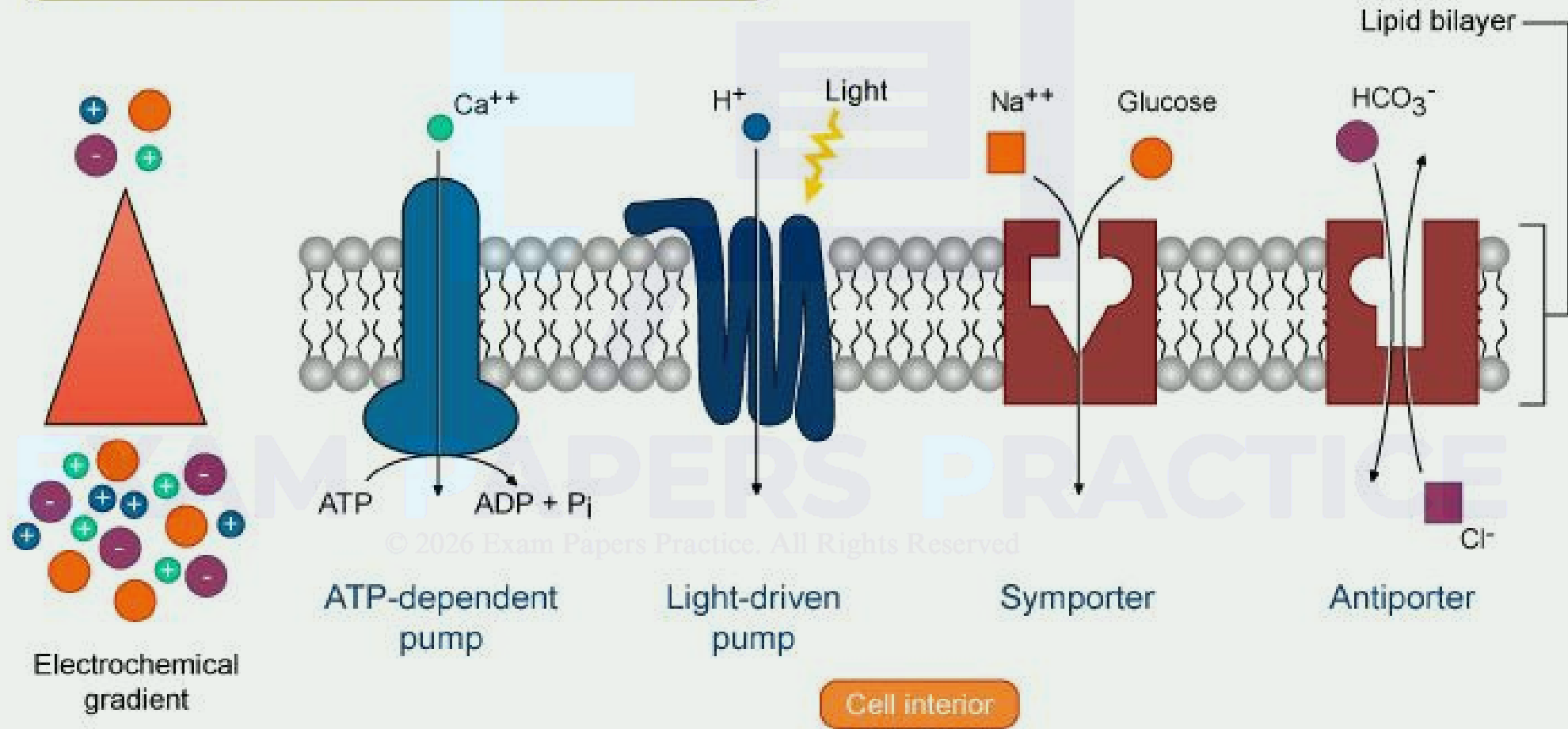
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Movement in and out of cells

Active transport

Four Different Mechanisms of Active Transport



Movement in and out of cells

Active transport

Discuss the importance of active transport?

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Movement in and out of cells

Active transport

Compare active transport, osmosis, diffusion

	diffusion	osmosis	Active transport
Need partially permeable membrane			
direction			
Need energy or not			
Need transport protein or not			
examples			

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