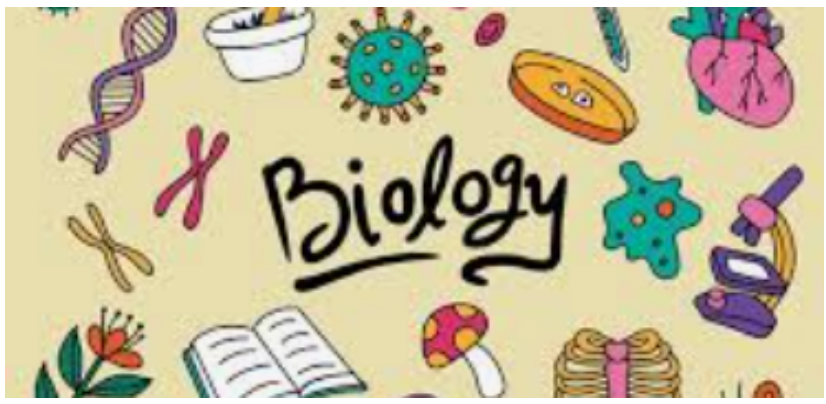
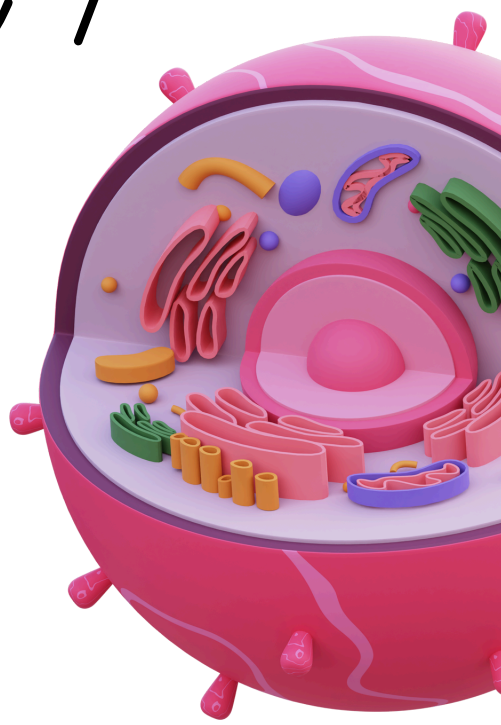
مدرسة السلمة للحلقة الثانية و الثالثة بنات | تربية وتعليم
Al Salamah Girls School for C2 & C3

وزارة التربية والتعليم
MINISTRY OF EDUCATION

Exam Practice Booklet

9 ADV- Term 1





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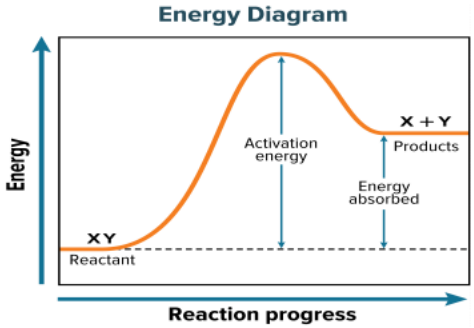
Module: Chemistry in Biology

Lesson 2: Chemical reactions

1. **What does the image shows?**
   A. A covalent bond
   B. A physical property
   C. A chemical reaction
   D. Van der Waals forces

2. **Which statement is true regarding this energy diagram?**



   A. It shows an exothermic reaction.
   B. It shows an endothermic reaction
   C. Reactant and product energy are equal
   D. Product energy is lesser than reactant energy

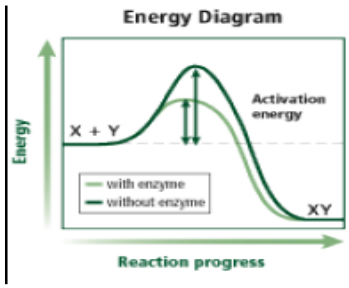
3. **In the following equation, what are the products of the reaction?**
   $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
   A. $C_6H_{12}O_6$ and $6H_2O$
   B. $C_6H_{12}O_6$ and $6O_2$
   C. $6O_2$ and $6CO_2$
   D. $6CO_2$ and $6H_2O$

4. **Which of the following is a substance that lowers the activation energy?**
   A. A substrate
   B. A catalyst
   C. A reactant
   D. An anion

5. **The specific location where a substrate binds on an enzyme is called the ____.**
   A. active site
   B. enzyme-substrate complex
   C. binding point
   D. catalyst

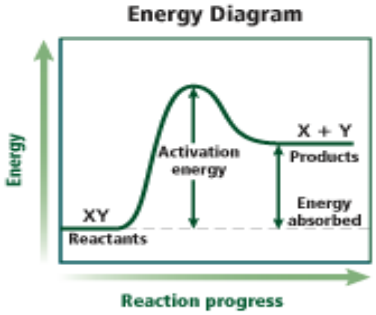
6. **Which statement is true of chemical reactions?**
   A. Reactants are on the right
   B. Products are on the right
   C. Products have fewer atoms than reactants
   D. Reactants have fewer atoms than products

7. **How can enzymes benefit chemical reactions, as shown in this energy diagram?**



   A. lowering activation energy
   B. raising activation energy
   C. slowing reactions
   D. increasing the amount of product

8. **What kind of chemical reaction does this energy diagram show?**



   A) exothermic
   B) endothermic
   C) ionic
   D) mass creating

9. What principle can be applied to all chemical reactions?

A) conservation of mass

B) reactants formed from products

C)energy loss theory

D) coefficient principle

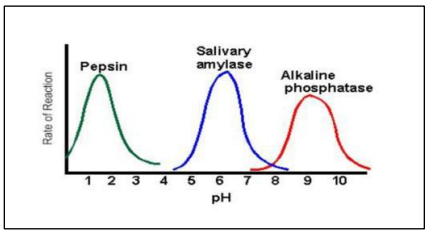
10. Identify the optimum pH of alkaline Phosphatase.

A. 2

B. 4

C. 6

D. 9



11. What is the function of the enzyme-substrate complex?

A) destroy the enzyme

B) prevent bondage at the active site

C) stop chemical reactions

D) break and forming chemical bonds

12. The minimum amount of energy needed for a chemical reaction is called ____.

A) product threshold

B) absorbent energy

C) principle mass

D) activation energy

13. Which is true about enzymes?

A They act on nonspecific, randomly chosen substrates.

B After a reaction, they cannot be reused.

C They can speed up metabolic processes in the body.

D They cannot change shape

14. Which statement is true of chemical equations?

A. Reactants come after the arrow, products come before.

B. Reactants and products come before the arrow.

C. Reactants come before the arrow, products come after.

D. Reactants and products both come after the arrow.

15. Which of the following equations is balanced?

A. $2Fe + 3Cl_2 \rightarrow 2FeCl_3$

B. $Fe + Cl_2 \rightarrow FeCl_3$

C. $3Fe + 2Cl_2 \rightarrow 3FeCl_3$

D. $Fe + 2Cl_2 \rightarrow 3FeCl_2$

16. Why must the number and type of atoms in the reactants equal the number and type atoms in the products formed?

A. Atoms are converted to other elements by chemical reactions.

B. The law of conservation of mass says matter cannot be created or destroyed.

C. Chemical processes convert between matter and energy.

E. Energy released by an exothermic reaction must balance energy absorbed by an endothermic one

17. To develop a product that warms people's hands, would you use an exothermic or endothermic reaction? Why?

A. Endothermic; that way the reaction will absorb heat.

B. Exothermic; that way the reaction will absorb heat.

C. Endothermic; that way the reaction will release heat.

D. Exothermic; that way the reaction will release heat.

18. Special proteins called..... are the biological catalysts that speed up the rate of chemical reactions in biological processes.

19. Why is the active site of an enzyme important to enzyme activity?

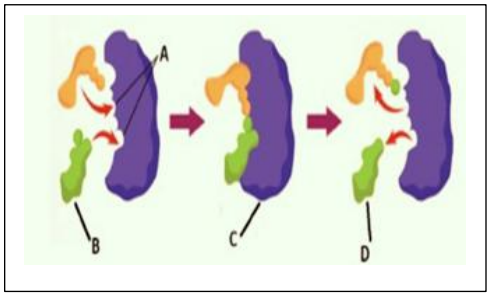
A. It raises the activation energy of a reaction.
B. It allows the enzyme to interact with a large variety of substrates.
C. It allows the enzyme to catalyze very specific reactions.
D.It allows an endothermic reaction to run as an exothermic reaction.

20. What is an active site?

A. the reactant to which an enzyme binds
B. the specific place where a substrate binds on an enzyme
C. a molecule that acts as a biological catalyst
D. a mixture that maintains the pH of a solution within a specific range

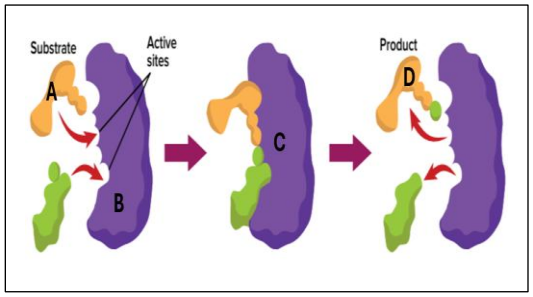
21. The figure below represents enzyme action. Which of the following letters represents the product.

A. A
B. B
C. C
D. D

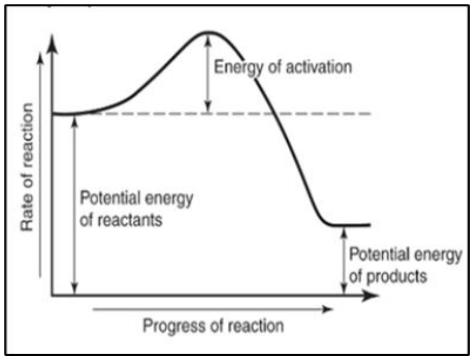


22. Which one is Enzyme-substrate complex?

A. A
B. B
C. C
D. D



23. Q. Below is a graph that shows the progress of a common cellular reaction in the human body. This reaction does not have the enzyme that would normally be present in the cell. If the appropriate enzyme was added, which of the following would be true?



A. The reaction would not proceed, and no product would form without an enzyme because there would be no effective collisions.
B. The amount of energy stored in the products would change with enzymes because enzymes alter the energy needed to start the reaction.
C. The activation energy would be lower in the enzyme-controlled reaction and there would be more effective collisions
D. The potential energy of the reactants would be lower when an enzyme is present because there would be more effective collisions

24. Which equation satisfies the law of conservation of matter?

A. $3O_2 + 2Al \rightarrow 2AlO_3$
B. $3O_2 + 2Al \rightarrow 3AlO_3$
C. $4O_2 + Al \rightarrow AlO_3$
D. $4O_2 + 3Al \rightarrow 3AlO_3$

25. complete the following chemical equation so it is balanced

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 +$ .....

a) $6H_2O$
b) $12H_2O$
c) $3H_2O$
d) H_2O

Lesson 3: Water & It's Solutions

1. **Which of the following is not a property of water?**

a) It is adhesive.
b) It is cohesive.
c) It combusts.
d) It is a good solvent

2. **Which statement is not true about pure water?**

a. It has a pH of 7.0
b. It is composed of polar molecules
c. It is composed of ionic bonds
d. It is a good solvent

3. **Based on the corresponding image, which of the following is a property of water that allows insects to rest on the surface of water?**

a. It is a good solvent.
b. It combusts.
c. It is cohesive.
d. It is adhesive

4. **Which property of water allows it to dissolve many different substances?**

a) Cohesion
b) Adhesion
c) Solubility
d) Polarity

5. **How are water molecules in a rain drop held together?**

a) attraction between positive charges
b) attraction between negative charges
c) van der Waals forces
d) ionic bonds

6. **Molecules that have an unequal distribution of charges are called ____.**

A) enzymes
B) polar molecules
C) substrate molecules
D) solvents

7. **Which of these is not a characteristic of a solution?**

A) substances retain properties
B) homogenous mixture forms
C) there is uniform composition
D) substances change properties

8. **How do solutes and solvents interact?**

A) solvents change the properties of solutes
B) solvents dissolve in solutes
C) solutes change the properties of solvents
D) solutes dissolve in solvents

9. **…….is a homogeneous mixture that is formed by dissolving a substance in solvent.**

a) solution
b) suspension
c) colloid
d) solute

10. **What does the image show?**

a) a homogeneous mixture
b) a suspension
c) a heterogeneous mixture
d) a solution

11. **What are van der Waals forces?**

a. attractive forces between molecules
b. minimum amount of energy needed for a chemical reaction
c. forces that bond ions together
d. molecules that store genetic information

12. **A beaker contains three solids- flour, sugar & baking soda. Which describes the content of the beaker?**

a) a homogeneous mixture
b) a suspension
c) a heterogeneous mixture
d) a solution

13. Small, lightweight insects can walk on the surface of water, as seen in the following figure: Which property of water best explains this phenomenon?

a) High surface tension - cohesive interactions between H2O molecules.
b) High specific heat capacity - amount of heat needed to raise the temperature.
c) Capillary action – happens as a result of adhesion.
d) Density of ice – less dense than liquid H2O

14. Identify which properties of water make it a compound necessary for life to exist on our planet. Select all that apply.

a) Its molecular weight is 18.
b) Its solid form is less dense than its liquid form; ice floats.
c) It is a polar molecule capable of forming hydrogen bonds.
d) It is composed of three atoms.
e) It is an excellent solvent.
f) It is adhesive and cohesive.

15. What is a polar molecule?

a) a molecule with oppositely charged regions
b) a molecule that produces hydroxide ions (OH-) in solution
c) a large molecule formed by joining smaller molecules together
d) a molecule that has lost or gained electrons

16. A(n)..... is combination of two or more different substances in which each retains its individual characteristics.

17. The human stomach needs to maintain a p^H value between 1 and 2 in order to digest food properly. Which of the following describes the environment of the human stomach?

a. It is acidic
b. It is basic
C. It is neutral
d. It can change to be basic and acidic

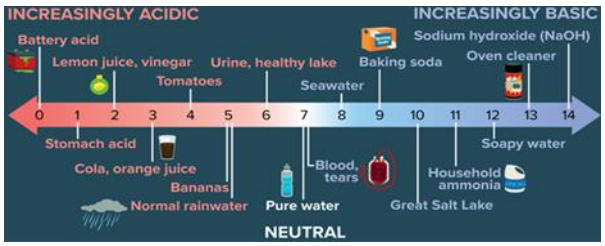
18. Which is a substance that produces OH- ions when it is dissolved in water?

a. A base
b. An acid
c. A buffer
d. A salt

19. Acid solutions are produced by the release of ____ ions.

a) potassium
b) hydrogen
c) oxygen
d) sodium

20. Which of the following would likely have a pH greater than 7

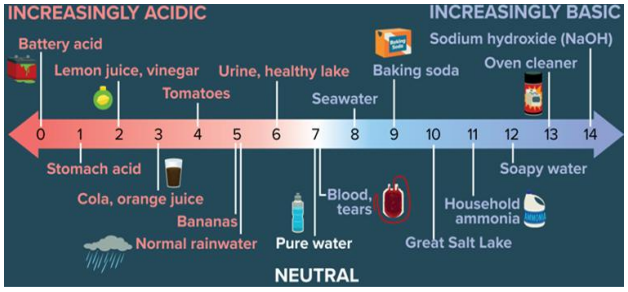


a. Lemon juice
b. Vinegar
c. Distilled water
d. Baking soda solution

21. What is a base?

a) a substance that releases hydroxide ions (OH-) into solution
b) a substance that quenches chemical reactions
c) a substance that decreases pH
d) a substance that releases hydrogen ions (H+) into solution

22. Which statement is true based on this scale?



A) Seawater has a higher concentration of hydrogen than tomatoes.

B) Tomatoes have a higher concentration of hydrogen than seawater.

C) Blood has no hydrogen ions.

D) Household ammonia is neutral.

23. Biological buffers work to keep pH in your body in a range of __.

a) 7.5 – 8.5
b) 4.5 – 5.5
c) 5.5 – 6.5
d) 6.5 – 7.5

24. Why are intermolecular forces, such as van der Waals forces, important to biological Function?

a) Intermolecular forces do not play a major role in biological functions.
b) They are stronger than ionic or covalent bonds.
c) They are easy to form and break apart, making them ideal for short-term interactions.
d) They are easy to form and break apart, making them ideal for long-term interactions.

25. Which of the following can be classified as a van der Waals force?

a) a strong electrostatic interaction between two atoms in an ionic bond
b) a non-polar covalent bond
c) a weak electrostatic interaction between two polar molecules
d) a polar covalent bond

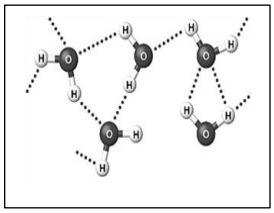
26. A(n)..... is a substance that produces hydroxide ions (OH–) in water, while a(n) .....produces hydrogen ions (H+) in water.

27. pH is a measure of the concentration of which ions in a solution?

a. Oxygen ions
b. Carbon ions
c. Nitrogen ions
d. d. Hydrogen ions

28. The _____ bond is an interaction involving a hydrogen atom of one molecule with a fluorine, oxygen or nitrogen atom from different molecule.

a) Covalent bond
b) Hydrogen bond
c) Ionic bond
d) Metallic bond



29. Which of the following property helps the polar bear in the picture.

a) Cohesion
b) Adhesion
c) Ice is less dense than water
d) Ice is denser than water

30. Leaves can rest on the surface of water due to the property of _____.

a) Cohesion
b) Solubility
c) Adhesion
d) Collision

31. Which of the following is NOT a correct explanation of importance of buffers to living organisms

a) Buffers allow large fluctuations in the concentrations of hydrogen ions in a cell
b) Buffers help maintain the pH level in the cell between 6.5 and 7.5
c) Buffers play a role in maintaining homeostasis
d) maintain the proper environment for enzymatic reactions and biological processes to occur

Lesson 4: Building Blocks of Life

1. **Which of the following is NOT a biological function of lipids?**
   A. cushioning and insulation
   B. precursors to the synthesis of signaling molecules
   C. store energy
   D. speeding up reactions
2. **Which of the following is attributed to lipids;**
   a) Speed reaction
   b) Control cell growth
   c) Energy storage
   d) Genetic information storage
3. **Which class of macromolecules store and communicate genetic information?**
   A. carbohydrates
   B. lipids
   C. proteins
   D. nucleic acids
4. **Which of the following functions can be attributed to carbohydrates;**
   a) Chemical signaling.
   b) Speed reactions
   c) Energy storage
   d) Genetic information storage
5. **You are analyzing a compound in a laboratory. You find that it is made up of carbon, hydrogen, and oxygen in a ratio of two hydrogen atoms for each carbon atom. How will you classify the compound?**
   A. carbohydrate
   B. lipid
   C. protein
   D. nucleic acid

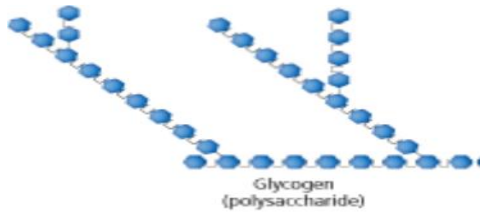
6. **Which of the following functions is not attributed to carbohydrates;**
   a) Signaling between cells.
   b) Structural support
   c) Energy storage
   d) Genetic information storage

7. **Which of the following joins amino acids together?**
   a) metallic bonds
   b) peptide bonds
   c) van der Waals forces
   d) ionic bonds
8. **What is a polymer?**
   a) a molecule that speeds up biological reactions by lowering activation energy
   b) a combination of two or more different substances in which each substance keeps its individual characteristics
   c) a pure substance with unique properties, formed when two or more different elements combine
   d) a large molecule formed from smaller identical (or nearly identical) repeating units
9. **Which substance is not part of a nucleotide?**
   a) phosphate
   b) base
   c) water
   d) sugar
10. **Which of the following functions is/are attributed to carbohydrates;**
    a) Structural support
    b) Signaling between cells
    c) Energy storage
    d) All of the above
11. **The figure shows examples of biological macromolecules. Which of the following macromolecules are responsible for energy storage.**

    a) (C) & (D) b) (C) & (B)
    c) (C) & (A) d) (D) & (A)
12. **Which of the following macromolecules matches its correct role in the cell?**

a) Nucleic acid - Transport substances
b) Lipids - Store genetic information
c) Proteins - Speed reactions
d) Carbohydrates - Make hormones

13. What is the structure shown here?



a) elements called carbohydrates
b) macromolecules called carbohydrates
c) compounds called proteins
d) macromolecules called nucleic acids

14. Which two elements are always found in amino acids?

a. Nitrogen and sulfur
b. Carbon and oxygen
c. Hydrogen and phosphorus
d. Sulfur and oxygen

15. Albumin is a protein found in egg whites. Which of the following describes the chemical structure of albumin?

a) A set of three fatty acid attached to a molecule of glycerol
b) A folded chain of amino acids
c) A series of monosaccharide linked together
d) A sequence of nucleic acids twisted into a form of an helix

16. What is the ratio of carbohydrates in a monosaccharide?

a) 1 carbon: 3 hydrogen: 1 oxygen
b) 1 carbon: 2 hydrogen: 1 oxygen
c) 2 carbon: 1 hydrogen: 2 oxygen
d) 1 carbon: 2 hydrogen: 2 oxygen

17. Which of the following compounds can be classified as a proteins?

a) polysaccharides
b) fatty acids
c) enzymes
d) nucleic acids

18. Why is the sequence of amino acids important to protein function?

a) The sequence of amino acids doesn't have an effect.
b) Amino acids can only be combined in a specific order, otherwise the bonds will fall apart.
c) The order of the amino acids can be read like a code to assemble DNA.
d) The order of amino acids determines the shape a protein will take.

19. Which of the following compounds are examples of nucleic acids? Select all that apply.

a) ribonucleic acid (RNA)
b) amino acids
c) fatty acids
d) polysaccharides
e) deoxyribonucleic acid (DNA)

20. Which of the following functions can be attributed to nucleic acids and nucleotides?

a) long-term energy storage
b) chemical signaling between cells
c) genetic information storage and transmission
d) barrier in biological membranes

21. What are saturated fats?

a) Lipids with double bonds between carbon atoms
b) Proteins with double bonds between carbon atoms
c) Lipids with single bonds between carbon atoms
d) Proteins with single bonds between carbon atoms

Module: Cellular Structure and Function

Lesson 1: Cell discovery & theory

1. **Which statement would not be included in a summary of the cell theory?**
   A. The cell is the basic unit of organization.
   B. All cells contain a nucleus that controls cell division.
   C. All organisms are made up of at least one cell.
   D. All cells come from other, preexisting cells.

2. **Which of the following statement is a part of cell theory,**
   A. The cell is the basic unit of life.
   B. All cells contain a nucleus that controls cell division.
   C. All cell contain membrane bound organelles.
   D. All organisms are made up of more than one cell.

3. **After studying plant tissues, animal tissues, and protozoans under the microscope, scientists summarized their observations of cells and formulated the cell theory. Which would not be included as part of the cell theory?**
   a. Unicellular organisms can grow from organic molecules
   b. Cells are the building blocks of living structures.
   C. Parent cells pass genetic material on to daughter cells
   d. All living things are made of one or more cells.

4. **What is the definition of the cell theory? It states that:**
   a) Organisms are made of one or more cells, cells are the basic unit of life, and all cells come only from other cells.
   b) All cells have a plasma membrane and genetic material called DNA.
   c) Eukaryotic cells are larger than prokaryotic cells.
   d) The cell is the basic structural and functional unit of all living organisms.

5. **Which defines a cell?**
   a) the basic unit of living things
   b) microscopic organisms in water
   c) the smallest type of animal
   d) protein molecules in animals

6. **Who was the first scientist to observe and name "cells"?**
   A. Anton van Leeuwenhoek
   B. Robert Hooke
   C. Matthias Schleiden
   D. Rudolf Virchow

7. **What did Anton van Leeuwenhoek discover when he observed pond water and milk?**
   A. Only non-living particles
   B. Dead plant cells
   C. Living organisms
   D. Air bubbles

8. **What material did Robert Hooke observe when he discovered cells?**
   A. Pond water
   B. Blood
   C. Cork
   D. Onion skin

9. **Which is the type of microscope that requires a specimen to be dead, thinly sliced, and stained with heavy metals?**
   a) SEM
   b) compound light
   c) optical
   d) TEM

10. **What does a TEM image mainly show?**
   A. The surface details of a specimen
   B. The internal structure of a specimen
   C. The color and texture of a specimen
   D. The chemical composition of a specimen

11. **What type of image does a Scanning Electron Microscope (SEM) produce?**
   A. Flat, two-dimensional image
   B. Three-dimensional image of the specimen surface
   C. Black-and-white image of internal details
   D. Color image of live cells

12. **What does the Scanning Tunneling Microscope (STM) allow scientists to study?**
   A. Whole organisms
   B. Internal cell structures
   C. Atoms and DNA molecules
   D. Dead tissues only

13. **What makes the Scanning Tunneling Microscope (STM) different from TEM and SEM?**
   A. It uses lenses instead of magnets
   B. It can be used with living specimens
   C. It cannot show three-dimensional images
   D. It magnifies less than other microscopes

14. **How does a Scanning Electron Microscope (SEM) differ from a TEM?**
   A. SEM produces 3D images while TEM produces 2D images
   B. SEM uses light; TEM uses electrons
   C. SEM can view live specimens; TEM cannot
   D. SEM provides color images; TEM gives black-and-white images

15. **What is one disadvantage of using a Transmission Electron Microscope (TEM)?**
   A. It cannot magnify more than 1,000×
   B. It can only view living specimens
   C. The specimen must be dead, sliced thin, and stained
   D. It produces colored images

16. **What is used in an electron microscope instead of lenses?**
   A. Mirrors
   B. Magnets
   C. Glass slides
   D. Light beams

17. **Who developed the first electron microscope?**
   A. Robert Hooke
   B. Anton van Leeuwenhoek
   C. Ernst Ruska
   D. Matthias Schleiden

18. **Which statement best compares how TEM and SEM form images?**
   A. TEM scans the surface with electrons, while SEM passes electrons through the specimen.
   B. TEM passes electrons through the specimen, while SEM scans the surface with electrons.
   C. Both TEM and SEM pass electrons through the specimen.
   E. Both TEM and SEM can be used on living cells.

19. **What is a common disadvantage to both TEM and SEM microscopes?**
   A. They produce color images.
   B. They can only be used on living cells.
   C. They can only be used on nonliving specimens.
   D. They cannot magnify more than 500×.

20. What is one significant disadvantage of scanning and transmission electron microscopes.

a. cells cannot absorb electrons
b. not as powerful as light microscopes
c. cells die when prepared for viewing
d. cannot observe plant cells

21. Which microscopy tool is most useful in observing the structure of viruses?

a) Light microscope
b) Electron microscope
c) Magnifying lens
d) Unaided eye

22. Why do many scientists think that prokaryotes are similar to the first organisms on Earth?

A. Prokaryote cells have a nucleus.
B. The first organisms were all plant-like.
C. Prokaryote cells have no nucleus.
D. They have membrane-bound organelles.

23. In which structure would you find a nucleus?

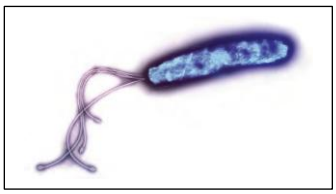
A. bacterial cell
B. plant cell
C. prokaryote
D. virus

24. What are the differences between prokaryotes and eukaryotes? Select all that apply.

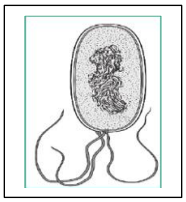
a) DNA
b) plasma membrane
c) nucleus
d) ribosomes
e) organelles

25. Which kind of cell is shown in the figure below?

Animal cell
Plant cell
Eukaryotic cell
Prokaryotic cell.



26. Identify the given organism



A. This organism is eukaryotic, because it has multiple flagellum.
B. This organism is prokaryotic, because it does not contain membrane-bound organelles.
C. This organism is eukaryotic, because it has a cell membrane.
E. This organism is prokaryotic, because it has ribosomes.

27. During their mission to planet Mars, astronauts have found material that might be a cell. Which of the following must the material have to be considered a cell?

a) The material must have a nucleus
b) The material must have mitochondria
c) The material must have a cell membrane
d) The material must have chloroplasts

28. If a microscope has a series of three lenses that magnify individually 5x, 5x, and 7x, what is the total magnification of the microscope?

a) 25X
b) 35X
c) 17X
d) 175X

Lesson 2: The Plasma Membrane

1. How is the plasma membrane of a cell organized?

A. one layer of phospholipids, through which proteins freely move

B. one layer of phospholipids, which are laid out end-to-end, with a hydrophobic tail touching a hydrophilic head

C. two layers of phospholipids, each of which has its hydrophilic side turned inward

D. two layers of phospholipids, with their polar hydrophilic heads facing away from each other

2. The plasma membrane has certain functions that help maintain the homeostasis of a cell.

i. It provides protection to the cell by prohibiting the entry of toxic or unwanted substances.

ii. The partially permeable nature of the membrane only allows specific ions and molecules to enter the cell.

iii. It prevents the exit of important or useful substances.

Which of these functions supports this claim?

a) i and ii only
b) i and iii only
c) ii and iii only
d) i, ii, iii

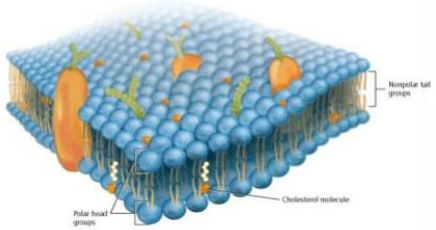
3. The image below shows the structure of the phospholipid bilayer. Each component of the bilayer has an important role in supporting cellular activities. What is the importance of cholesterol in this case?

A. It contributes to the fluidity of the plasma membrane by preventing the fatty acid tails of the phospholipid bilayer from sticking together.

B. It gives the cell its shape by anchoring to the cell's inner support structure.

C. It defines the cell's characteristics and helps cells identify chemical signals.

D. It moves needed substances or waste materials through the plasma membrane.



4. The above picture shows a phospholipid bilayer. What crucial functions do the nonpolar tails of the phospholipids have.

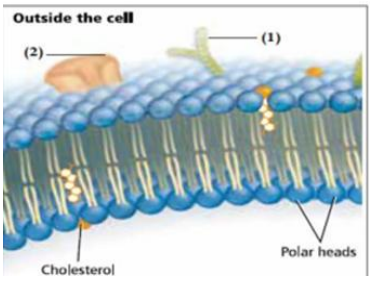
A) speed chemical reactions with enzymes

B) keep water-soluble substances from passing easily into the cell

C) allow water-soluble substances to pass easily into the cell

D) help encode genetic material

5. Which of the following represents the structures (1) and (2) shown in the below figure?



A. Vitamin chain and membrane protein

B. Nonpolar Tails and membrane protein

C. Cilia and Transport protein

D. Carbohydrate chain and membrane protein

6. A ____ contains polar and nonpolar ends, forming the plasma membrane.

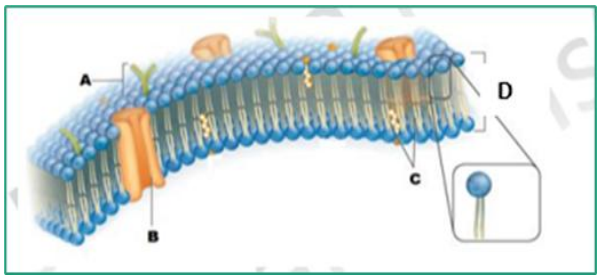
a) Microtubule
b) transport protein
c) cytoskeleton
d) phospholipid bilayer

7. **In the figure below, the fish net selectively captures fish while allowing water and other debris to pass through. Which of the following works Similarly?**

a. The plasma membrane
b. The cytoplasm
c. The Cytoskeleton
d. The nucleolus

8. **Which of the following represents the transport protein in the plasma membrane.**

a) A b) B
c) C d) D

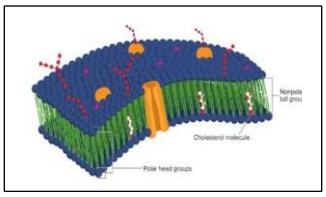


9. **Which of the following represents the phospholipid bilayer in the plasma membrane. (use above image)**

a)A b) B
c) C d) D

10. **Which macromolecule is responsible for the formation of the plasma membrane bilayer? Use the figure below to answer.**

a. Lipids
b. Carbohydrates
C. Nucleic acids
d. Proteins

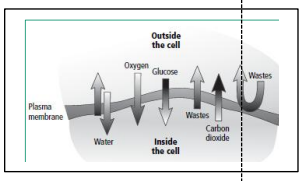


11. **What critical function does cholesterol serve in the body?**

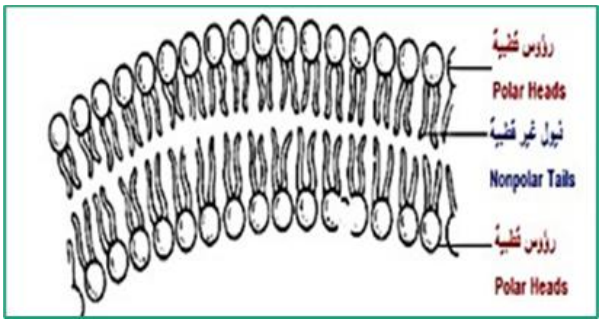
destroys the plasma membrane
binds fatty acid tails to water
disrupts homeostasis
increases fluidity of plasma membrane

12. **What characteristics of the plasma membrane is illustrated in this drawing?**

A selective permeability
B phospholipid bilayer
C fluid mosaic construction
D impermeability to water

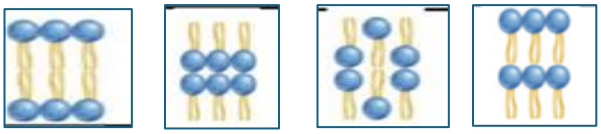


13. **Use the illustration below that shows the phospholipid bilayer of the cellular membrane to answer the question: Which is the effect of having the polar and nonpolar ends of phospholipid molecules?**



A. It allows transport proteins to move easily through the membrane
B. It helps the cell to maintain its characteristic shape
C. It makes more room inside the phospholipid bilayer
D. It controls the movement of substances across the membrane

14. **Which one is the best representing of the phospholipid bilayer of the plasma membrane ?**



15. **What is the definition of selective permeability?**

a) It is the property of the plasma membrane that allows it to control movement of substances into or out of the cell.
b) It moves needed substances or waste materials through the plasma membrane.
c) It is the process of maintaining balance

in an organism's internal environment.

d) It is layers composed of phospholipid molecules arranged with polar heads facing outside and non-polar tails facing the inside.

16. .....is a property of the plasma membrane that allows it to control what enters and leaves the cell.

17. Which cellular structure helps control what enters and leaves the cell?

a) cytoplasm
b) cytoskeleton
c) plasma membrane
d) nucleus

18. Materials can cross the plasma membrane through tunnels created by ____.

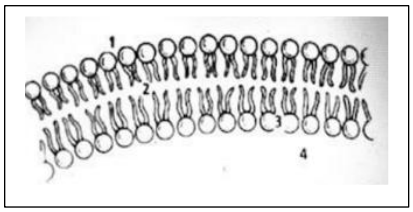
a) organelles
b) transport proteins
c) water molecules
d) glucose molecules

19. Why is the phospholipid bilayer critical to cell function?

a) It forms a shell around the cell nucleus.
b) Phospholipids allows water-soluble substances to pass easily into cell.
c) Transport proteins are blocked from entering plasma membrane.
d) Arrangement of phospholipids enables selective permeability.

20. Which number in the illustration represents the location where you would expect to find water-insoluble substances?

a) 1
b) 2
c) 3
d) 4



21. What is the function of a selectively permeable membrane?

a) provides alternative to phospholipid bilayer
b) prevents transport proteins from harming cell
c) controls what enters and leaves cell
d) blocks all water from entering cell

Lesson 3: Cellular Transport

1. Which of the following is not a main factor that affects the rate of diffusion?

a) conductivity
b) temperature
c) pressure
d) concentration

2. 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) motor protein
b) channel protein
c) receptor protein
d) carrier protein

3. A molecule needs to enter into the cell but cannot go through the plasma membrane because of its polarity. However, the molecule can bind to a protein and the protein changes shape to allow the particle to move through the membrane.

a) carrier
b) receptor
c) channel
d) motor

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

5. What describes transport proteins moving molecules across the plasma membrane?

a) Diffusion
b) dynamic equilibrium
c) facilitated diffusion
d) osmosis

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

a) transport proteins
b) polar heads
c) DNA
d) water molecules

7. Which of these describes continuous particle movement with no overall change in concentration?

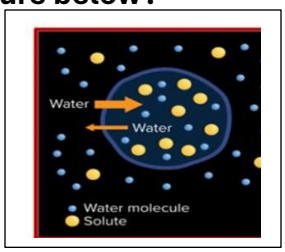
a) selective permeability
b) facilitated diffusion
c) osmosis
d) dynamic equilibrium

8. How do carrier proteins facilitate active transport?

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

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

A. Hypotonic
B. Isotonic
C. Hypertonic
D. No one of these

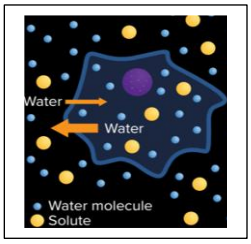


10. Which of the following solution would allow cells to retain their normal shapes?

A. Hypotonic
B. Isotonic
C. Hypertonic
D. When the concentration inside the cell is lower

11. The figure below shows an animal cell after being placed in a specific solution. Based on the figure, which of the following describes this solution?

A. Hypotonic
B. Isotonic
C. Osmotic pressure
D. Hypertonic

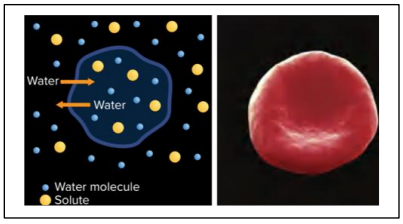


12. The diagram above represents a cell in water. Explain why more water is moving out of the cell than into the cell.

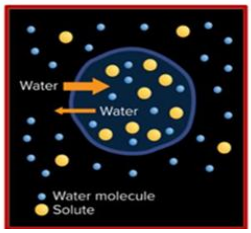
A. The concentration of solute in the cell is higher than it is outside the cell.
B. The concentration of water outside the cell is too great.
C. The concentration of solute outside the cell is higher than it is inside the cell.
D. The concentration of solute outside and inside are the same

13. The figure below shows a blood cell placed in a solution. Which of the following is the solution used?

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

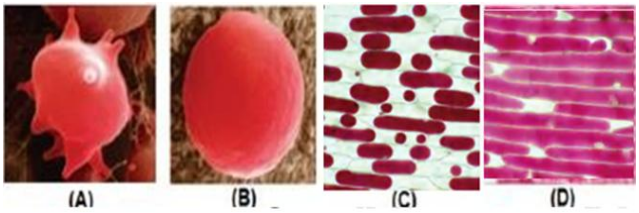


14. The animal cells below were placed in a hypotonic solution. What happened to the damaged cell?



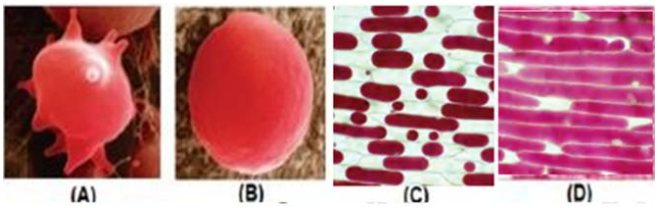
a) Osmosis was prevented in the cell.
b) Osmosis caused the cell to shrivel.
c) Osmotic pressure caused the cell to rupture.
d) The cell was damaged by bacteria.

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



a) (C), (D)
b) (C), (B)
c) (D), (A)
d) (A), (C)

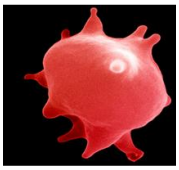
16. The figure below shows a group of cells placed in solutions of different concentrations. Which of the following refers to cells in a low concentrated solution?



a) (C), (D)
b) (B), (D)
c) (D), (A)
d) (C), (A)

17. 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



18. How could you prevent cells from bursting in an extremely hypotonic solution?

a) Allow water to increase osmotic pressure.
b) Decrease the concentration of solute outside cell.
c) Increase the concentration of solute outside the cell.
d) Wait for diffusion to reach equilibrium.

19.The condition of continuous, random movement of particles but no overall change in concentration of materials is called __.

22. The diffusion of water across the selectively permeable membrane of an alga cell is called.....

23. A pump located in a cell's plasma membrane transports sodium and.....

24. The spread of a drop of food dye throughout a glass of milk is called.....

25. Diffusion occurs when there is a net movement of particles from an area of.....concentration to an area of .....concentration.

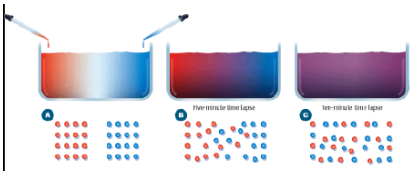
26. Which type of transport requires energy input in the cell

a) Osmosis
b) Simple diffusion
c) Facilitated diffusion
d) Active transport

27. Predict how oxygen crosses the plasma membrane if the concentration of oxygen is lower inside the cell than it is outside the cell.

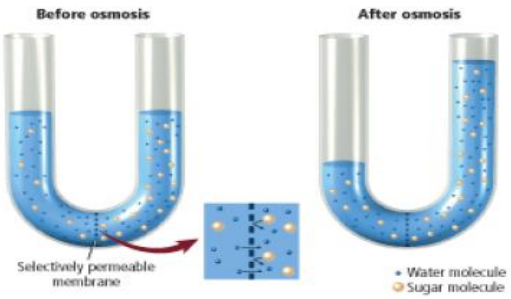
a) Oxygen enters the cell through channel proteins.
b) Oxygen leaves the cell through channel proteins.
c) Oxygen enters the cell through the plasma membrane.
d) Oxygen leaves the cell through the plasma membrane.

28. 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

29. 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

30. What is a significant difference of endocytosis and exocytosis?

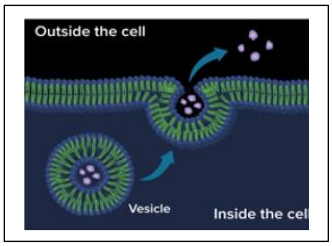
A) Exocytosis does not require energy input.
B) Endocytosis does not involve waste secretion.
C) Endocytosis does not require energy input.
D) Exocytosis does not maintain homeostasis.

31. Which of the following is not true of exocytosis?

a) results in hormone secretion
b) does not require energy input
c) allows waste matter to be expelled
d) occurs at the plasma membrane

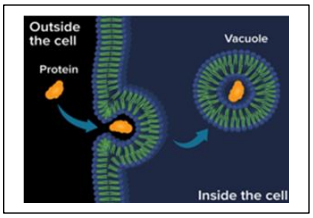
32. Which method of cellular transport can you see in the picture below?

a. Facilitative Diffusion
b. Osmosis
c. Exocytosis
d. Endocytosis

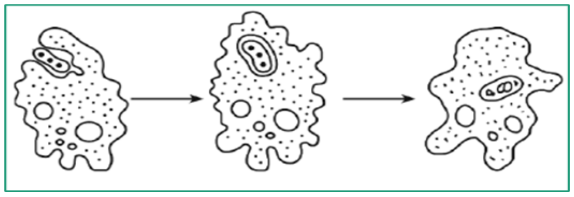


33. Which method of cellular transport can you see in the picture below?

a. Facilitative Diffusion
b. Osmosis
c. Exocytosis
d. Endocytosis



34. Different transport processes are used by organisms to carry materials into and out of their cells. Which transport mechanism is shown in the diagram above?



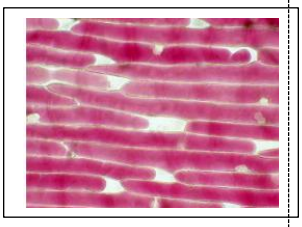
a) Exocytosis: bulk transport in which materials are transported out of the cell.
b) Facilitated diffusion: molecules moving along their concentration gradient with the help of transport proteins.
c) Endocytosis: bulk transport in which materials move into the cell.
d) Passive transport: molecules simply move along their concentration gradient.

35. What is the term that describes the net movement of particles from an area of higher concentration to an area of lower concentration?

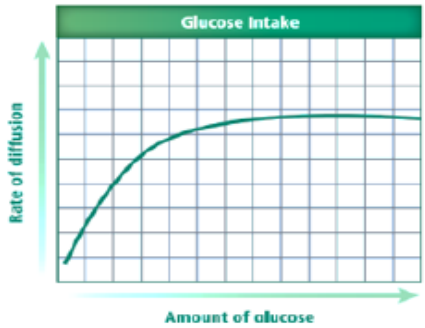
a) Osmosis
b) Diffusion
c) Active transport
d) Exocytosis

36. What type of solution are these cells in? What would be the net movement of water?

a) hypertonic, into the cell
b) hypertonic; out of the cell
c) hypotonic; into the cell
d) hypotonic; out of the cell

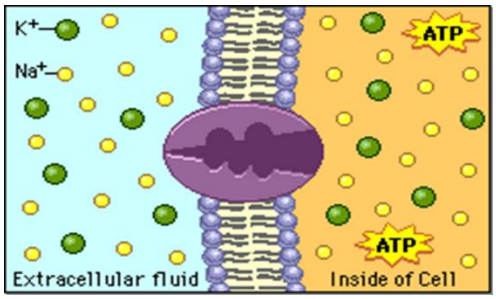


37. The graph below describes the relationship between the amount of glucose entering a cell and the rate at which the glucose enters the cell with the help of carrier proteins. The graph lime shows that as the amount of glucose increases, the diffusion rate increases until a maximum rate is reached. Which of the following is the correct reason for the stability of diffusion rate when higher amounts of glucose are reached?



a) Because there is no more carrier proteins to transport the glucose
b) Because the cell is unable to produce more energy required for diffusion
c) Because the cell cannot handle more glucose
d) Because the carrier proteins change their shapes

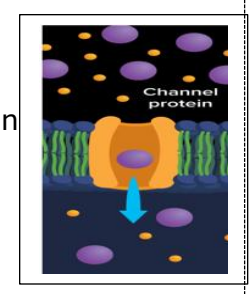
38. Some cells use elaborate pumping systems, such as the Na+/K+ ATPase pump shown below. Which of the following shows how this pump works to maintain the level of sodium ions (Na+) and potassium ions (K+) inside and outside the cell?



a) Transports 2(Na+) out of the cell and moves 3 (K+) into the cell
b) Transports 3 (Na+) Into the cell and moves 2 (K+) out of the cell
c) Transports 3 (Na+) out of the cell and moves 2 (K+) into the cell
d) Transports 2 (Na+) Into the cell and moves 3 (K+) out of the cell

39. Which of the following indicates the process shown in the figure below.

a) Diffusion
b) Exocytosis
c) Facilitated diffusion
d) Active transport



Lesson 4: Structures & Organelles

1. Why do many scientists think that prokaryotes are similar to the first organisms on Earth?

A. Prokaryote cells have a nucleus.
B. The first organisms were all plantlike.
C. Prokaryote cells have no nucleus.
D. They have membrane-bound organelles

2. On a laboratory exam, a student is asked to determine if the cells under a microscope are plant cells or animal cells. What might the student look for?

A. chloroplasts and a cell wall
B. ribosomes and vacuoles
C. a nucleus and ribosomes
D. a cell membrane and mitochondria

3. Science students in Alma's class are observing prepared slides of the cells of maple tree leaves and mammal skin cells. As they study the cells under the microscope's highest magnification, their teacher records their observations on the board. Which would be included in the teacher's list?

a) The leaf cells have green organelles called chloroplasts; the animal cells do not.
b) Both the animal and plant cells have an oval shape and are about the same size.
c) The skin cells have a nucleus, but the cells of the leaves have no nucleus.
d) Both types of cells have a membrane that is also surrounded by a cell wall.

4. What is the function of the nuclear envelope?

a) It stores genetic information for protein production.
b) It produces ribosomes.
c) It surrounds the nucleus by a double membrane.
d) It allows larger-sized substances to move in and out of the nucleus

5. The function of the nucleolus is to.....

a) produce ribosomes
b) store genetic information
c) surround the nucleus by a double membrane
d) allow substances to move in and out of the nucleus

6. **What is the function of the nuclear pores?**

a) They produce ribosomes.
b) They surround the nucleus by a double membrane.
c) They allow larger-sized substances to move in and out of the nucleus.
d) They store genetic information for protein production.

7. Where do light-dependent reactions take place?

a) cristae
b) stroma
c) grana
d) thylakoids

8. The stroma is the fluid-filled space where the .....take place.

a) chlorophyll intake
b) bond breaking reactions
c) light-dependent reactions
d) light-independent reactions

9. 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.

10. Vesicles that contain substances that digest excess or worn-out organelles and food particles are called.....

11. The main component for processing, transporting, and storing materials is called.....

a) a vacuole
b) the rough ER
c) the Golgi apparatus
d) a vesicle

12. The..... harness light energy and converts it into chemical energy. The..... convert fuel particles into usable energy for the cell.

13. Ribosomes are produced in the ..... and produce proteins in the.....

14. Which organelle produces protein for a cell?

a) ribosome
b) nucleus
c) endoplasmic reticulum
d) Golgi apparatus

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

a) vacuole
b) chloroplast
c) centriole
d) nucleolus

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

a) ribosome
b) vesicle
c) nucleus
d) mitochondria

17. Which organelle is present in a paramecium protozoan but absent in the cells of a strawberry plant?

a) microtubules
b) nucleus
c) cytoskeleton
d) cilia

18. The central structure that defines the cell is called the.....

19. A flu virus could easily infect a cell without the presence of.....

20. Vesicles that digest worn-out organelles or food particles are called ____.

A) lysosomes
B) centrioles
C) ribosomes
D) plasma membranes

21. Which of the following comparisons of animal and plant cells is NOT true?

a) Chloroplasts are found in plant cells but not in animal cells
b) Plant cells have a large vacuole while animal cells rarely have few vacuoles
c) Cellulose cell wall is found in plant cells but not in animal cells
d) Mitochondria are found in animal cells but not in plant cells

22. "Lysosomes play a key role in defending the cell against.....

A. Nutrient uptake
B. Pathogens and foreign invaders
C. Oxygen transportation
D. Genetic mutations

23. The ___ is a network of fibers that form a framework and anchor organelles

A) endoplasmic reticulum
B) cytoplasm
C) cytoskeleton
D) golgi apparatus

24. Which of the following organelle is matched with its correct role in the cell?

Nucleus: provides support to the cell
Mitochondria: the site of protein synthesis
Plasma membrane: controls the movement of substances into and out of the cells
Endoplasmic reticulum: forms a framework for the cell within the cytoplasm

25. Which of the following organelle is matched with its correct role in the cell?

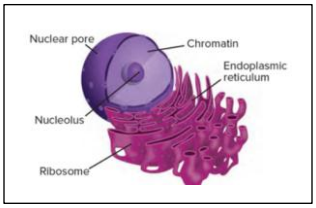
a) Mitochondria: are the site of protein synthesis
b) Nucleus: provides support to the cell
c) Ribosomes: makes energy available to the rest of the cell
d) Chloroplast: it is where photosynthesis takes place

26. Which of the following organelle is large in plant cell, but small or absent in animal cell

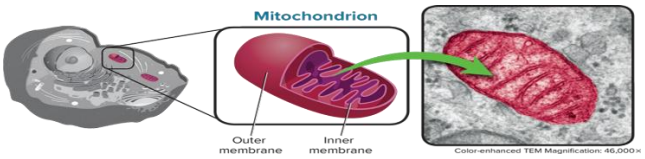
a) Vacuole
b) Chloroplast
c) Nucleus
d) Centriole

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

Ribosome
Nucleolus
chromatin
Endoplasmic reticulum

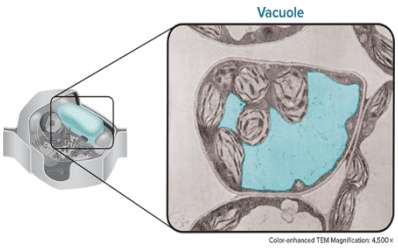


28. Observe the structure of this mitochondrion. Why is its inner membrane crucial for cell functioning?



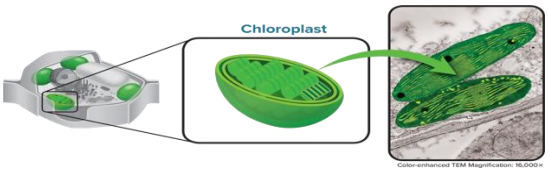
A) provides a large surface area
B) keeps sunlight from damaging cell
C) provides inflexible barrier on cell surface
D) promotes photosynthesis

29. The large compartment shown in the detailed image of this plant cell is a ___.



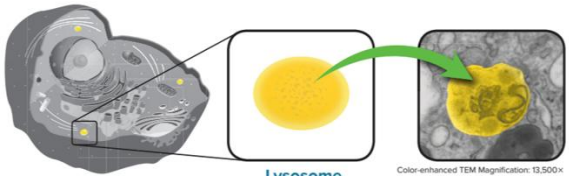
A) nucleus
B) vacuole
C) ribosome
D) plasma membrane

30. 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

31. Vesicles that digest worn-out organelles or food particles are called ____.



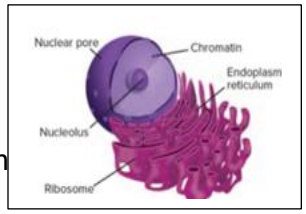
A) lysosomes
B) centrioles
C) ribosomes
D) plasma membranes

32. Which is not a component of the cytoskeleton?

a) Microtubule
b) Microfilament
c) Centriole
d) Cell wall

33. Which is the site of protein synthesis?

Nuclear pore
Nucleolus
chromatin
Endoplasmic reticulum



34. Which is not a characteristic of a typical plant cell?

A. contains chloroplasts
B. eventually loses cytoplasm
C. has a large central vacuole
D. surrounded by a cell wall

35. In which structure would you expect to find a cell wall?

a) Human skin cell
b) Cell from an oak tree
c) Blood cell from a cat
d) Liver cell from a mouse

36. A cell's genetic material is contained in the

A) plasma membrane
B) nucleus
C) unicellular bacteria
D) phospholipid bilayer

37. Which of the following is not a function of the Golgi apparatus?

a) modifies proteins
b) produces proteins
c) organizes where proteins are sent
d) packages proteins into vesicles

38. The semifluid environment inside the plasma membrane is called

A) endoplasmic reticulum
B) microtubules
C) Cytoplasm
D) mitochondria

Module: Introduction to plants

Lesson 2: Plant Structure & Function

1. Collenchyma, parenchyma, and sclerenchyma are examples of plant

A. cells.
B. fibers.
C. hormones.
D. tissues.

2. Sclerenchyma plant cells

A. are spherical in shape with thin cell walls.
B. have an elongated shape and can be stretched.
C. lack living components when they mature.
D. maintain the greatest variety of organelles.

3. What is the function of parenchyma cells?

A. accelerate plant growth in stems and roots
B. form wood to support the entire plant
C. provide support for surrounding cells
D. undergo cell division to help repair a plant

4. If a sunflower plant lost all of its collenchyma cells, it would

A. fall over.
B. lose petals.
C. stop growing.
D. turn brown.

5. If a sunflower plant lost all of its collenchyma cells, it would be unable to

A. absorb vital nutrients and minerals.
B. collect large quantities of water.
C. grow new cells on its stem and root tips.
D. support the weight of its flower.

6. Why are sclerenchyma cells useful for textile materials?

A. Their guard cells form durable tissues.
B. Rigid cell walls and fibers form durable tissues.
C. They perform most of the major cell functions.
D. Vascular cambium provides elastic fibers

7. Which from this function it is not related to parenchyma cells?

a) Storage
b) Photosynthesis
c) Support
d) Protection

8. What do you expect would happen to a sunflower plant if it lost all its collenchyma cells?

a) it will turn brown
b) it will lose its petals
c) it will fall over easily
d) it will stop growing

9. What is a distinguishing feature of sclerenchyma cells?

A. contain soft walls that can expand
B. lack cytoplasm and other living components
C. capable of photosynthesis and gas exchange
D. have a spherical shape

10. What type of plant cell would be useful for making textiles such as this ancient Egyptian sandal?

A. guard cells
B. parenchyma cells
C. sclerenchyma cells
D. cork cambium

11. Which type of cells provides fiber that humans use to make ropes and clothing?

a) cambium cells
b) mesophyll cells
c) sclerenchyma cells
d) trichome cells

12. Which plant cell type is mainly responsible for photosynthesis and storage?

A. Collenchyma
B. Parenchyma
C. Sclerenchyma
D. Xylem

13. What is one of the main functions of parenchyma cells?

A. Transport of materials
B. Providing flexibility
C. Photosynthesis and gas exchange
D. Forming thick walls for support

14. Which type of plant cell provides flexibility and support for surrounding tissues?

A. Parenchyma
B. Collenchyma
C. Sclerenchyma
D. Phloem

15. Which cell type provides strong support and helps in transport of materials?

A. Parenchyma
B. Collenchyma
C. Sclerenchyma
D. Epidermis

16. Which two plant cell types are involved in tissue repair and replacement?

A. Parenchyma and Collenchyma
B. Collenchyma and Sclerenchyma
C. Parenchyma and Sclerenchyma
D. Xylem and Phloem

17. Which statement about Sclerenchyma cells is correct?

A. They are responsible for gas exchange.
B. They are living cells with thin walls.
C. They provide rigid support and transport materials.
D. They store food and perform photosynthesis.

18. Which plant cell type has thin cell walls and large vacuoles?

A. Collenchyma
B. Parenchyma
C. Sclerenchyma
D. Xylem

19. In which type of plant cell are the walls thickened mainly with cellulose to provide flexibility without breaking?

A. Parenchyma
B. Collenchyma
C. Sclerenchyma
D. Meristematic cells