

# Chapter 6 A Tour of the Cell

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This chapter is a preview of those to follow. Therefore, many of the questions take a rather holistic approach. Questions in the new edition reflect additions to the chapter and an increase of Application/Analysis and Synthesis/Evaluation questions. Where possible, some reflect integration with prior chapters on macromolecules.

## Multiple-Choice Questions

- 1) When biologists wish to study the internal ultrastructure of cells, they most likely would use
- A) a light microscope.
  - B) a scanning electron microscope.
  - C) a transmission electronic microscope.
  - D) A and B
  - E) B and C

Answer: C

Topic: Concept 6.1

Skill: Knowledge/Comprehension

- 2) The advantage of light microscopy over electron microscopy is that
- A) light microscopy provides for higher magnification than electron microscopy.
  - B) light microscopy provides for higher resolving power than electron microscopy.
  - C) light microscopy allows one to view dynamic processes in living cells.
  - D) A and B
  - E) B and C

Answer: C

Topic: Concept 6.1

Skill: Knowledge/Comprehension

- 3) A primary objective of cell fractionation is to
- A) view the structure of cell membranes.
  - B) identify the enzymes outside the organelles.
  - C) determine the size of various organelles.
  - D) separate the major organelles so that their particular functions can be determined.
  - E) crack the cell wall so the cytoplasmic contents can be released.

Answer: D

Topic: Concept 6.1

Skill: Knowledge/Comprehension

- 4) In the fractionation of homogenized cells using centrifugation, the primary factor that determines whether a specific cellular component ends up in the supernatant or the pellet is
- A) the relative solubility of the component.
  - B) the size and weight of the component.
  - C) the percentage of carbohydrates in the component.
  - D) the number of enzymes in the fraction.
  - E) the presence or absence of lipids in the component.

Answer: B

Topic: Concept 6.1

Skill: Knowledge/Comprehension

- 5) Which of the following *correctly* lists the order in which cellular components will be found in the pellet when homogenized cells are treated with increasingly rapid spins in a centrifuge?
- A) ribosomes, nucleus, mitochondria
  - B) chloroplasts, ribosomes, vacuoles
  - C) nucleus, ribosomes, chloroplasts
  - D) vacuoles, ribosomes, nucleus
  - E) nucleus, mitochondria, ribosomes

Answer: E

Topic: Concept 6.1

Skill: Application/Analysis

- 6) Quantum dots are small (15–30 nm diameter), bright particles visible using light microscopy. If the dots can be specifically bound to individual proteins on a plasma membrane of a cell, which of the following *correctly* describes the advantage of using quantum dots in examining proteins?
- A) The dots permit the position of the proteins to be determined more precisely.
  - B) The dots permit the average distance between the proteins to be determined more precisely.
  - C) The dots permit the size of the proteins to be determined more precisely.
  - D) The dots permit the motion of the proteins to be determined more precisely.
  - E) The dots permit visualization of proteins interacting with lipids.

Answer: D

Topic: Concept 6.1

Skill: Application/Analysis

- 7) If a modern electron microscope (TEM) can resolve biological images to the nanometer level, as opposed to the best light microscope, this is due to which of the following?
- A) The focal length of the electron microscope is significantly longer.
  - B) Contrast is enhanced by staining with atoms of heavy metal.
  - C) Electron beams have much shorter wavelengths than visible light.
  - D) The electron microscope has much greater ratio of image size to real size.
  - E) The electron microscope cannot image whole cells at one time.

Answer: C

Topic: Concept 6.1

Skill: Application/Analysis

- 8) A biologist is studying kidney tubules in small mammals. She wants specifically to examine the juxtaposition of different types of cells in these structures. The cells in question can be distinguished by external shape, size, and 3-dimensional characteristics. Which would be the optimum method for her study?
- A) transmission electron microscopy
  - B) cell fractionation
  - C) light microscopy using stains specific to kidney function
  - D) light microscopy using living unstained material
  - E) scanning electron microscopy

Answer: E

Topic: Concept 6.1

Skill: Synthesis/Evaluation

- 9) A newspaper ad for a local toy store indicates that a very inexpensive microscope available for a small child is able to magnify specimens nearly as much as the much more costly microscope available in your college lab. What is the primary reason for the price difference?
- A) The ad agency is misrepresenting the ability of the toy microscope to magnify.
  - B) The toy microscope does not have the same fine control for focus of the specimen.
  - C) The toy microscope magnifies a good deal, but has low resolution and therefore poor quality images.
  - D) The college microscope produces greater contrast in the specimens.
  - E) The toy microscope usually uses a different wavelength of light source.

Answer: C

Topic: Concept 6.1

Skill: Application/Analysis

- 10) Why is it important to know what microscopy method was used to prepare the images you wish to study?
- A) so that you can judge whether the images you are seeing are of cells or of organelles
  - B) so that you can make a judgment about the likelihood of artifacts having been introduced in the preparation
  - C) so that you can decide whether the image is actually of the size described
  - D) so that you can know whether to view the image in color or not
  - E) so that you can interpret the correct biochemical process that is occurring

Answer: B

Topic: Concept 6.1

Skill: Application/Analysis

- 11) All of the following are part of a prokaryotic cell *except*
- A) DNA.
  - B) a cell wall.
  - C) a plasma membrane.
  - D) ribosomes.
  - E) an endoplasmic reticulum.

Answer: E

Topic: Concept 6.2

Skill: Knowledge/Comprehension

- 12) The volume enclosed by the plasma membrane of plant cells is often much larger than the corresponding volume in animal cells. The most reasonable explanation for this observation is that
- A) plant cells are capable of having a much higher surface-to-volume ratio than animal cells.
  - B) plant cells have a much more highly convoluted (folded) plasma membrane than animal cells.
  - C) plant cells contain a large vacuole that reduces the volume of the cytoplasm.
  - D) animal cells are more spherical, while plant cells are elongated.
  - E) the basic functions of plant cells are very different from those of animal cells.

Answer: C

Topic: Concept 6.2

Skill: Synthesis/Evaluation

- 13) A mycoplasma is an organism with a diameter between 0.1 and 1.0  $\mu\text{m}$ . What does its size tell you about how it might be classified?
- A) It must be a single celled protist.
  - B) It must be a single celled fungus.
  - C) It could be almost any typical bacterium.
  - D) It could be a typical virus.
  - E) It could be a very small bacterium.

Answer: E

Topic: Concept 6.2

Skill: Application/Analysis

- 14) Which of the following is a major cause of the size limits for certain types of cells?
- A) the evolution of larger cells after the evolution of smaller cells
  - B) the difference in plasma membranes between prokaryotes and eukaryotes
  - C) the evolution of eukaryotes after the evolution of prokaryotes
  - D) the need for a surface area of sufficient area to allow the cell's function
  - E) the observation that longer cells usually have greater cell volume

Answer: D

Topic: Concept 6.2

Skill: Knowledge/Comprehension

- 15) Large numbers of ribosomes are present in cells that specialize in producing which of the following molecules?
- A) lipids
  - B) starches
  - C) proteins
  - D) steroids
  - E) glucose

Answer: C

Topic: Concept 6.3

Skill: Knowledge/Comprehension

- 16) The nuclear lamina is an array of filaments on the inner side of the nuclear membrane. If a method were found that could cause the lamina to fall into disarray, what would you expect to be the most likely consequence?
- A) the loss of all nuclear function
  - B) the inability of the cell to withstand enzymatic digestion
  - C) a change in the shape of the nucleus
  - D) failure of chromosomes to carry genetic information
  - E) inability of the nucleus to keep out destructive chemicals

Answer: C

Topic: Concept 6.3

Skill: Synthesis/Evaluation

- 17) Recent evidence shows that individual chromosomes occupy fairly defined territories within the nucleus. Given the structure and location of the following parts of the nucleus, which would be more probably involved in chromosome location?
- A) nuclear pores
  - B) the nucleolus
  - C) the outer lipid bilayer
  - D) the nuclear lamina
  - E) the nuclear matrix

Answer: E

Topic: Concept 6.3

Skill: Synthesis/Evaluation

- 18) Under which of the following conditions would you expect to find a cell with a predominance of free ribosomes?
- A) a cell that is secreting proteins
  - B) a cell that is producing cytoplasmic enzymes
  - C) a cell that is constructing its cell wall or extracellular matrix
  - D) a cell that is digesting food particles
  - E) a cell that is enlarging its vacuole

Answer: B

Topic: Concepts 6.3, 6.4

Skill: Application/Analysis

- 19) Which type of organelle is primarily involved in the synthesis of oils, phospholipids, and steroids?
- A) ribosome
  - B) lysosome
  - C) smooth endoplasmic reticulum
  - D) mitochondrion
  - E) contractile vacuole

Answer: C

Topic: Concept 6.4

Skill: Knowledge/Comprehension

- 20) Which structure is the site of the synthesis of proteins that may be exported from the cell?
- A) rough ER
  - B) lysosomes
  - C) plasmodesmata
  - D) Golgi vesicles
  - E) tight junctions

Answer: A

Topic: Concept 6.4

Skill: Knowledge/Comprehension

- 21) The Golgi apparatus has a polarity or sidedness to its structure and function. Which of the following statements *correctly* describes this polarity?
- A) Transport vesicles fuse with one side of the Golgi and leave from the opposite side.
  - B) Proteins in the membrane of the Golgi may be sorted and modified as they move from one side of the Golgi to the other.
  - C) Lipids in the membrane of the Golgi may be sorted and modified as they move from one side of the Golgi to the other.
  - D) Soluble proteins in the cisternae (interior) of the Golgi may be sorted and modified as they move from one side of the Golgi to the other.
  - E) All of the above correctly describe polar characteristics of the Golgi function.

Answer: E

Topic: Concept 6.4

Skill: Knowledge/Comprehension

- 22) The fact that the outer membrane of the nuclear envelope has bound ribosomes allows one to *most reliably* conclude that
- A) at least some of the proteins that function in the nuclear envelope are made by the ribosomes on the nuclear envelope.
  - B) the nuclear envelope is not part of the endomembrane system.
  - C) the nuclear envelope is physically continuous with the endoplasmic reticulum.
  - D) small vesicles from the Golgi fuse with the nuclear envelope.
  - E) nuclear pore complexes contain proteins.

Answer: A

Topic: Concept 6.4

Skill: Knowledge/Comprehension

- 23) The difference in lipid and protein composition between the membranes of the endomembrane system is largely determined by
- A) the physical separation of most membranes from each other.
  - B) the transportation of membrane among the endomembrane system by small membrane vesicles.
  - C) the function of the Golgi apparatus in sorting membrane components.
  - D) the modification of the membrane components once they reach their final destination.
  - E) the synthesis of lipids and proteins in each of the organelles of the endomembrane system.

Answer: C

Topic: Concept 6.4

Skill: Knowledge/Comprehension

- 24) In animal cells, hydrolytic enzymes are packaged to prevent general destruction of cellular components. Which of the following organelles functions in this compartmentalization?
- A) chloroplast
  - B) lysosome
  - C) central vacuole
  - D) peroxisome
  - E) glyoxysome

Answer: B

Topic: Concept 6.4

Skill: Knowledge/Comprehension

- 25) Which of the following statements *correctly* describes some aspect of protein disposal from prokaryotic cells?
- A) Prokaryotes are unlikely to be able to excrete proteins because they lack an endomembrane system.
  - B) The mechanism of protein excretion in prokaryotes is probably the same as that in eukaryotes.
  - C) Proteins that are excreted by prokaryotes are synthesized on ribosomes that are bound to the cytoplasmic surface of the plasma membrane.
  - D) In prokaryotes, the ribosomes that are used for the synthesis of secreted proteins are located outside of the cell.
  - E) Prokaryotes contain large pores in their plasma membrane that permit the movement of proteins out of the cell.

Answer: C

Topic: Concept 6.4

Skill: Application/Analysis

- 26) Tay-Sachs disease is a human genetic abnormality that results in cells accumulating and becoming clogged with very large and complex lipids. Which cellular organelle must be involved in this condition?
- A) the endoplasmic reticulum
  - B) the Golgi apparatus
  - C) the lysosome
  - D) mitochondria
  - E) membrane-bound ribosomes

Answer: C

Topic: Concept 6.4

Skill: Application/Analysis

- 27) The liver is involved in detoxification of many poisons and drugs. Which of the following structures is primarily involved in this process and therefore abundant in liver cells?
- A) rough ER
  - B) smooth ER
  - C) Golgi apparatus
  - D) Nuclear envelope
  - E) Transport vesicles

Answer: B

Topic: Concept 6.4

Skill: Knowledge/Comprehension

28) Which of the following produces and modifies polysaccharides that will be secreted?

- A) lysosome
- B) vacuole
- C) mitochondrion
- D) Golgi apparatus
- E) peroxisome

Answer: D

Topic: Concept 6.4

Skill: Knowledge/Comprehension

29) Which of the following contains hydrolytic enzymes?

- A) lysosome
- B) vacuole
- C) mitochondrion
- D) Golgi apparatus
- E) peroxisome

Answer: A

Topic: Concept 6.4

Skill: Knowledge/Comprehension

30) Which of the following is a compartment that often takes up much of the volume of a plant cell?

- A) lysosome
- B) vacuole
- C) mitochondrion
- D) Golgi apparatus
- E) peroxisome

Answer: B

Topic: Concept 6.4

Skill: Knowledge/Comprehension

31) Which is one of the main energy transformers of cells?

- A) lysosome
- B) vacuole
- C) mitochondrion
- D) Golgi apparatus
- E) peroxisome

Answer: C

Topic: Concept 6.5

Skill: Knowledge/Comprehension

32) Which of the following contains its own DNA and ribosomes?

- A) lysosome
- B) vacuole
- C) mitochondrion
- D) Golgi apparatus
- E) peroxisome

Answer: C

Topic: Concept 6.5

Skill: Knowledge/Comprehension



33) Which of the following contains enzymes that transfer hydrogen from various substrates to oxygen?

- A) lysosome
- B) vacuole
- C) mitochondrion
- D) Golgi apparatus
- E) peroxisome

Answer: E

Topic: Concept 6.5

Skill: Knowledge/Comprehension

34) Grana, thylakoids, and stroma are all components found in

- A) vacuoles.
- B) chloroplasts.
- C) mitochondria.
- D) lysosomes.
- E) nuclei.

Answer: B

Topic: Concept 6.5

Skill: Knowledge/Comprehension

35) Organelles other than the nucleus that contain DNA include

- A) ribosomes.
- B) mitochondria.
- C) chloroplasts.
- D) B and C only
- E) A, B, and C

Answer: D

Topic: Concept 6.5

Skill: Knowledge/Comprehension

36) The chemical reactions involved in respiration are virtually identical between prokaryotic and eukaryotic cells. In eukaryotic cells, ATP is synthesized primarily on the inner membrane of the mitochondria. Where are the corresponding reactions likely to occur in prokaryotic respiration?

- A) in the cytoplasm
- B) on the inner mitochondrial membrane
- C) on the endoplasmic reticulum
- D) on the inner plasma membrane
- E) on the inner nuclear envelope

Answer: D

Topic: Concept 6.5

Skill: Knowledge/Comprehension

- 37) A biologist ground up some plant leaf cells and then centrifuged the mixture to fractionate the organelles. Organelles in one of the heavier fractions could produce ATP in the light, while organelles in the lighter fraction could produce ATP in the dark. The heavier and lighter fractions are most likely to contain, respectively,
- A) mitochondria and chloroplasts.
  - B) chloroplasts and peroxisomes.
  - C) peroxisomes and chloroplasts.
  - D) chloroplasts and mitochondria.
  - E) mitochondria and peroxisomes.

Answer: D

Topic: Concept 6.5

Skill: Application/Analysis

- 38) Which of the following are capable of converting light energy to chemical energy?
- A) chloroplasts
  - B) mitochondria
  - C) leucoplasts
  - D) peroxisomes
  - E) Golgi bodies

Answer: A

Topic: Concept 6.5

Skill: Knowledge/Comprehension

- 39) A cell has the following molecules and structures: enzymes, DNA, ribosomes, plasma membrane, and mitochondria. It could be a cell from
- A) a bacterium.
  - B) an animal, but not a plant.
  - C) a plant, but not an animal.
  - D) a plant or an animal.
  - E) any kind of organism.

Answer: D

Topic: Concept 6.5

Skill: Knowledge/Comprehension

- 40) The mitochondrion, like the nucleus, has two or more membrane layers. How is the innermost of these layers different from that of the nucleus?
- A) The inner mitochondrial membrane is highly folded.
  - B) The two membranes are biochemically very different.
  - C) The space between the two layers of the nuclear membrane is larger.
  - D) The inner membrane of the mitochondrion is separated out into thylakoids.
  - E) The inner mitochondrial membrane is devoid of nearly all proteins.

Answer: A

Topic: Concept 6.5

Skill: Knowledge/Comprehension

- 41) Why isn't the mitochondrion classified as part of the endomembrane system?
- A) It only has two membrane layers.
  - B) Its structure is not derived from the ER.
  - C) It has too many vesicles.
  - D) It is not involved in protein synthesis.
  - E) It is not attached to the outer nuclear envelope.

Answer: B

Topic: Concept 6.5

Skill: Synthesis/Evaluation

- 42) The peroxisome gets its name from its interaction with hydrogen peroxide. If a liver cell is detoxifying alcohol and some other poisons, it does so by removal of hydrogen from the molecules. What, then, do the enzymes of the peroxisome do?
- A) combine the hydrogen with ATP
  - B) use the hydrogen to break down hydrogen peroxide
  - C) transfer the harmful substances to the mitochondria
  - D) transfer the hydrogens to oxygen molecules

Answer: D

Topic: Concept 6.5

Skill: Application/Analysis

- 43) How does the cell multiply its peroxisomes?
- A) They bud off from the ER.
  - B) They are brought into the cell from the environment.
  - C) They are built de novo from cytosol materials.
  - D) They split in two after they are too large.
  - E) The cell synthesizes hydrogen peroxide and encloses it in a membrane.

Answer: D

Topic: Concept 6.5

Skill: Knowledge/Comprehension

- 44) Motor proteins provide for molecular motion in cells by interacting with what types of cellular structures?
- A) sites of energy production in cellular respiration
  - B) membrane proteins
  - C) ribosomes
  - D) cytoskeletons
  - E) cellulose fibers in the cell wall

Answer: D

Topic: Concept 6.6

Skill: Knowledge/Comprehension

45) Cells can be described as having a cytoskeleton of internal structures that contribute to the shape, organization, and movement of the cell. Which of the following are part of the cytoskeleton?

- A) the nuclear envelope
- B) mitochondria
- C) microfilaments
- D) lysosomes
- E) nucleoli

Answer: A

Topic: Concept 6.6

Skill: Knowledge/Comprehension

46) Of the following, which cell structure would most likely be visible with a light microscope that has been manufactured to the maximum resolving power possible?

- A) mitochondrion
- B) microtubule
- C) ribosome
- D) largest microfilament
- E) nuclear pore

Answer: A

Topic: Concept 6.6

Skill: Knowledge/Comprehension

47) Which of the following contain the 9 + 2 arrangement of microtubules?

- A) cilia
- B) centrioles
- C) flagella
- D) A and C only
- E) A, B, and C

Answer: D

Topic: Concept 6.6

Skill: Knowledge/Comprehension

Use the following to answer the following questions. All three are involved in maintenance of cell shape.

| Property       | Microtubules (tubulin polymers)                                | Microfilaments (actin filaments)                                   | Intermediate filaments                           |
|----------------|--|--|--|
| Structure      | Hollow tubes; wall consists of 13 columns of tubulin molecules | Two intertwined strands of actin, each a polymer of actin subunits | Fibrous proteins supercoiled into thicker cables |
| Diameter       | 25 nm with 15-nm lumen   | 7 nm   | 8-12 nm  |
| Main functions | Cell motility  | Cell motility  | Anchorage  |

- 48) Tubulin is a dimer, made up of 2 slightly different polypeptides, alpha and beta. Given the structure above, what is the most likely consequence to the structure of the microtubule?
- A) One "half-pipe" side of the tubule must be heavier in alpha and the other in beta subunits.
  - B) One end of a microtubule can grow or release dimers at a faster rate than the other.
  - C) Microtubules grow by adding a complete circular layer at a time rather than spiraling.
  - D) Microtubules in cilia must never grow or become shorter.
  - E) Tubulin molecules themselves must be rigid structures.

Answer: B

Topic: Concept 6.6

Skill: Application/Analysis

- 49) The differences among the three categories of cytoskeletal elements would suggest that each of the following has specialized roles. Which of the following is a correct match?
- A) microfilaments and the nuclear lamina
  - B) microtubules and cleavage furrow formation
  - C) microfilaments and ciliary motion
  - D) intermediate filaments and cytoplasmic streaming
  - E) microtubules and chromosome movement

Answer: E

Topic: Concept 6.6

Skill: Application/Analysis

- 50) Centrioles, cilia, flagella, and basal bodies have remarkably similar structural elements and arrangements. This leads us to which of the following as a probable hypothesis?
- A) Disruption of one of these types of structure should necessarily disrupt each of the others as well.
  - B) Loss of basal bodies should lead to loss of all cilia, flagella, and centrioles.
  - C) Motor proteins such as dynein must have evolved before any of these four kinds of structure.
  - D) Evolution of motility, of cells or of parts of cells, must have occurred only once.
  - E) Natural selection for motility must select for microtubular arrays in circular patterns.

Answer: E

Topic: Concept 6.6

Skill: Synthesis/Evaluation

- 51) If an individual has abnormal microtubules, due to a hereditary condition, in which organs or tissues would you expect dysfunction?
- A) limbs, hearts, areas with a good deal of contraction
  - B) microvilli, alveoli, and glomeruli
  - C) all ducts, such as those from salivary or sebaceous glands
  - D) sperm, larynx, and trachea
  - E) egg cells (ova), uterus, and kidneys

Answer: D

Topic: Concept 6.6

Skill: Synthesis/Evaluation

- 52) Which of the following possesses a microtubular structure similar to a basal body?
- A) centriole
  - B) lysosome
  - C) nucleolus
  - D) peroxisome
  - E) ribosome

Answer: A

Topic: Concept 6.6

Skill: Knowledge/Comprehension

- 53) Microfilaments are well known for their role in which of the following?
- A) amoeboid movement
  - B) formation of cleavage furrows
  - C) contracting of muscle cells
  - D) A and B only
  - E) A, B, and C

Answer: E

Topic: Concept 6.6

Skill: Knowledge/Comprehension

- 54) Which of the following statements about the cytoskeleton is *true*?
- A) The dynamic aspect of cytoskeletal function is made possible by the assembly and disassembly of a large number of complex proteins into larger aggregates.
  - B) Microfilaments are structurally rigid and resist compression, while microtubules resist tension (stretching).
  - C) Movement of cilia and flagella is the result of motor proteins causing microtubules to move relative to each other.
  - D) Chemicals that block the assembly of the cytoskeleton would cause little effect on the cell's metabolism
  - E) Transport vesicles among the membranes of the endomembrane system produce the cytoskeleton.

Answer: C

Topic: Concept 6.6

Skill: Application/Analysis

55) Cells require which of the following to form cilia or flagella?

- A) centrosomes
- B) ribosomes
- C) actin
- D) A and B only
- E) A, B, and C

Answer: D

Topic: Concept 6.7

Skill: Knowledge/Comprehension

56) All of the following serve an important role in determining or maintaining the structure of plant cells. Which of the following are distinct from the others in their composition?

- A) microtubules
- B) microfilaments
- C) plant cell walls
- D) intermediate filaments
- E) nuclear lamina

Answer: C

Topic: Concept 6.7

Skill: Knowledge/Comprehension

57) Which of the following relationships between cell structures and their respective functions is correct?

- A) cell wall: support, protection
- B) chloroplasts: chief sites of cellular respiration
- C) chromosomes: cytoskeleton of the nucleus
- D) ribosomes: secretion
- E) lysosomes: formation of ATP

Answer: B

Topic: Concept 6.7

Skill: Knowledge/Comprehension

58) The cell walls of bacteria, fungi, and plant cells and the extracellular matrix of animal cells are all external to the plasma membrane. Which of the following is a characteristic of all of these extracellular structures?

- A) They must block water and small molecules in order to regulate the exchange of matter and energy with their environment.
- B) They must permit information transfer between the cell's cytoplasm and the nucleus.
- C) They must provide a rigid structure that maintains an appropriate ratio of cell surface area to volume.
- D) They are constructed of materials that are largely synthesized in the cytoplasm and then transported out of the cell.
- E) They are composed of a mixture of lipids and carbohydrates.

Answer: D

Topic: Concept 6.7

Skill: Application/Analysis

- 59) When a potassium ion ( $K^+$ ) moves from the soil into the vacuole of a cell on the surface of a root, it must pass through several cellular structures. Which of the following correctly describes the order in which these structures will be encountered by the ion?
- A) plasma membrane → primary cell wall → cytoplasm → tonoplast
  - B) secondary cell wall → plasma membrane → primary cell wall → cytoplasm → tonoplast
  - C) primary cell wall → plasma membrane → cytoplasm → tonoplast
  - D) primary cell wall → plasma membrane → tonoplast → cytoplasm → vacuole
  - E) tonoplast → primary cell wall → plasma membrane → cytoplasm

Answer: C

Topic: Concept 6.7

Skill: Application/Analysis

- 60) A cell lacking the ability to make and secrete glycoproteins would most likely be deficient in its
- A) nuclear DNA.
  - B) extracellular matrix.
  - C) Golgi apparatus.
  - D) B and C only
  - E) A, B, and C

Answer: D

Topic: Concept 6.7

Skill: Knowledge/Comprehension

- 61) The extracellular matrix is thought to participate in the regulation of animal cell behavior by communicating information from the outside to the inside of the cell via which of the following?
- A) gap junctions
  - B) the nucleus
  - C) DNA and RNA
  - D) integrins
  - E) plasmodesmata

Answer: D

Topic: Concept 6.7

Skill: Knowledge/Comprehension

- 62) Plasmodesmata in plant cells are *most* similar in function to which of the following structures in animal cells?
- A) peroxisomes
  - B) desmosomes
  - C) gap junctions
  - D) extracellular matrix
  - E) tight junctions

Answer: C

Topic: Concept 6.7

Skill: Knowledge/Comprehension



- 63) Ions can travel directly from the cytoplasm of one animal cell to the cytoplasm of an adjacent cell through
- A) plasmodesmata.
  - B) intermediate filaments.
  - C) tight junctions.
  - D) desmosomes.
  - E) gap junctions.

Answer: E

Topic: Concept 6.7

Skill: Knowledge/Comprehension

- 64) Which of the following makes it necessary for animal cells, although they have no cell walls, to have intercellular junctions?
- A) Cell membranes do not distinguish the types of ions and molecules passing through them.
  - B) Large molecules, especially proteins, do not readily get through one, much less two adjacent cell membranes.
  - C) Cell-to-cell communication requires physical attachment of one cell to another.
  - D) Maintenance of connective tissue shape requires cells to adhere to one another.
  - E) The relative shapelessness of animal cells requires a mechanism for keeping the cells aligned.

Answer: B

Topic: Concept 6.7

Skill: Synthesis/Evaluation

- 65) Recent evidence shows that the extracellular matrix can take part in regulating the expression of genes. A likely possibility for this might be which of the following?
- A) Mechanical signals of the ECM can alter the cytoskeleton, which can alter intracellular signaling.
  - B) Intracellular signals might cause changes in the fibronectin binding to the cell surface.
  - C) Orientation of microfilaments to the ECM can change the gene activity.
  - D) Fibronectin binds to integrins built into the plasma membrane.
  - E) Proteoglycans in the ECM become large enough in aggregate to force genetic alteration.

Answer: A

Topic: Concept 6.7

Skill: Synthesis/Evaluation

- 66) Of the following molecules of the ECM, which is capable of transmitting signals between the ECM and the cytoskeleton?
- A) fibronectin
  - B) proteoglycans
  - C) integrins
  - D) collagen
  - E) middle lamella

Answer: C

Topic: Concept 6.7

Skill: Knowledge/Comprehension

## Self-Quiz Questions

The following questions are from the end-of-chapter-review Self-Quiz questions in Chapter 6 of the textbook.

- 1) Which statement *correctly* characterizes bound ribosomes?
- A) Bound ribosomes are enclosed in their own membrane.
  - B) Bound and free ribosomes are structurally different.
  - C) Bound ribosomes generally synthesize membrane proteins and secretory proteins.
  - D) The most common location for bound ribosomes is the cytoplasmic surface of the plasma membrane.
  - E) All of the above.

Answer: C

- 2) Which structure is *not* part of the endomembrane system?
- A) nuclear envelope
  - B) chloroplast
  - C) Golgi apparatus
  - D) plasma membrane
  - E) ER

Answer: B

- 3) Cells of the pancreas will incorporate radioactively labeled amino acids into proteins. This "tagging" of newly synthesized proteins enables a researcher to track their location. In this case, we are tracking an enzyme secreted by pancreatic cells. What is its most likely pathway?
- A) ER → Golgi → nucleus
  - B) Golgi → ER → lysosome
  - C) nucleus → ER → Golgi
  - D) ER → Golgi → vesicles that fuse with plasma membrane
  - E) ER → lysosomes → vesicles that fuse with plasma membrane

Answer: D

- 4) Which structure is common to plant *and* animal cells?
- A) chloroplast
  - B) wall made of cellulose
  - C) central vacuole
  - D) mitochondrion
  - E) centriole

Answer: D

- 5) Which of the following is present in a prokaryotic cell?
- A) mitochondrion
  - B) ribosome
  - C) nuclear envelope
  - D) chloroplast
  - E) ER

Answer: B

6) Which cell would be best for studying lysosomes?

- A) muscle cell
- B) nerve cell
- C) phagocytic white blood cell
- D) leaf cell of a plant
- E) bacterial cell

Answer: C

7) Which structure–function pair is *mismatched*?

- A) nucleolus; production of ribosomal subunits
- B) lysosome; intracellular digestion
- C) ribosome; protein synthesis
- D) Golgi; protein trafficking
- E) microtubule; muscle contraction

Answer: E

8) Cyanide binds with at least one molecule involved in producing ATP. If a cell is exposed to cyanide, most of the cyanide would be found within the

- A) mitochondria.
- B) ribosomes.
- C) peroxisomes.
- D) lysosomes.
- E) endoplasmic reticulum.

Answer: A

9) From memory, draw two cells, showing the structures below and any connections between them.

|                 |                        |                 |                |
|-----------------|------------------------|-----------------|----------------|
| nucleus         | rough ER               | smooth ER       | mitochondrion  |
| centrosome      | chloroplast            | vacuole         | lysosome       |
| microtubules    | cell wall              | ECM             | microfilaments |
| Golgi apparatus | intermediate filaments | plasma membrane | peroxisome     |
| ribosomes       | nucleolus              | nuclear pore    | vesicles       |
| flagellum       | microvilli             | plasmodesma     |                |

Answer: See Figure 6.9 in the textbook.