شرح عمليات الانتشار والانتشار الميسر في الخلية - تغطية اختبار نهاية الفصل



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تاريخ إضافة الملف على موقع المناهج: 2026-11-15 23:16:18	
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التواصل الاجتماعي بحسب الصف التاسع					
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المزيد من الملفات بحسب الصف التاسع والمادة أحياء في الفصل الأول	
1	أسئلة درس التفاعلات الكيميائية والإنزيمات - بريدج

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Q21	BIO.3.1.01.057 Explain the processes of diffusion and osmosis and their roles within a cell	Figure 8	47

Diffusion

- ☐ As the aroma of baking cookies makes its way to you, particles are moving and colliding with each other in the air.
- ☐ This happens because the particles in gases, liquids, and solids are in **random motion.**
- ☐ Similarly, substances dissolved in water move constantly in random motion called **Brownian motion.**
- ☐ This **random motion causes diffusion**, which is the net movement of particles from an area where there are many particles of a substance to an area where there are fewer particles of the substance.
- ☐ The amount of a substance in a particular area is called **concentration.**
- ☐ **Additional energy input is not required** for diffusion because the **particles already are in motion.**
- ☐ If you drop blue and yellow ink into a container of water at opposite ends of the container, which is similar to the watery environment of a cell the process of diffusion begins, as shown in Figure 8(A).
- ☐ In a short period of time, the ink particles have mixed as a result of diffusion to the point where a green-colored blended area is visible.
- ☐ Figure 8(B) shows the initial result of this diffusion.

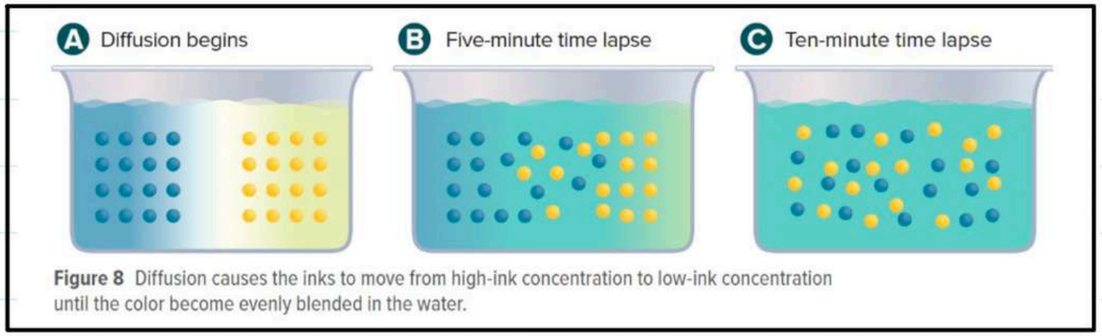


Figure 8 Diffusion causes the inks to move from high-ink concentration to low-ink concentration until the color become evenly blended in the water.

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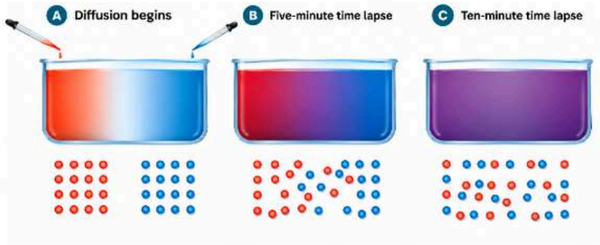
- ☐ Given more time, the ink particles continue to mix and, in this case, continue to form the **uniform mixture** shown in Figure 8(C) .
- ☐ Mixing continues until the concentrations of yellow ink and blue ink are the same in all areas.
- ☐ After mixing is complete, the **particles continue to move randomly**, but **no further change in concentration** will occur
- ☐ This condition, in which there is continuous movement but no overall change, is called **Dynamic equilibrium.**
- ☐ One of the **key characteristics of diffusion is the rate at which diffusion takes place.**
- ☐ Three main factors affect the rate of diffusion: **concentration**, **temperature**, and **pressure**.
- ☐ When concentration is high, diffusion occurs more quickly because there are more particles to collide and bounce off one another.
- ☐ Similarly, when temperature or pressure increases, the number of collisions increases, thus increasing the rate of diffusion.
- ☐ Recall that at higher temperatures particles move faster, and at higher pressure the particles are closer together.
- ☐ In both cases, more collisions occur, and diffusion is faster.
- ☐ The **size** and **charge** of a substance also affects the rate of diffusion.



Q21	BIO.3.1.01.057 Explain the processes of diffusion and osmosis and their roles within a cell	Figure 8	47

1

The picture shows the movement of ink molecules in water. Which of the following processes has occurred?



A.	endocytosis	**B.**	osmosis	**C.**	diffusion	**D.**	exocytosis

2

The net movement of particles from an area of higher concentration to an area of lower concentration is called…..

A.	Diffusion	**B.**	dynamic equilibrium	**C.**	facilitated diffusion	**D.**	osmosis

3

What is dynamic equilibrium?

A.	A condition in which all particle movement stops	**B.**	A condition in which particles continue to move, but there is no overall change in concentration	**C.**	A condition in which particles move in only one direction	**D.**	A condition in which concentration always increases

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Q22	BIO.3.1.01.057 Explain the processes of diffusion and osmosis and their roles within a cell	Figure 9	48

Diffusion Across the Plasma Membrane

- ☐ In addition to water, **cells need certain ions and small molecules**, such as **chloride ions** and **sugars**, to **perform cellular functions.**
- ☐ **Water can diffuse across the plasma membrane,** as shown in Figure 9(A), but **most other substances cannot.**
- ☐ Another form of transport, called **facilitated diffusion**, uses transport proteins to move other ions and small molecules across the plasma membrane.
- ☐ By this method, substances move into the cell through a water filled transport protein, called a **channel protein**, that opens and closes to allow the substance to diffuse through the plasma membrane, as shown in Figure 9(B).
- ☐ Another type of transport protein, called a **carrier protein**, also can help substances diffuse across the plasma membrane.
- ☐ **Carrier proteins** change shape as the diffusion process continues to help move the particle through the membrane, as illustrated in Figure 9(C).
- ☐ **Diffusion of water and facilitated diffusion of other substances require no additional input of energy** because the particles are moving from an area of high concentration to an area of lower concentration. This is also known as **passive transport.**
- ☐ You will learn later in this lesson about a form of cellular transport that does require energy input.

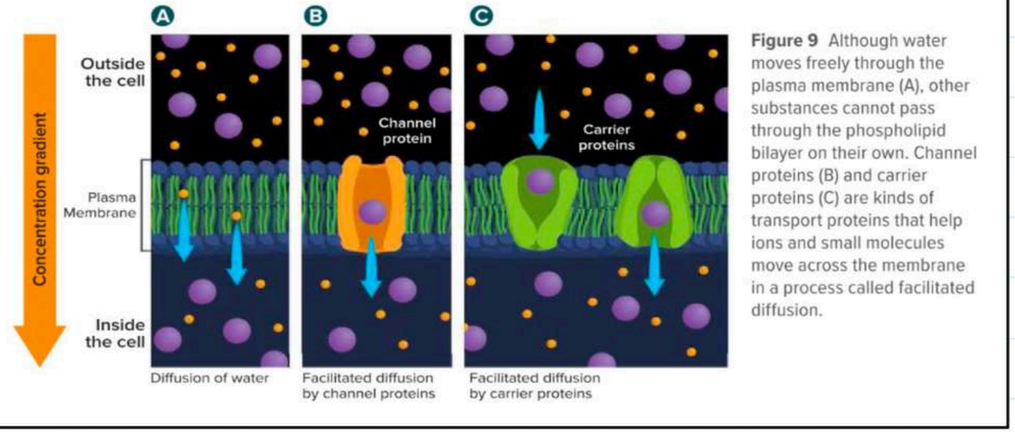


Figure 9 Although water moves freely through the plasma membrane (A), other substances cannot pass through the phospholipid bilayer on their own. Channel proteins (B) and carrier proteins (C) are kinds of transport proteins that help ions and small molecules move across the membrane in a process called facilitated diffusion.

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Q22	BIO.3.1.01.057 Explain the processes of diffusion and osmosis and their roles within a cell	Figure 9	48

1

A molecule that is important for cell functioning cannot diffuse through the plasma membrane, but needs a protein that can open and close to allow the molecule to diffuse. What is this protein called?

A.	B.	C.	D.
motor protein	channel protein	receptor protein	carrier protein

2

What moves needed substances or waste materials through the plasma membrane?

A.	B.	C.	D.
DNA	Transport proteins	Polar heads	Water molecules

3

How do carrier proteins facilitate active transport?

A.	B.	C.	D.
block the plasma membrane	move substances against a concentration gradient	prevent homeostasis	create an isotonic solution



Q23	BIO.3.1.01.057 Explain the processes of diffusion and osmosis and their roles within a cell	Figure 10	49

Osmosis: Diffusion of Water

- ☐ The diffusion of water across a selectively permeable membrane is called **osmosis**.
- ☐ **Water molecules pass freely into and out of a cell through aquaporins.**
- ☐ **Aquaporins** are channel proteins embedded in the plasma membrane composed of tiny holes that selectively allow small uncharged molecules, such as water, to pass through.
- ☐ **Regulating the movement of water across the plasma membrane** is an **important factor in maintaining homeostasis within the cell.**

How Osmosis Works

- ☐ Recall that in a solution, a substance called the **solute is dissolved in a solvent.**
- ☐ **Water** is the **solvent in a cell and its environment.**
- ☐ **Concentration** is a measure of the amount of solute dissolved in a solvent.
- ☐ The concentration of a solution decreases when the amount of solvent increases.
- ☐ In other words, a more concentrated solution has more solute than a less concentrated solution.

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- ☐ Examine Figure 10, which shows a U-shaped tube containing solutions with different sugar concentrations **separated by a selectively permeable membrane.**
- ☐ What will happen if the solvent (water) can pass through the membrane but the solute (sugar) cannot?
- ☐ **Water molecules diffuse toward the side with the greater sugar concentration**—the right side.
- ☐ As **water moves to the right**, the **concentration of the sugar solution decreases.**
- ☐ The water continues to diffuse until **dynamic equilibrium** occurs—the **concentration of the solutions is the same on both sides.**
- ☐ Notice in Figure 10 that the result is an **increase in solution level on the right side.**
- ☐ During dynamic equilibrium, **water molecules continue to diffuse back and forth across the membrane.**
- ☐ But, the **concentrations on each side no longer change.**

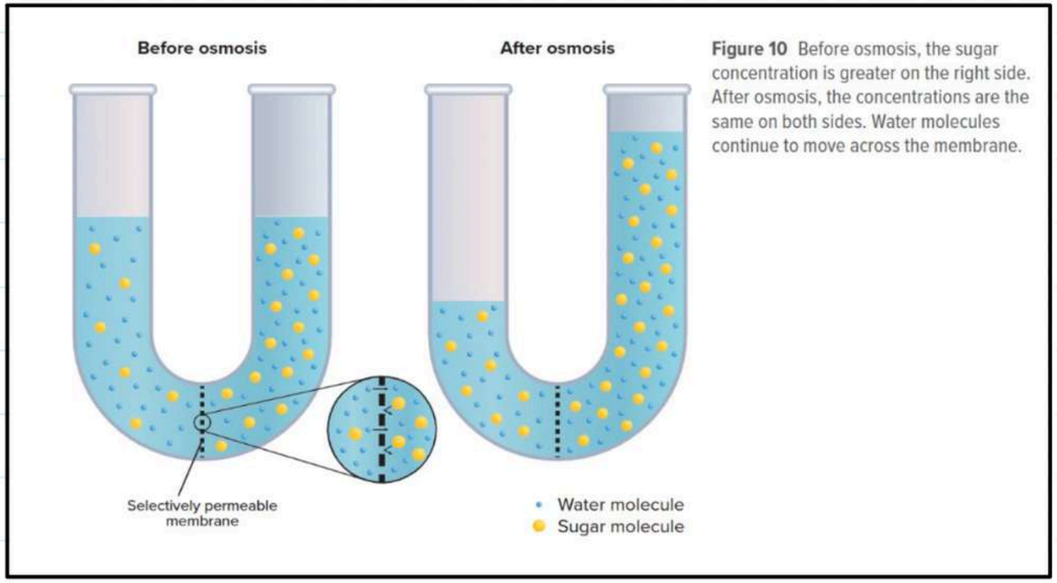


Figure 10 Before osmosis, the sugar concentration is greater on the right side. After osmosis, the concentrations are the same on both sides. Water molecules continue to move across the membrane.

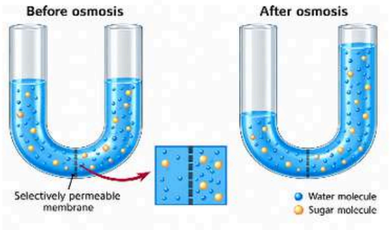
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Q23	BIO.3.1.01.057 Explain the processes of diffusion and osmosis and their roles within a cell	Figure 10	49

1

This shows a sugar solution with a selectively permeable membrane. What has occurred?

A. water diffused toward higher sugar concentration
B. sugar molecules crossed the membrane
C. water diffused toward lower sugar concentration
D. water did not cross the membrane



2

What is osmosis?

A. The movement of proteins across the plasma membrane	**B.** The movement of solutes using energy	**C.** The movement of large particles into a cell	**D.** The diffusion of water across a selectively permeable membrane

3

During osmosis, water molecules continue to move across a selectively permeable membrane in both directions. However, the concentrations on both sides remain unchanged. What is this state called?

A. Selective permeability	**B.** Dynamic equilibrium	**C.** Homeostasis	**D.** Diffusion

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Q24	BIO.3.1.01.071: Explain the swelling of the cells of living organisms when put in water and its shrinking when put in salt solution, and generalize the phenomenon on all living organisms.	Figure 11 A,B,C	51

Cells in an Isotonic Solution

- ☐ When a cell is in a solution that has the same concentration of water and solutes—ions, sugars, proteins, and other substances as its cytoplasm, the cell is said to be in an **isotonic solution.**
- ☐ **Iso-** comes from the Greek word meaning equal.
- ☐ Water still moves through the plasma membrane, but water enters and leaves the cell at the same rate.
- ☐ The cell is at equilibrium with the solution, and there is no net movement of water.
- ☐ The cells retain their normal shape, as shown in Figure 11(A).
- ▶ Most cells in organisms are in isotonic solutions, such as **blood.**

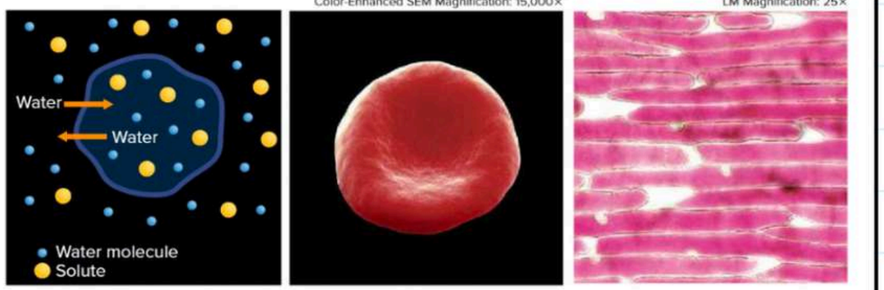


Figure 11(A) In an isotonic solution, water molecules move into and out of the cell at the same rate, and cells retain their normal shape. The animal cell and the plant cells have their normal shapes in an isotonic solution.

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Cells in a hypotonic solution

- If a cell is in a solution that has a lower concentration of solute, the cell is said to be in a **hypotonic solution.**
- **Hypo**-comes from the Greek word meaning under.
- There is more water outside of the cell than inside.
- As a result of osmosis, the net movement of water through the plasma membrane is into the cell, as illustrated in Figure 11(B).
- Pressure generated as water flows through the plasma membrane is called **osmotic pressure.**
- In an **animal cell**, as water moves into the cell, the pressure increases, and the plasma membrane swells.
- If the solution is extremely hypotonic, the plasma membrane might be unable to withstand this pressure, and the cell might burst.
- Because they have a rigid cell wall that supports them, plant cells do not burst when they are placed in a hypotonic solution.
- As the pressure inside a cell increases, the plant's central vacuole fills with water, pushing the plasma membrane against the cell wall.
- Shown in the plant cells in Figure 11(B). Instead of bursting, the plant cell becomes firmer.
- Grocers use this process to keep produce looking fresh by misting fruits and vegetables with water.

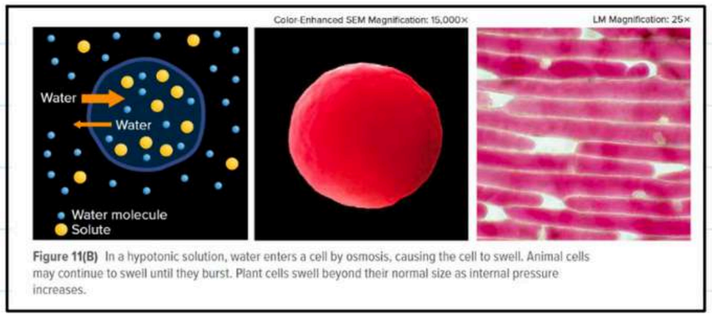


Figure 11(B) In a hypotonic solution, water enters a cell by osmosis, causing the cell to swell. Animal cells may continue to swell until they burst. Plant cells swell beyond their normal size as internal pressure increases.

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Cells in a hypertonic solution

- ☐ When a cell is placed in a **hypertonic solution**, the concentration of the solute outside of the cell is higher than it is inside.
- ☐ **Hyper**- comes from the Greek word meaning above.
- ☐ During osmosis, the net movement of water is out of the cell, as illustrated in Figure 11(C).
- ☐ Animal cells in a hypertonic solution shrivel because of decreased pressure in the cells.
- ☐ Plant cells in a hypertonic solution lose water, mainly from the central vacuole.
- ☐ The plasma membrane shrinks away from the cell wall.
- ☐ Loss of water in a plant cell causes wilting.

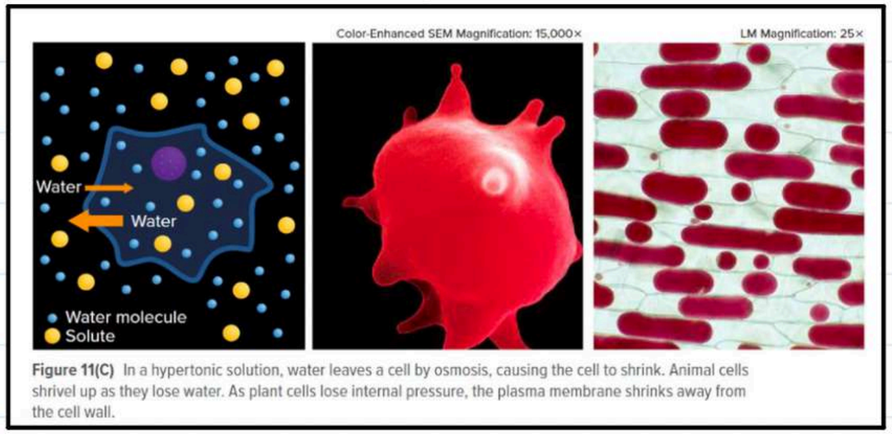


Figure 11(C) In a hypertonic solution, water leaves a cell by osmosis, causing the cell to shrink. Animal cells shrivel up as they lose water. As plant cells lose internal pressure, the plasma membrane shrinks away from the cell wall.

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1

The figure below shows a group of cells placed in solutions of different concentrations. Which of the following refers to cells in a low concentrated solution

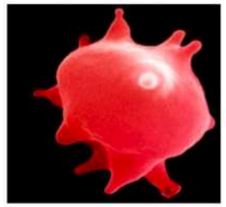


A. C & D	**B.** D & B	**C.** C & A	**D.** D & A

2

What type of solution is this cell in? What would be the net movement of water?

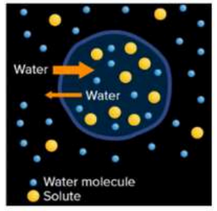
A. Hypotonic, out of the cell
B. Hypertonic, out of the cell
C. Hypotonic, into the cell
D. Hypertonic, into the cell



3

Which type of solution could cause an animal cell to burst Like the picture below?

A. Hypotonic
B. Isotonic
C. Hypertonic
D. Osmosis



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Q25	BIO.3.1.01.043: Build a model of the cell membrane indicating the active and passive transport in terms of the difference in concentration, the required energy, and the movement direction of the particle and explain how the movement of a particle affects the cell.	Information from text Figure 18	57

Components of the cytoskeleton

- ☐ At one time, scientists thought that cell organelles floated in a sea of cytoplasm.
- ☐ More recently, cell biologists have discovered that organelles do not float freely in a cell.
- ☐ Instead, the organelles are supported by a structure within the cytoplasm similar to the structure shown in Figure 18.
- ☐ **The cytoskeleton** is a supporting network of long, thin protein fibers that form a framework for the cell and provide an anchor for the organelles inside the cell.
- ☐ The cytoskeleton also has a function in cell movement and other cellular activities.

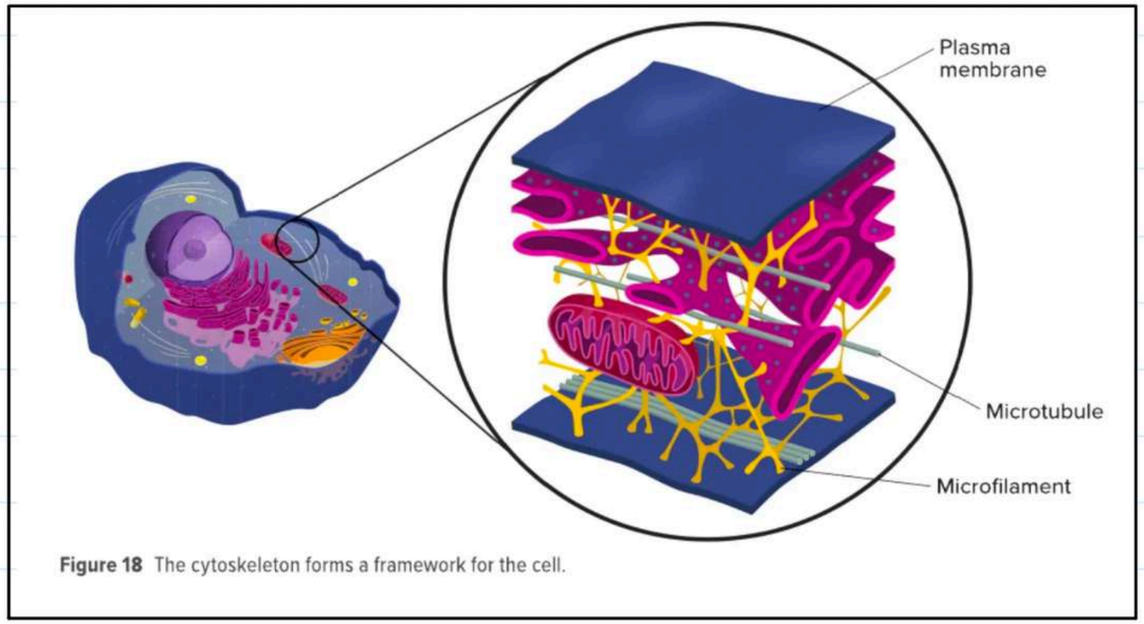


Figure 18 The cytoskeleton forms a framework for the cell.

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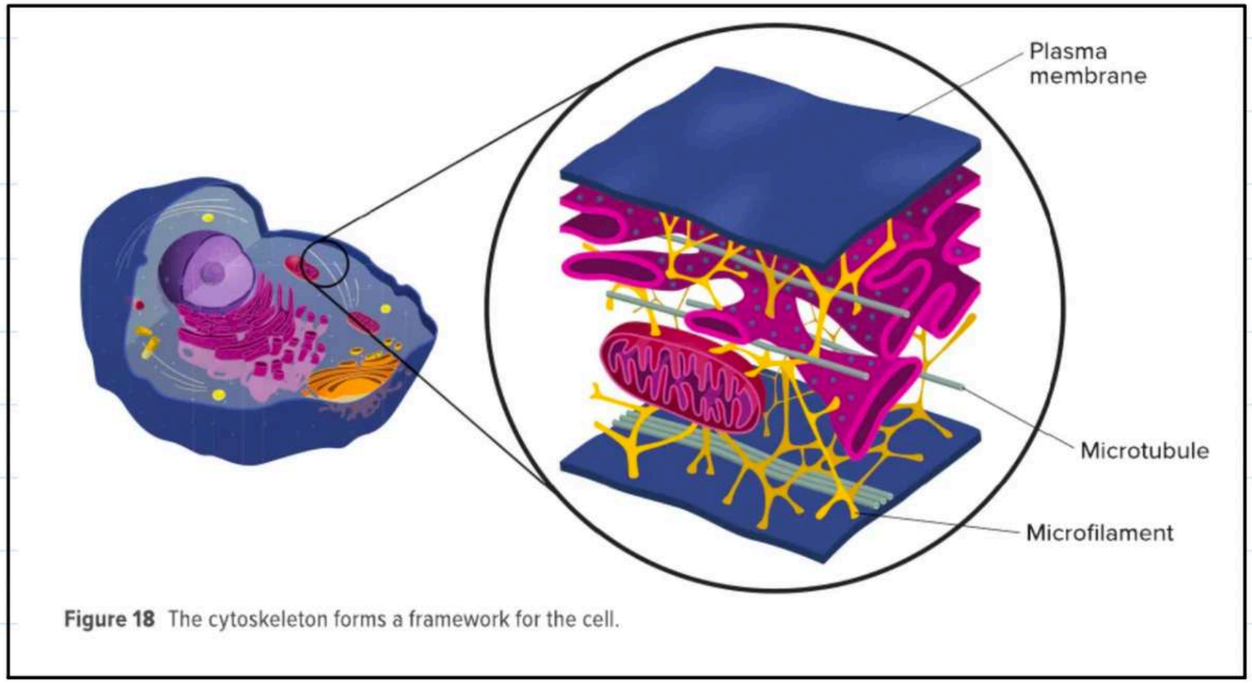


Figure 18 The cytoskeleton forms a framework for the cell.

Microtubules and microfilaments

- ☐ The cytoskeleton is composed of substructures called **microtubules and microfilaments.**
- ☐ **Microtubules** are long, hollow protein cylinders that form a rigid skeleton for the cell and assist in moving substances within the cell.
- ☐ **Microfilaments** are thin protein threads that help give the cell shape and enable the entire cell or parts of the cell to move.
- ☐ Microtubules and microfilaments rapidly assemble and disassemble and slide past one another.
- ☐ This allows cells and organelles to **move**.

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Q25	BIO.3.1.01.043: Build a model of the cell membrane indicating the active and passive transport in terms of the difference in concentration, the required energy, and the movement direction of the particle and explain how the movement of a particle affects the cell.	Information from text Figure 18	57

1

Which structure provides support for the cell and helps organize its internal components?

A.	Nuclear envelope	**B.**	Cell wall	**C.**	Plasma membrane	**D.**	Cytoskeleton

2

The long, hollow protein structures that form part of the cytoskeleton are called __.

A.	Microfilaments	**B.**	Cilia	**C.**	Microtubules	**D.**	Vesicles

3

How do microtubules and microfilaments help cells and organelles move?

A.	By producing energy for movement	**B.**	By rapidly assembling, disassembling, and sliding past one another	**C.**	By controlling the movement of water across the membrane	**D.**	By storing proteins inside the nucleus

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Q26	BIO.3.1.01.050: Identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each.	Figure 22	60

Controlling Cell Activities

☐ Just as a factory needs a manager to direct and oversee the tasks carried out in the factory, a cell needs an organelle to direct the cell processes.

The nucleus

☐ The nucleus, shown in Figure 22, is the cell's managing structure.

☐ It contains most of the cell's DNA, which stores information used to make proteins for cell growth, function, and reproduction.

☐ Within the nucleus is the site of ribosome production called the **nucleolus**.

☐ **The nucleus** is surrounded by a double membrane called the nuclear envelope

☐ The nuclear envelope is similar to the plasma membrane, except the **nuclear membrane has nuclear pores** that allow larger-sized substances to move in and out of the nucleus.

☐ **Chromatin**, which is a complex DNA attached to protein, is spread throughout the nucleus.

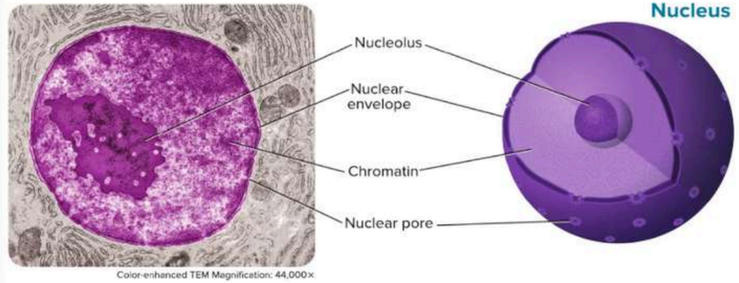


Figure 22 The nucleus of a cell is a three-dimensional shape. The photomicrograph shows a cross section of a nucleus.

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Q26	BIO.3.1.01.050: Identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each.	Figure 22	60

1

A cell's genetic material is contained in the

A.	Nucleus.	**B.**	Plasma Membrane .	**C.**	Phospholipid bilayer.	**D.**	Unicellular bacteria.

2

What is the function of the nuclear pores?

A.	They produce ribosomes.	**B.**	They surround the nucleus by a double membrane.	**C.**	hey allow larger-sized substances to move in and out of the nucleus.	**D.**	They store genetic information for protein production.

3

Which statement about the nucleus is correct?

A.	It is the site of photosynthesis.	**B.**	It contains digestive enzymes that break down waste.	**C.**	It contains most of the cell's DNA.	**D.**	It stores materials in a membrane-bound sac.

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Q27	BIO.3.1.01.050: Identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each.	Information from text Figure 23	61

Mitochondria

- ☐ Cells have energy generators called **mitochondria**, which convert fuel (mainly sugars) into usable energy.
- ☐ Figure 23 shows that a mitochondrion has an outer membrane and a highly folded inner membrane that provides a large surface area for breaking the bonds in sugar molecules.
- ☐ The energy produced is stored in the bonds of other molecules and later used by the cell.

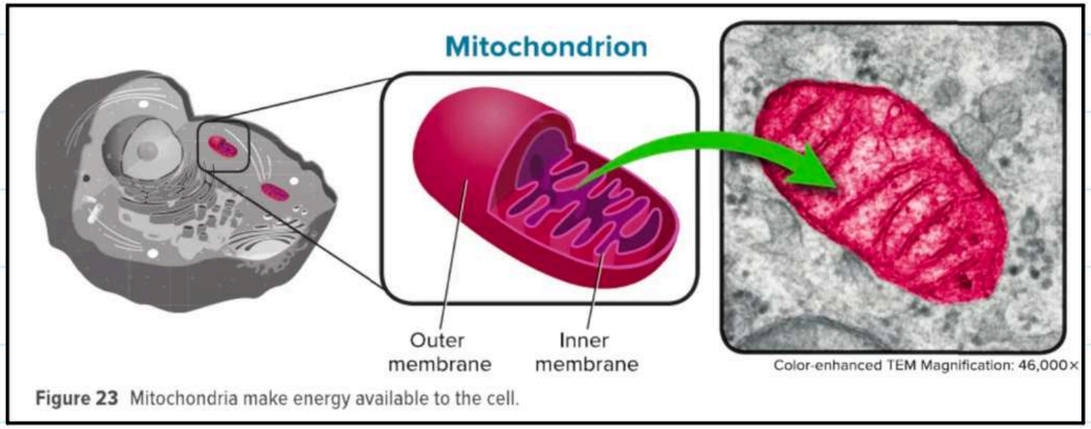


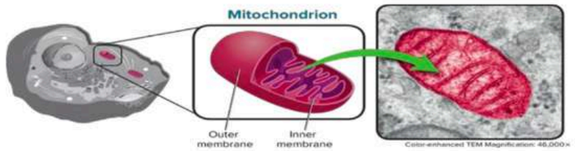
Figure 23 Mitochondria make energy available to the cell.

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1

Observe the structure of this mitochondrion. Why is its inner membrane crucial for cell functioning?



A. provides a large surface area	**B.** keeps sunlight from damaging cell	**C.** provides inflexible barrier on cell surface	**D.** promotes photosynthesis

2

Which organelle is called the "powerhouse of the cell"?

A. ribosome	**B.** vesicle	**C.** nucleus	**D.** mitochondria

3

Why is the inner membrane of a mitochondrion highly folded

A. To store genetic information.	**B.** To provide a large surface area for energy-producing reactions	**C.** To control what enters and leaves the cell	**D.** To support and anchor cell organelles

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Q28	BIO.3.1.01.050: Identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each.	Information from text Figure 24	61

Chloroplasts

- ☐ In addition to mitochondria, plants and some other eukaryotic cells contain **chloroplasts,** organelles that capture light energy and convert it to chemical energy through a process called photosynthesis.
- ☐ Examine Figure 24. Notice that inside the inner membrane are many small, disk shaped compartments called **thylakoids.**
- ☐ This structure relates to their function-trapping energy from sunlight in a pigment called **chlorophyll**.
- ☐ Chlorophyll gives leaves and stems their green color.
- ☐ Chloroplasts belong to a group of plant organelles called **plastids**, some of which are used for storage.
- ☐ Some plastids store starches or lipids.
- ☐ Others, such as chromoplasts, contain red, orange, or yellow pigments that trap light energy and give color to plant structures such as flowers and leaves.

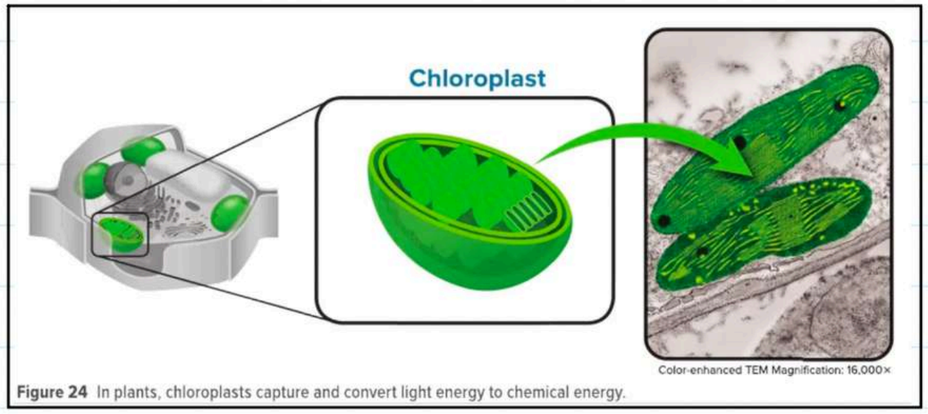


Figure 24 In plants, chloroplasts capture and convert light energy to chemical energy.

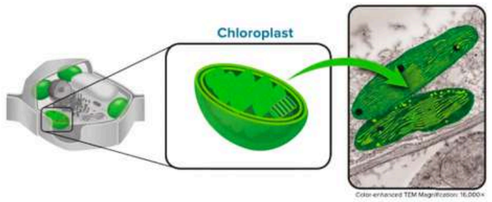
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1

What is the function of the small, disk- shaped thylakoids in this plant cell?

A. digest enzymes
B. assist cell movement
C. store food and enzymes
D. contain chlorophyll for trapping sunlight



2

Which organelle captures light energy and converts it into chemical energy through photosynthesis?

A.	ribosome	**B.**	Chloroplast	**C.**	nucleus	**D.**	mitochondria

3

The green pigment that absorbs light energy during photosynthesis is called___

A.	Peptidoglycan	**B.**	Cellulose	**C.**	Chlorophyll	**D.**	Chromatin

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Ribosome

- ☐ One of the functions of a cell is to produce proteins.
- ☐ The organelle that **help manufacture proteins** is called the **ribosome**.
- ☐ **Ribosomes** are made of two components—RNA and protein—and are not bound by a membrane like other organelles are.
- ☐ The nucleolus is the site of ribosome production.
- ☐ Cells have many ribosomes that produce a variety of proteins that are used by the cell or are moved out and used by other cells.
- ☐ Some ribosomes float freely in the cytoplasm, while others are bound to another organelle called the **endoplasmic reticulum.**
- ☐ Free-floating ribosomes produce proteins for use within the cytoplasm of the cell.
- ☐ Bound ribosomes produce proteins that will be bound within membranes or used by other cells.

Endoplasmic Reticulum

- ☐ **The endoplasmic reticulum, also called ER,** is a membrane system of folded sacs and interconnected channels that serves as the site for protein and lipid synthesis.
- ☐ The structure of the ER, with many pleats and folds, provides a large amount of surface area where cellular functions can take place.

Rough Endoplasmic Reticulum

- ☐ The area of ER where ribosomes are attached is called **rough endoplasmic reticulum**
- ☐ Notice in Figure 25 that the rough ER appears to have bumps on it
- ☐ These bumps are the attached ribosomes that will produce proteins for export to other cells.

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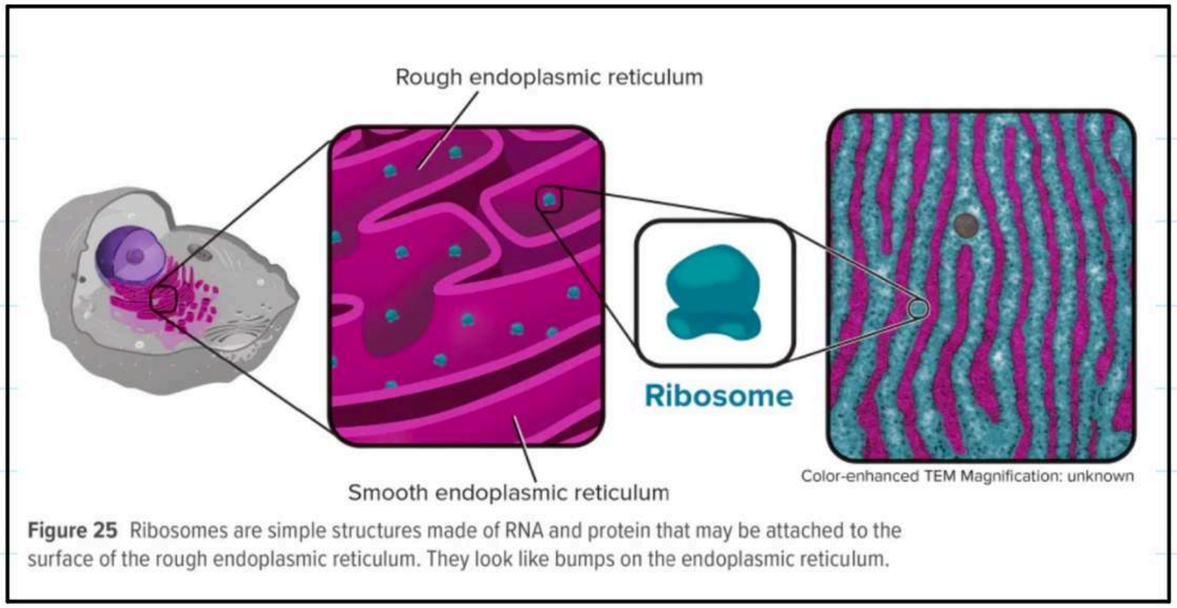


Figure 25 Ribosomes are simple structures made of RNA and protein that may be attached to the surface of the rough endoplasmic reticulum. They look like bumps on the endoplasmic reticulum.

Smooth Endoplasmic Reticulum

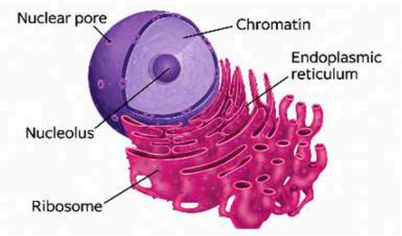
- ☐ Notice that Figure 25 also shows that there are areas of the ER that do not have ribosomes attached.
- ☐ The area of ER where no ribosomes are attached is called **smooth endoplasmic reticulum.**
- ☐ Although the smooth ER has no ribosomes, it does perform important functions for the cell.
- ☐ For example, the smooth ER provides a membrane surface where a variety of complex carbohydrates and lipids including phospholipids, are synthesized.
- ☐ Smooth ER in the liver detoxifies harmful substances.

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1

What structure synthesizes proteins that will be used by the cell?



A. Ribosomes	B. Nucleus	C. Chloroplast	D. Endoplasmic reticulum

2

What is the function of the smooth ER?

A. A variety of complex carbohydrates and lipids are synthesized.	B. Proteins are synthesized and produced.	C. It surrounds the nucleus with a double membrane.	D. Carbohydrates, lipids, and other substances are consumed.

3

Choose the INCORRECT statement about the endoplasmic reticulum (ER).

A. It is a system of folded membranes and interconnected channels.	B. Rough ER has ribosomes attached to its surface.	C. Smooth ER has ribosomes attached to its surface.	D. Rough and smooth ER have different functions.

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Q30	BIO.3.1.01.050: Identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each	Figure 26	63

Golgi apparatus

- ☐ After hiking boots are made in a factory, they must be organized into pairs, boxed, and shipped.
- ☐ Similarly, after proteins are made in the endoplasmic reticulum, some might be transferred to the Golgi apparatus, illustrated in Figure 26.
- ☐ The Golgi apparatus is a flattened stack of membranes that modifies, sorts, and packages proteins into sacs called **vesicles**.
- ☐ Vesicles then can fuse with the cell's plasma membrane to release proteins to the environment outside the cell

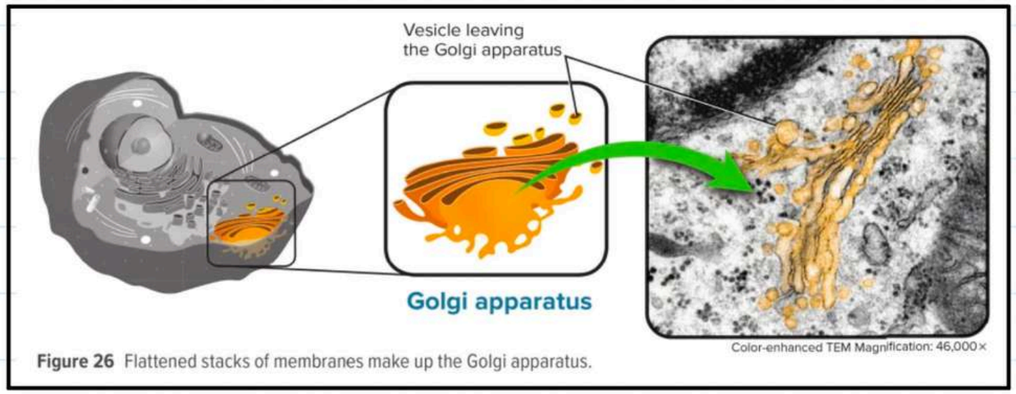


Figure 26 Flattened stacks of membranes make up the Golgi apparatus.

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Vesicles & Vacuoles

- ☐ A factory needs a place to store materials and waste products
- ☐ Similarly, cells have membrane-bound vesicles called **vacuoles** for temporary storage of materials within the cytoplasm
- ☐ A vacuole, such as the plant vacuole shown in Figure 27, is a sac used to store food, enzymes, and other materials needed by a cell
- ☐ Some vacuoles store waste products
- ☐ In contrast to plant cells, animal cells usually do not contain vacuoles.
- ☐ If animal cells do have vacuoles, they are much smaller than those in plant cells.

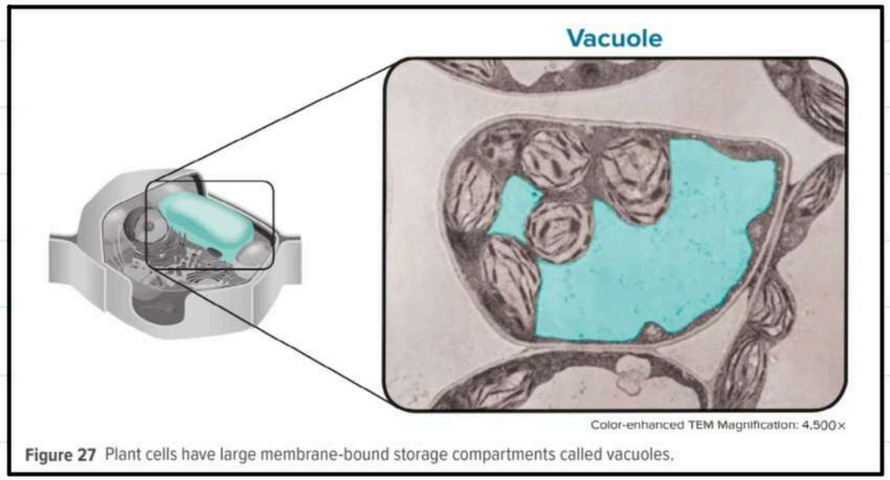


Figure 27 Plant cells have large membrane-bound storage compartments called vacuoles.

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Q30	BIO.3.1.01.050: Identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each	Figure 26	63

1

Which organelle is large in plant cells but small or absent in animal cells?

A.	vacuole	**B.**	chloroplast	**C.**	centriole	**D.**	nucleolus

2

What is the main function of the Golgi apparatus?

A.	To produce usable energy	**B.**	To control cell activity	**C.**	To capture light energy	**D.**	To modify, sort, and package proteins

3

A cell produces proteins on the rough endoplasmic reticulum. The proteins then need to be modified, sorted, and packaged before transport. Which organelle performs this function

A.	Mitochondrion	**B.**	Lysosome	**C.**	Centriole	**D.**	Golgi apparatus

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