

*Biology: Science for Life with Physiology, 4e (Belk)*

**Chapter 2 Are We Alone in the Universe? Water, Biochemistry, and Cells**

1) Each of the following is a feature of all known living things EXCEPT

- A) genes made from proteins.
- B) growth.
- C) homeostasis.
- D) metabolism.

Answer: A

Diff: 1

Topic: 2.1

Skill: Factual

2) Which term best describes the water in a sugar-water solution?

- A) product
- B) reactant
- C) solute
- D) solvent

Answer: D

Diff: 1

Topic: 2.1

Skill: Conceptual

3) Which term best describes the sugar in a sugar-water solution?

- A) product
- B) reactant
- C) solute
- D) solvent

Answer: C

Diff: 1

Topic: 2.1

Skill: Conceptual

4) Because the electrons in a water molecule are shared unequally between hydrogen and oxygen, water is said to be

- A) hydrophobic.
- B) ionic.
- C) noncovalent.
- D) polar.

Answer: D

Diff: 2

Topic: 2.1

Skill: Factual

5) Which of the following are found in the nucleus of an atom?

- A) electrons and neutrons
- B) neutrons and protons
- C) protons and electrons
- D) neutrons, electrons, and protons

Answer: B

Diff: 1

Topic: 2.1

Skill: Factual

6) Nonliving things include fire, water, and viruses. Many features of living things are also found in nonliving things. Of the following features, which is most likely to be absent in nonliving things?

- A) consumption of energy-containing molecules
- B) homeostasis
- C) reproduction
- D) response to external stimuli

Answer: B

Diff: 2

Topic: 2.1

Skill: Conceptual

7) An atom will be least likely to form chemical bonds with other atoms when

- A) the number of protons equals the number of electrons.
- B) the number of protons equals the number of neutrons.
- C) there is only one electron in the valence shell.
- D) the valence shell is full of electrons.

Answer: D

Diff: 2

Topic: 2.1

Skill: Conceptual

8) What type of chemical bond connects the complementary strands of a DNA molecule to each other?

- A) hydrogen bonds
- B) ionic bonds
- C) nonpolar covalent bonds
- D) polar covalent bonds

Answer: A

Diff: 1

Topic: 2.1

Skill: Factual

9) If life on Mars is fundamentally like life on Earth, its macromolecules will be based on which element?

- A) carbon
- B) hydrogen
- C) nitrogen
- D) oxygen

Answer: A

Diff: 1

Topic: 2.1

Skill: Conceptual

10) Imagine a newly discovered biological molecule that is mostly hydrophobic in its structure. This new molecule will most likely be classified as a

- A) carbohydrate.
- B) lipid.
- C) nucleic acid.
- D) protein.

Answer: B

Diff: 2

Topic: 2.1

Skill: Conceptual

11) Which of the following pairs of molecules can be held together by a hydrogen bond?

- A) one polar molecule and one nonpolar molecule
- B) two ions
- C) two nonpolar molecules
- D) two polar molecules

Answer: D

Diff: 2

Topic: 2.1

Skill: Conceptual

12) What kind of bond holds the atoms of a single water molecule together?

- A) hydrogen bonds
- B) ionic bonds
- C) covalent bonds that are not polar
- D) covalent bonds that are polar

Answer: D

Diff: 2

Topic: 2.1

Skill: Factual

13) What kind of bond holds two water molecules to each other?

- A) hydrogen bonds
- B) ionic bonds
- C) nonpolar covalent bonds
- D) polar covalent bonds

Answer: A

Diff: 2

Topic: 2.1

Skill: Factual

14) In general, what makes one kind of amino acid different from other amino acids?

- A) the amino group
- B) the carboxyl group
- C) the side group
- D) the type of bonds

Answer: C

Diff: 1

Topic: 2.1

Skill: Factual

15) Which macromolecule has a sugar-phosphate backbone?

- A) lipid
- B) nucleic acid
- C) protein
- D) polysaccharide

Answer: B

Diff: 1

Topic: 2.1

Skill: Factual

16) The atomic number of an element refers to the number of \_\_\_\_\_ in one atom of that element.

- A) electrons
- B) neutrons
- C) protons
- D) protons plus neutrons

Answer: C

Diff: 1

Topic: 2.1

Skill: Factual

17) How do the concentrations of  $H^+$  and  $OH^-$  compare to each other in an acidic solution?

- A) The concentration of  $H^+$  is higher.
- B) The concentration of  $H^+$  is lower.
- C) The concentration of  $H^+$  is the same.
- D) Acidic solutions do not contain  $H^+$ .

Answer: A

Diff: 1

Topic: 2.1

Skill: Conceptual

18) What is the pH of a neutral solution?

- A) 1
- B) 5
- C) 7
- D) 9

Answer: C

Diff: 1

Topic: 2.1

Skill: Factual

19) A molecule that is composed only of chains and rings of hydrogen and carbon is called a

- A) carbohydrate.
- B) hydrocarbon.
- C) polypeptide.
- D) polysaccharide.

Answer: B

Diff: 1

Topic: 2.1

Skill: Factual

20) What is the name of a molecule composed of one or more sugars?

- A) carbohydrate
- B) lipid
- C) nucleic acid
- D) polypeptide

Answer: A

Diff: 1

Topic: 2.1

Skill: Factual

21) Polysaccharides are polymers of

- A) amino acids.
- B) fatty acids.
- C) nucleotides.
- D) sugars.

Answer: D

Diff: 1

Topic: 2.1

Skill: Factual

22) Proteins are polymers of

- A) amino acids.
- B) fatty acids.
- C) nucleotides.
- D) sugars.

Answer: A

Diff: 1

Topic: 2.1

Skill: Factual

23) Nucleic acids are polymers of

- A) amino acids.
- B) fatty acids.
- C) nucleotides.
- D) sugars.

Answer: C

Diff: 1

Topic: 2.1

Skill: Factual

24) Which of the following is a lipid?

- A) cellulose
- B) cholesterol
- C) sucrose
- D) ribonucleic acid

Answer: B

Diff: 1

Topic: 2.1

Skill: Factual

25) What is the name for the ability of living things to maintain a relatively constant internal environment?

- A) cellular respiration
- B) homeostasis
- C) metabolism
- D) stimulus-response

Answer: B

Diff: 1

Topic: 2.1

Skill: Factual

26) Sodium chloride is composed of molecules that are stable when dry. In the presence of water, however, the atoms that compose the molecules separate from each other. What type of chemical bond holds the dry substance together?

- A) hydrogen bonds
- B) ionic bonds
- C) nonpolar covalent bonds
- D) polar covalent bonds

Answer: B

Diff: 2

Topic: 2.1

Skill: Conceptual

27) Cholesterol is classified as a lipid because it contains a large proportion of

- A) carbohydrates.
- B) phosphates.
- C) glycerol.
- D) hydrocarbons.

Answer: D

Diff: 1

Topic: 2.1

Skill: Conceptual

28) Enzymes are

- A) carbohydrates.
- B) lipids.
- C) nucleic acids.
- D) proteins.

Answer: D

Diff: 1

Topic: 2.1

Skill: Factual

29) The \_\_\_\_\_ of an organism is defined as all the chemical processes that occur in the cells of that organism.

Answer: metabolism

Diff: 1

Topic: 2.1

Skill: Factual

30) \_\_\_\_\_ is the ability of living things to maintain a relatively constant internal environment even when the external environment is changing.

Answer: Homeostasis

Diff: 1

Topic: 2.1

Skill: Factual

31) \_\_\_\_\_ are the smallest units into which an element can be broken down.

Answer: Atoms

Diff: 1

Topic: 2.1

Skill: Factual

32) Proteins are composed of monomer subunits called \_\_\_\_\_ (two words).

Answer: amino acids

Diff: 1

Topic: 2.1

Skill: Factual

33) Which of the following is considered part of a life-form's metabolism?

- A) secretion of wastes
- B) growth and development
- C) responses to external stimuli
- D) reproduction

Answer: A

Diff: 1

Topic: 2.1

Skill: Factual

34) Which of the following is an element?

- A) water
- B) methane
- C) hydrogen
- D) carbon dioxide

Answer: C

Diff: 1

Topic: 2.1

Skill: Factual

35) Protons have a \_\_\_\_\_ charge and, collectively, give an element its \_\_\_\_\_.

- A) negative; polarity
- B) positive; atomic number
- C) negative; electronegativity
- D) positive; ionic charge

Answer: B

Diff: 1

Topic: 2.1

Skill: Factual

36) Which of the following is nonpolar?

- A) a positive ion
- B) a negative ion
- C) a neutral ion
- D) a molecule with no partial charges

Answer: D

Diff: 1

Topic: 2.1

Skill: Conceptual

37) Oxygen is highly electronegative, meaning that it

- A) pulls electrons toward itself.
- B) is nonpolar.
- C) repels electrons away from its nucleus and into the outermost electron shell.
- D) discharges electrons readily out of the atom.

Answer: A

Diff: 1

Topic: 2.1

Skill: Factual



38) A solution with a pH of 2 has an  $H^+$  ion concentration that is \_\_\_\_\_ than a solution with a pH of 4.

- A) 2 times higher
- B) 10 times lower
- C) 100 times higher
- D) 1000 times lower

Answer: C

Diff: 3

Topic: 2.1

Skill: Applied

39) Which of the following has the lowest  $OH^-$  concentration?

- A) baking soda
- B) pure water
- C) coffee
- D) battery acid

Answer: D

Diff: 3

Topic: 2.1

Skill: Conceptual

40) Which pH represents an equal number of  $H^+$  and  $OH^-$  ions?

- A) 1
- B) 5
- C) 7
- D) 10

Answer: C

Diff: 1

Topic: 2.1

Skill: Factual

41) Which of the following could accept one (and only one) electron?

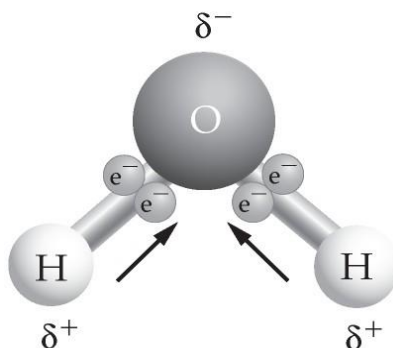
- A) carbon (atomic number = 6)
- B) nitrogen (atomic number = 7)
- C) oxygen (atomic number = 8)
- D) hydrogen (atomic number = 1)

Answer: D

Diff: 3

Topic: 2.1

Skill: Applied



42) Use the figure to answer the following question. If two or more of these molecules are in proximity to one another, how will they bond together?

- A) hydrogen bonding, with two hydrogen atoms bonded together
- B) covalent bonding, with two oxygen atoms bonded together
- C) hydrogen bonding, with a hydrogen atom bonded to an oxygen atom
- D) ionic bonding, with a hydrogen ion bonded to an oxygen atom

Answer: C

Diff: 2

Topic: 2.1

Skill: Applied

43) Which organelle contains digestive enzymes that degrade a variety of macromolecules?

- A) chloroplast
- B) endoplasmic reticulum
- C) lysosome
- D) mitochondrion

Answer: C

Diff: 1

Topic: 2.2

Skill: Factual

44) Which organelle is found in plant cells but not in animal cells?

- A) chloroplast
- B) endoplasmic reticulum
- C) centriole
- D) mitochondrion

Answer: A

Diff: 2

Topic: 2.2

Skill: Factual

45) Which organelle performs photosynthesis?

- A) chloroplast
- B) Golgi apparatus
- C) lysosome
- D) mitochondrion

Answer: A

Diff: 1

Topic: 2.2

Skill: Factual

46) Which organelle performs cellular respiration?

- A) endoplasmic reticulum
- B) Golgi apparatus
- C) lysosome
- D) mitochondrion

Answer: D

Diff: 1

Topic: 2.2

Skill: Factual

47) Cells contain proteins that help transport substances from the exterior to the interior of the cell. Where are these proteins found?

- A) Golgi apparatus
- B) lysosome
- C) mitochondrion
- D) plasma membrane

Answer: D

Diff: 2

Topic: 2.2

Skill: Conceptual

48) Which organelle is represented by a network of membranes involved in the production of proteins?

- A) chloroplast
- B) endoplasmic reticulum
- C) lysosome
- D) nucleus

Answer: B

Diff: 1

Topic: 2.2

Skill: Factual

49) Which organelle is a stack of membranous sacs that are involved in sorting proteins to their proper cellular location?

- A) centriole
- B) endoplasmic reticulum
- C) Golgi apparatus
- D) lysosome

Answer: C

Diff: 1

Topic: 2.2

Skill: Factual

50) Which cell component is composed of microtubules and helps move chromosomes around during cell division?

- A) centriole
- B) chromatin
- C) cytoskeletal element
- D) nucleolus

Answer: A

Diff: 1

Topic: 2.2

Skill: Factual

51) Microtubules, microfilaments, and intermediate filaments compose what part of a cell?

- A) centriole
- B) cholesterol
- C) chromatin
- D) cytoskeletal elements

Answer: D

Diff: 1

Topic: 2.2

Skill: Factual

52) What kind of molecule forms a bilayer that is the basis for all cellular membranes?

- A) carbohydrate
- B) cholesterol
- C) phospholipid
- D) protein

Answer: C

Diff: 1

Topic: 2.2

Skill: Factual

53) In what unit of a eukaryotic cell are ribosomes made?

- A) endoplasmic reticulum
- B) Golgi apparatus
- C) lysosome
- D) nucleolus

Answer: D

Diff: 1

Topic: 2.2

Skill: Factual

54) Which feature is found in both prokaryotic and eukaryotic cells?

- A) mitochondrion
- B) Golgi body
- C) DNA
- D) centriole

Answer: C

Diff: 1

Topic: 2.2

Skill: Factual

55) According to the theory of evolution, which states that all life-forms on Earth arose from a common ancestor, all living organisms

- A) share a common organic chemistry.
- B) have DNA within their nucleus.
- C) exhibit the same basic cell wall.
- D) perform the same mode of reproduction.

Answer: A

Diff: 2

Topic: 2.2

Skill: Conceptual

56) The internal membrane-bound compartments found in eukaryotic cells are called \_\_\_\_\_.

Answer: organelles

Diff: 1

Topic: 2.2

Skill: Factual

57) The \_\_\_\_\_ (two words) defines the outer boundary of all cells, separating the cell's contents from its environment.

Answer: plasma membrane

Diff: 1

Topic: 2.2

Skill: Factual

58) Proteins in cells are assembled on workbench-like structures called \_\_\_\_\_.

Answer: ribosomes

Diff: 1

Topic: 2.2

Skill: Factual

59) Inside a eukaryotic cell, the organelles are located within a watery matrix called the \_\_\_\_\_.

Answer: cytosol

Diff: 1

Topic: 2.2

Skill: Factual

60) The \_\_\_\_\_ is the compartment in a eukaryotic cell that stores DNA in the form of chromatin.

Answer: nucleus

Diff: 2

Topic: 2.2

Skill: Factual

61) Prokaryotic cells have

- A) a nucleus.
- B) endoplasmic reticulum.
- C) Golgi apparatus.
- D) a cell wall.

Answer: D

Diff: 1

Topic: 2.2

Skill: Factual

62) The purported fossils in meteorite ALH84001 resemble modern prokaryotes called

- A) nanobacteria.
- B) amoebas.
- C) fungi.
- D) nucleoids.

Answer: A

Diff: 2

Topic: 2.2

Skill: Factual

63) Scientists believe that the first prokaryotes on Earth arose over \_\_\_\_\_ years ago, and the first eukaryotes arose about \_\_\_\_\_ years later.

- A) 3.5 million; 1.7 million
- B) 1.7 million; 3.5 million
- C) 3.5 billion; 1.7 billion
- D) 1.7 billion; 3.5 billion

Answer: C

Diff: 1

Topic: 2.2

Skill: Factual

64) Prokaryotic cells are generally \_\_\_\_\_ the diameter of eukaryotic cells.

- A) twice
- B) one-half
- C) one-tenth
- D) one-thousandth

Answer: C

Diff: 3

Topic: 2.2

Skill: Factual

65) The plasma membrane of a photosynthetic eukaryotic cell

- A) converts carbon dioxide and water into sugars.
- B) isolates the cell's contents from the external environment.
- C) controls protein synthesis in the cell.
- D) is composed of cellulose.

Answer: B

Diff: 2

Topic: 2.2

Skill: Conceptual

- 66) The reactions of cellular respiration occur in the  
A) nucleolus of the nucleus.  
B) ribosomes of the rough endoplasmic reticulum.  
C) matrix of the mitochondria.  
D) hydrophobic core of the outermost cell plasma membrane.

Answer: C

Diff: 3

Topic: 2.2

Skill: Factual

- 67) The liquid interior of the chloroplast is called the  
A) centriole.  
B) chromatin.  
C) Golgi apparatus.  
D) stroma.

Answer: D

Diff: 2

Topic: 2.2

Skill: Factual

- 68) The antibiotic streptomycin prevents protein synthesis in prokaryotes. Which cell component is the most likely target of this antibiotic?

- A) ribosome  
B) cell membrane  
C) Golgi apparatus  
D) cell wall

Answer: A

Diff: 3

Topic: 2.2

Skill: Applied

- 69) Assume that a plant is suffering from drought and is beginning to wilt. Which cell component is most likely being affected, and what type of molecule is being lost from this structure?

- A) endoplasmic reticulum; protein  
B) Golgi apparatus; water  
C) lysosome; enzymes  
D) vacuole; water

Answer: D

Diff: 1

Topic: 2.2

Skill: Conceptual

- 70) Cell membranes are \_\_\_\_\_, which means that they allow certain molecules to pass through while preventing the passage of other molecules.

Answer: semipermeable

Diff: 1

Topic: 2.2

Skill: Factual

71) Mitochondria convert food energy into a high-energy molecule that is directly usable by the cell, called \_\_\_\_\_.

Answer: adenosine triphosphate

Diff: 2

Topic: 2.2

Skill: Factual

72) Which organelle in a scavenging white blood cell would break down bacteria that had entered the body?

Answer: lysosome

Diff: 1

Topic: 2.2

Skill: Factual

73) The \_\_\_\_\_ is the fundamental structural unit of life on Earth.

Answer: cell

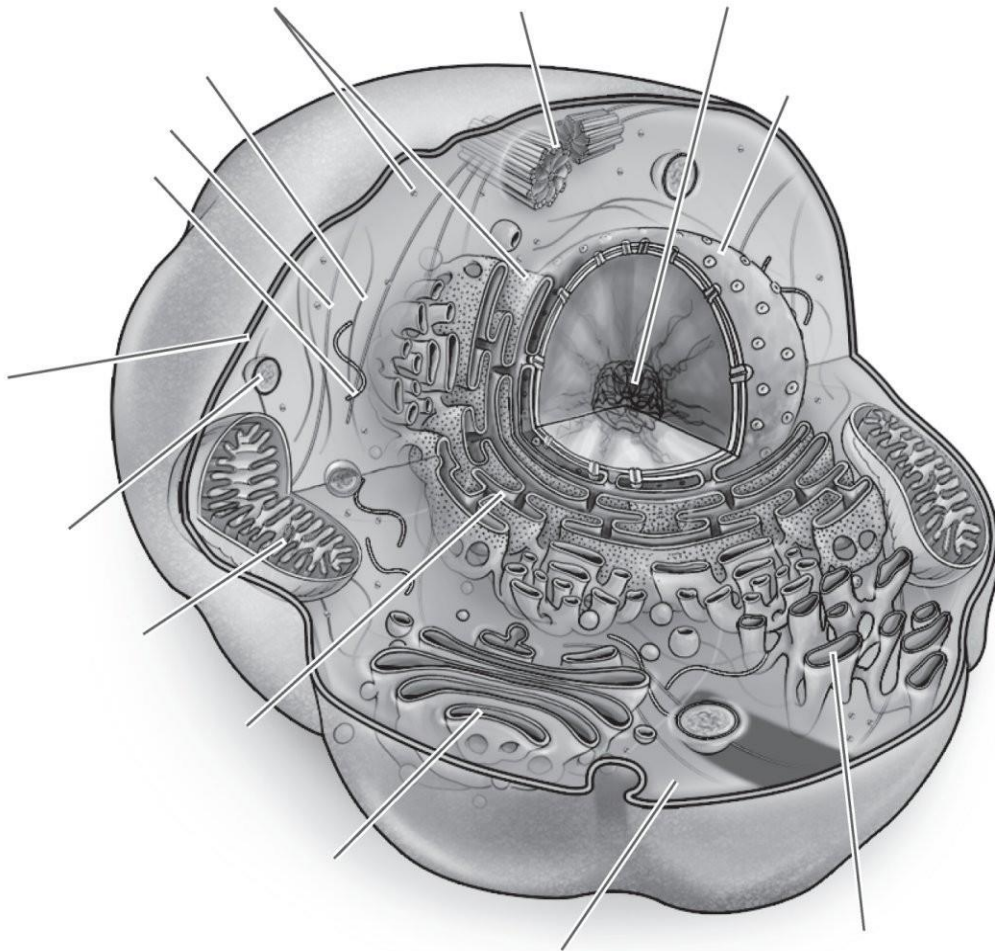
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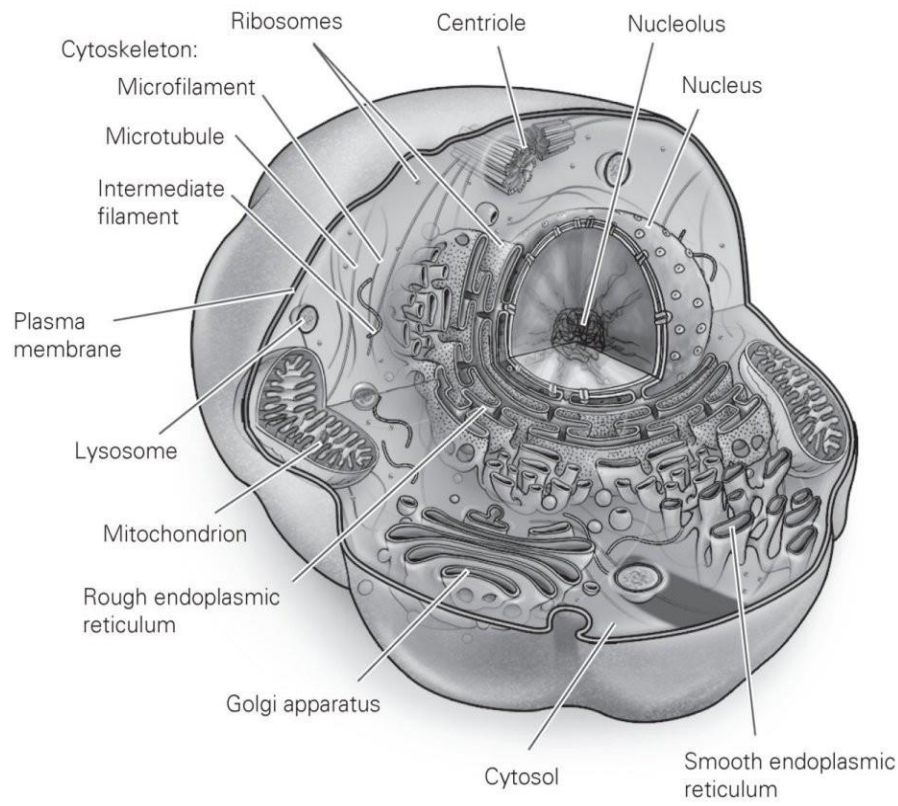
Skill: Factual



74) Label the parts of the animal cell.



Answer:

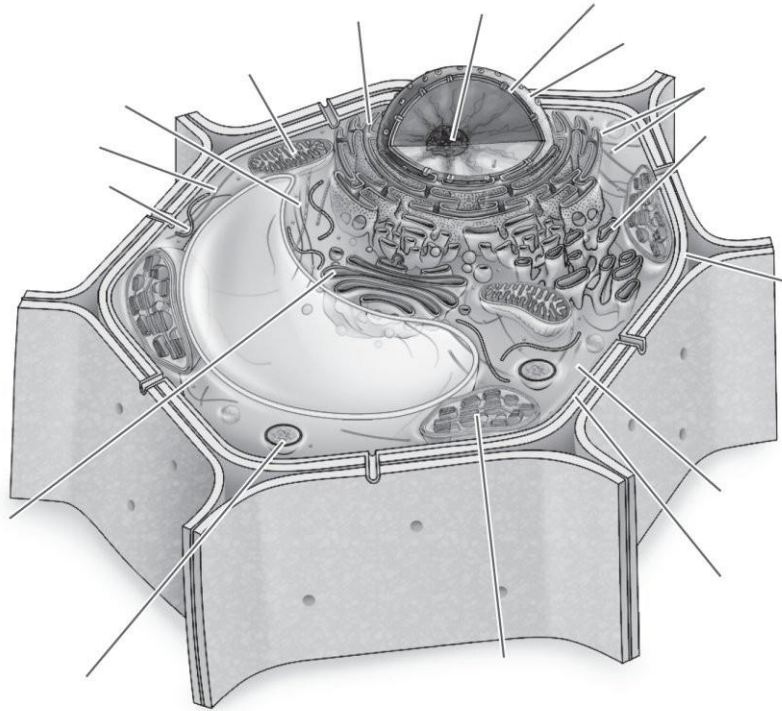


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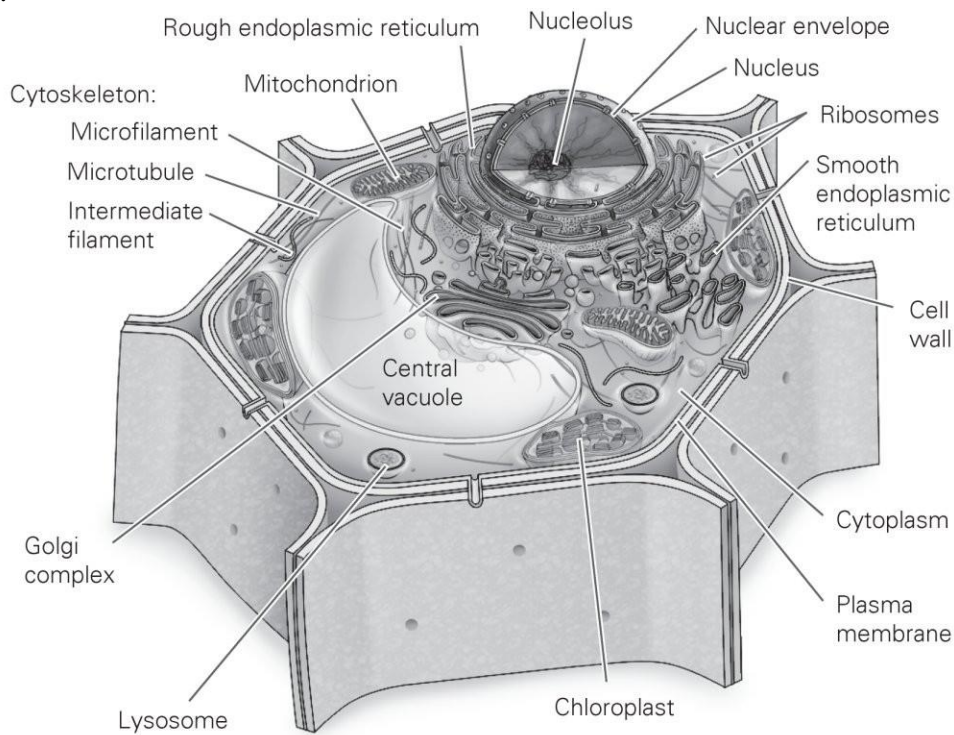
Topic: 2.2

Skill: Factual

75) Label the parts of the plant cell.



Answer:



Diff: 2

Topic: 2.2

Skill: Factual