

Chapter 2—Cell Physiology

MULTIPLE CHOICE

1. Which component below is not always found in a typical human cell?
 - a. cytosol.
 - b. DNA.
 - c. flagellum.
 - d. plasma membrane.
 - e. water.

ANS: C PTS: 1

2. A typical human cell is about ____micrometers in diameter.
 - a. 1 to 2
 - b. 10 to 20
 - c. 80 to 100
 - d. 150 to 200
 - e. 200 to 300

ANS: B PTS: 1

3. Select the structure that is not located in the cytosol of the cell.
 - a. ER.
 - b. golgi complex.
 - c. lysosome.
 - d. mitochondrion.
 - e. all of the above are located in the cytosol

ANS: E PTS: 1

4. Which organelle is associated with energy production?
 - a. golgi body.
 - b. lysosome.
 - c. mitochondrion.
 - d. RER.
 - e. ribosome.

ANS: C PTS: 1

5. Which of the following statements concerning cells is incorrect?
 - a. cells serve as the living building blocks of the body.
 - b. the average human cell is about one hundred times smaller than the smallest particle visible by the unaided eye.
 - c. inanimate chemical molecules are organized within each cell into a living entity.
 - d. cells are generally colorless and transparent so they must be stained for visualization under a microscope.
 - e. the three major subdivisions of a cell are the plasma membrane, the nucleus, and the cytoplasm.

ANS: B PTS: 1

6. The plasma membrane:
- a. is composed mostly of lipid molecules
 - b. is composed mostly of protein molecules
 - c. allows the ICF and ECF to easily exchange materials
 - d. is a barrier that prevents most molecules from passing through
 - e. is a very thick structure relative to the size of the cell

ANS: A PTS: 1

7. The rough endoplasmic reticulum
- a. is studded with ribosomes.
 - b. synthesizes proteins for export from the cell or for use in construction of a new cellular membrane.
 - c. is continuous with the smooth endoplasmic reticulum.
 - d. is connected to the nucleus.
 - e. all of these answers.

ANS: E PTS: 1

8. The rough ER is a membranous system associated with
- a. chromosomes.
 - b. lysosomes.
 - c. microfilaments.
 - d. ribosomes.
 - e. vacuoles.

ANS: D PTS: 1

9. Of the organelles below which occurs in the lowest numbers within a typical human cell?
- a. mitochondria.
 - b. ribosomes
 - c. peroxisomes.
 - d. lysosomes.
 - e. nuclei.

ANS: E PTS: 1

10. Which of the following is contained within the nucleus?
- a. deoxyribonucleic acid.
 - b. cytosol.
 - c. plasma membrane.
 - d. endoplasmic reticulum.
 - e. none of these answers.

ANS: A PTS: 1

11. Select the incorrect statement regarding ribosomes
- a. they are composed of RNA.
 - b. they assemble polypeptides.
 - c. they may be bound to endoplasmic reticulum.
 - d. they are comprised of 2 parts.
 - e. they are membrane-bounded.

ANS: E PTS: 1

12. The smooth endoplasmic reticulum
- is most abundant in cells specialized for protein secretion.
 - gives rise to transport vesicles containing newly synthesized molecules wrapped in a layer of smooth ER membrane.
 - consists of stacks of relatively flattened sacs called cisternae.
 - has many ribosomes.
 - all of these answers.

ANS: B PTS: 1

13. This molecule carries and delivers amino acids during the process of protein synthesis:
- mRNA
 - rRNA
 - tRNA
 - DNA
 - cDNA

ANS: C PTS: 1

14. This molecule provides the template for the process of transcription.
- mRNA
 - rRNA
 - tRNA
 - DNA
 - cDNA

ANS: D PTS: 1

15. Select the incorrect statement about the smooth ER.
- It is abundant in most cell types.
 - It is found in liver cells.
 - It specializes in lipid metabolism.
 - The sarcoplasmic reticulum is a modified form of it.
 - This organelle does not contain ribosomes.

ANS: A PTS: 1

16. Which structure is not associated with the secretion of proteins produced by ER?
- golgi complex.
 - smooth ER.
 - transport vesicles.
 - lysosomal membrane.
 - plasma membrane.

ANS: D PTS: 1

17. Polyribosomes
- a unusually large ribosomes.
 - are found on smooth ER.
 - synthesize lipids and nucleic acids.
 - are clusters of ribosomes synthesizing the same protein.
 - none of these answers.

ANS: D PTS: 1

18. Which characteristic of the golgi complex is incorrect?
- a. they sort and direct products to their final destination.
 - b. they modify proteins chemically.
 - c. they produce secretory vesicles.
 - d. they produce proteins using ribosome.
 - e. they receive transport vesicles coming from the ER.

ANS: D PTS: 1

19. This cytosol:
- a. is found within the nucleus
 - b. does not contain organelles or cytoskeleton
 - c. is found only in plant cells
 - d. is found outside the cell
 - e. is part of the ECF

ANS: B PTS: 1

20. Extrusion of materials to the exterior of the cell through the plasma membrane is called
- a. endocytosis
 - b. exocytosis
 - c. phagocytosis
 - d. pinocytosis
 - e. all of these answers.

ANS: B PTS: 1

21. The form of endocytosis in which whole cells such as bacteria are brought in is
- a. exocytosis.
 - b. pinocytosis.
 - c. receptor-mediated endocytosis.
 - d. phagocytosis.
 - e. mitosis.

ANS: D PTS: 1

22. On average a cell contains how many lysosomes?
- a. 3
 - b. 30
 - c. 300
 - d. 3,000
 - e. 3,000,000

ANS: C PTS: 1

23. Select the incorrect characteristic of mitochondria?
- a. they have an inner fluid filled space called the cristae.
 - b. they possess their own DNA.
 - c. they are the site a cell respiration.
 - d. their inner membranes posses electron carriers.
 - e. they possess two membranes.

ANS: A PTS: 1

24. Where do the citric acid cycle reactions occur?

- a. cytoplasm.
- b. cytosol.
- c. inner-mitochondrial membrane.
- d. outer-mitochondrial membrane.
- e. mitochondrial matrix.

ANS: E PTS: 1

25. What accounts for the most ATP production?

- a. Kreb's cycle.
- b. Citric acid cycle.
- c. NADH.
- d. oxidative phosphorylation.
- e. glycolysis.

ANS: D PTS: 1

26. Where is CO₂ released in the aerobic cellular respiration process?

- a. glycolysis.
- b. electron transport chain.
- c. Kreb's cycle.
- d. fermentation.
- e. none of these answers.

ANS: C PTS: 1

27. Why do we need to breath in, exchange, and deliver to each cell the oxygen molecule?

- a. glucose can't be broken down without it.
- b. it pulls electrons off the electron transport chains in the last part. of cell respiration.
- c. all chemical reactions require it.
- d. all of these answers.
- e. none of these answers.

ANS: B PTS: 1

28. What might happen if you did not get enough niacin in your diet?

- a. glucose would not be able to be cleaved.
- b. available FAD would decrease.
- c. when the 3-carbon chain is oxidized in glycolysis, electrons would not be able to be captured.
- d. only fermentation would be possible
- e. all of these answers.

ANS: C PTS: 1

29. What is the carbon-based end product (chain) of glycolysis?

- a. NADH.
- b. ATP.
- c. pyruvate
- d. FADH₂.
- e. CO₂.

ANS: C PTS: 1

30. Why does anaerobic respiration take place when O₂ is not available?
- a. to continue releasing at least some energy from molecules.
 - b. to continue the glycolysis processes.
 - c. to generate some ATP.
 - d. to regenerate the limited NAD.
 - e. all of these answers.

ANS: E PTS: 1

31. Chemiosmosis:
- a. releases CO₂.
 - b. extracts energy from a H⁺ concentration gradient.
 - c. to reduce NAD.
 - d. to ferment pyruvic acid to lactic acid.
 - e. none of these answers.

ANS: B PTS: 1

32. Pyruvate derived from glycolysis is transported into which structure to continue the process of cellular respiration?
- a. mitochondrial matrix
 - b. mitochondrial cristae
 - c. cytosol
 - d. nucleus
 - e. lysosome

ANS: A PTS: 1

33. Cristae are found in the
- a. lysosome.
 - b. mitochondrion.
 - c. nucleolus.
 - d. nucleus.
 - e. rough ER.

ANS: B PTS: 1

34. Select the incorrect association.
- a. ATP/high-energy bonds.
 - b. electron transport chain/aerobic
 - c. glycolysis/anaerobic.
 - d. glycolysis/cytosol.
 - e. oxidative phosphorylation/low ATP production

ANS: E PTS: 1

35. In an anaerobic condition,
- a. oxygen is not present.
 - b. the degradation of glucose cannot proceed beyond glycolysis.
 - c. mitochondrial processing of nutrient molecules takes place.
 - d. both (a) and (b) above.
 - e. both (a) and (c) above.

ANS: D PTS: 1

36. The universal energy currency in cells is

- a. ATP.
- b. glucose.
- c. glycogen.
- d. insulin.
- e. myosin.

ANS: A PTS: 1

37. The gradient of which ion supplies the energy that drive ATP synthesis by ATP synthase?

- a. Na^+
- b. K^+
- c. H^+
- d. Cl^-
- e. Ca^{+2}

ANS: C PTS: 1

38. Which molecule that directly enters the citric acid cycle.

- a. acetyl CoA.
- b. adenosine diphosphate.
- c. citric acid.
- d. oxaloacetic acid.
- e. pyruvic acid.

ANS: A PTS: 1

39. ATP synthase

- a. transports hydrogen ions from the matrix to the intermembrane space of the mitochondrion.
- b. is activated by the flow of hydrogen ions from the intermembrane space to the matrix.
- c. enzymatically converts $\text{ADP} + \text{P}_i$ to ATP.
- d. both (b) and (c) above.
- e. all of these answers.

ANS: D PTS: 1

40. The function of ATP synthase is to

- a. act enzymatically.
- b. build membranes.
- c. carry hydrogen.
- d. synthesize ATP.
- e. transport oxygen.

ANS: D PTS: 1

41. NADH

- a. is an energy carrier.
- b. plays a role in cellular respiration.
- c. is utilized in glycolysis.
- d. is utilized in the citric acid cycle.
- e. all of these answers.

ANS: A PTS: 1

42. Glycolysis
- a. yields two molecules of ATP for each molecule of glucose processed.
 - b. requires oxygen.
 - c. takes place in the mitochondrial matrix.
 - d. both (a) and (b) above.
 - e. all of these answers.

ANS: A PTS: 1

43. The purpose of glycolysis is
- a. to produce citric acid.
 - b. to liberate energy from glucose.
 - c. to produce large numbers of ATP.
 - d. to trap energy in FADH₂.
 - e. none of these answers.

ANS: B PTS: 1

44. The term aerobic means
- a. in the blood.
 - b. with carbon dioxide.
 - c. with oxygen.
 - d. without carbon dioxide.
 - e. without oxygen.

ANS: C PTS: 1

45. Select the correct statement about peroxisomes
- a. they may play a role in drug resistance.
 - b. their shape resembles hexagonal barrels.
 - c. they contain oxidative enzymes
 - d. they are not organelles.
 - e. they contain hydrolytic enzymes

ANS: C PTS: 1

46. Select the element that is not a part of the cytoskeleton.
- a. inclusions.
 - b. intermediate filaments.
 - c. microfilaments.
 - d. microtubular lattice.
 - e. microtubules.

ANS: A PTS: 1

47. The bending movements of cilia and flagella
- a. are accomplished by alternate solation and gelation of the cytosol.
 - b. involve the alternate assembly and disassembly of actin filaments.
 - c. are produced by the sliding of adjacent microtubule doublets past each other.
 - d. are important in providing motility for many organisms but are not of any use in humans.
 - e. none of these answers.

ANS: C PTS: 1

48. Microtubules
- a. serve as a mechanical stiffener for microvilli.
 - b. are specialized to detect sound and positional changes in the ear.
 - c. form nonmuscle contractile assemblies.
 - d. play a structural role in parts of the cell subject to mechanical stress.
 - e. none of these answers.

ANS: E PTS: 1

49. Microtubules are composed primarily of:
- a. phospholipids
 - b. actin
 - c. myosin
 - d. tubulin
 - e. enzymes

ANS: D PTS: 1

50. Molecular motors:
- a. are transporter proteins
 - b. attach to the particle to be transported
 - c. do not use energy from ATP to function properly
 - d. a and b
 - e. all of the above

ANS: D PTS: 1

51. Which of the following is the molecular motor that carries secretory vesicles to the ends of the axon?
- a. kinesin
 - b. dynein
 - c. actin
 - d. NAD
 - e. microfilaments

ANS: A PTS: 1

52. The function of the microtrabecular lattice is
- a. to maintain asymmetrical cell shapes.
 - b. to suspend and functionally link the largest cytoskeletal elements and organelles.
 - c. to provide for cellular contractile systems.
 - d. to serve as mechanical stiffeners.
 - e. serve as the chief structural units of cilia.

ANS: B PTS: 1

53. Which of the following is not characteristic of the cytoskeleton?
- a. the cytoskeleton supports the plasma membrane and is responsible for the particular shape, rigidity, and spatial geometry of each different cell type.
 - b. the cytoskeleton probably plays a role in regulating cell growth and division.
 - c. the cytoskeletal elements are all rigid, permanent structures.
 - d. the cytoskeleton is responsible for cell contraction and cell movements.
 - e. the cytoskeleton supports and organizes the ribosomes, mitochondria, and lysosomes.

ANS: C PTS: 1

54. Phagocytosis is a function of which cell type?

- a. epithelial.
- b. muscle.
- c. nerve.
- d. red blood.
- e. white blood.

ANS: E PTS: 1

55. Which structure is transiently formed from microtubules during cell division?

- a. flagella
- b. cilia
- c. mitotic spindle
- d. microfilaments
- e. none of the above

ANS: C PTS: 1

56. Intermediate filaments

- a. comprised mitotic spindles.
- b. are important in cell regions subject to mechanical stress.
- c. comprise cilia.
- d. comprise flagella.
- e. form the basal bodies.

ANS: B PTS: 1

TRUE/FALSE

1. Microtubules serve as mechanical supports or stiffeners.

ANS: T PTS: 1

2. DNA's genetic code is transcribed into messenger RNA.

ANS: T PTS: 1

3. The cytosol is the gel-like mass of the cytoplasm.

ANS: T PTS: 1

4. DNA in the nucleus has the genetic instructions to make enzymatic proteins.

ANS: T PTS: 1

5. mRNA is formed within the nucleus and then moves into the cytoplasm where it is involved in protein synthesis.

ANS: T PTS: 1

6. The rough endoplasmic reticulum is most abundant in cells specialized for protein secretion, whereas smooth endoplasmic reticulum is abundant in cells that specialize in lipid metabolism.

ANS: T PTS: 1

7. Proteins synthesized by the endoplasmic reticulum become permanently separated from the cytosol as soon as they have been synthesized.

ANS: T PTS: 1

8. RER is most abundant in cells specialized for steroid production.

ANS: F PTS: 1

9. The golgi complex is functionally connected to the ER.

ANS: T PTS: 1

10. The endoplasmic reticulum is one continuous organelle consisting of many tubules and cisternae.

ANS: T PTS: 1

11. The lysosomes contain oxidative enzymes.

ANS: F PTS: 1

12. The smooth ER specializes in protein metabolism.

ANS: F PTS: 1

13. Secretory vesicles are released to the exterior of the cell by means of the process of phagocytosis.

ANS: F PTS: 1

14. Pinocytosis is a highly selective process that enables cells to import specific large molecules that it needs from its environment

ANS: F PTS: 1

15. Sorting and directing the finished products to their final destinations is basic function of the . Golgi stack.

ANS: T PTS: 1

16. All cell organelles are renewable.

ANS: T PTS: 1

17. Secretion refers to release to the cell's exterior, on appropriate stimulation, of a product produced by the cell

ANS: T PTS: 1

18. Endocytosis can be accomplished by phagocytosis and pinocytosis.

ANS: T PTS: 1

19. Phagocytosis is a specialized form of endocytosis used for bringing in liquids.

ANS: F PTS: 1

20. The peroxisomes mainly generates hydrogen peroxide.

ANS: T PTS: 1

21. Glycolysis generates ATP from glucose via aerobic processes.

ANS: F PTS: 1

22. ATP synthase is located in the inner mitochondrial membrane.

ANS: T PTS: 1

23. Most intermediary metabolism is accomplished in the cytosol.

ANS: T PTS: 1

24. Glycolysis reactions generate the most ATP per glucose molecule.

ANS: F PTS: 1

25. Dynein is a mitochondrial enzyme.

ANS: F PTS: 1

26. Keratin is important in the formation of skin cell networks.

ANS: T PTS: 1

27. Amoeboid movement is accomplished by transitions of the cytosol between a gel and a sol state as a result of alternate assembly and disassembly respectively of actin filaments.

ANS: T PTS: 1

28. The protective, waterproof outer layer of skin is formed by the tough skeleton of the microtrabecular lattice that persists after the surface skin cells die.

ANS: F PTS: 1

COMPLETION

1. The three major subdivisions of a cell are the _____, the _____, and the _____.

ANS: plasma membrane, nucleus, cytoplasm

PTS: 1

2. The fluid contained within all of the cells of the body is known collectively as _____, and the fluid outside of the cells is referred to as _____.

ANS: intracellular fluid, extracellular fluid

PTS: 1

3. The two major parts of the cell's interior are the _____ and the _____.

ANS: nucleus, cytoplasm

PTS: 1

4. _____ RNA carries amino acids to the sites of protein synthesis in the cell.

ANS: transfer

PTS: 1

5. The _____ ER is the central packaging and discharge site for molecules to be transported from the ER.

ANS: smooth

PTS: 1

6. The nucleus is surrounded by a double-layered membrane, the _____ which is pierced by many nuclear _____.

ANS: nuclear envelope, pores

PTS: 1

7. _____ are distinct, highly organized structures that perform specialized functions within the cell.

ANS: Organelles

PTS: 1

8. The ribosomes of the rough ER synthesize _____, whereas its membranous walls contain enzymes essential for the synthesis of _____.

ANS: proteins, lipids

PTS: 1

9. The sarcoplasmic reticulum stores the substance _____.

ANS: calcium

PTS: 1

10. Among these so-called storage diseases is _____ disease, which is characterized by abnormal accumulation of complex molecules found in nerve cells.

ANS: Tay-Sachs

PTS: 1

11. _____ refers to the process of an intracellular vesicle fusing with the plasma membrane, then opening and emptying its contents to the exterior.

ANS: exocytosis

PTS: 1

12. _____ is a protein responsible for pinching off an endocytic vesicle.

ANS: dynamin

PTS: 1

13. Foreign material to be attacked by lysosomal enzymes is brought into the cell by the process of _____.

ANS: endocytosis

PTS: 1

14. Lysosomes contain _____ enzymes that are capable of digesting and removing unwanted debris from the cell.

ANS: hydrolytic

PTS: 1

15. Lysosomes that have completed their digestive activities are known as _____.

ANS: residual bodies

PTS: 1

16. Peroxisomes form _____ from molecular oxygen and the hydrogen atoms stripped from the toxic molecule.

ANS: hydrogen peroxide

PTS: 1

17. When ATP is utilized _____ and _____ are produced.

ANS: ADP/Pi

PTS: 1

18. _____ refers collectively to the large set of intracellular chemical reactions that involve the degradation, synthesis, and transformation of small organic molecules.

ANS: intermediary metabolism

PTS: 1

19. The decomposition of hydrogen peroxide produces the substances _____ and _____.

ANS: water, oxygen

PTS: 1

20. _____ is a peroxisomal enzyme that breaks down hydrogen peroxide.

ANS: catalase

PTS: 1

21. One glucose molecule is converted into two molecules of _____ by the end of glycolysis.

ANS: pyruvate

PTS: 1

22. The metabolism of acetyl CoA into the citric acid cycle depends on the presence of _____ gas in the cell.

ANS: oxygen

PTS: 1

23. The chemiosmotic mechanism involves the transport of hydrogen across the membranes of the _____.

ANS: mitochondrion

PTS: 1

24. Adipose tissue stores the substance _____.

ANS: fat

PTS: 1

25. _____ are the dominant structural and functional components of cilia and flagella.

ANS: microtubules

PTS: 1

26. Microfilaments are comprised of the protein _____.

ANS: actin

PTS: 1

27. One disease caused by neurofilament abnormalities is _____.

ANS: amyotrophic lateral sclerosis.

PTS: 1

28. A cilium or flagellum originates from the _____, a structure in the cell.

ANS: basal body

PTS: 1

MATCHING

Match the following with its characteristics.

- a. glycolysis
- b. citric-acid cycle
- c. oxidative phosphorylation

- 1. directly uses inspired oxygen
- 2. does not directly use inspired oxygen
- 3. takes place in the cytosol
- 4. takes place in the mitochondrial matrix
- 5. takes place on the inner mitochondrial membrane
- 6. low yield of ATP
- 7. high yield of ATP

1. ANS: C PTS: 1

2. ANS: A PTS: 1 NOT: B is also correct.

3. ANS: A PTS: 1

4. ANS: B PTS: 1

5. ANS: C PTS: 1

6. ANS: A PTS: 1 NOT: B is also correct.

7. ANS: C PTS: 1

Complete the sentences by matching the appropriate vesicle(s) from the following list. More than one answer may apply.

- a. transport vesicles
- b. coated vesicles
- c. secretory vesicles

- 8. Originate from the Golgi complex.
- 9. Originate from the endoplasmic reticulum.
- 10. Contain newly-synthesized molecules
- 11. Contents emptied to the exterior by exocytosis.
- 12. Enclosed in a clathrin framework.
- 13. Fuse with and enter the Golgi complex.
- 14. Contents become concentrated over time.
- 15. Contents are unloaded at a specific intracellular compartment.

- | | | |
|------------|--------|-------------------------|
| 8. ANS: B | PTS: 1 | NOT: C is also correct. |
| 9. ANS: A | PTS: 1 | |
| 10. ANS: A | PTS: 1 | |
| 11. ANS: C | PTS: 1 | |
| 12. ANS: B | PTS: 1 | |
| 13. ANS: A | PTS: 1 | |
| 14. ANS: C | PTS: 1 | |
| 15. ANS: B | PTS: 1 | |

Match the term to its description.

- a. plasma membrane
- b. nucleus
- c. cytoplasm
- d. cytosol
- e. organelles
- f. cytoskeleton

- 16. Houses the cell's DNA.
- 17. Is/are responsible for cell shape and movement.
- 18. Are highly organized membrane-bound intracellular structures.
- 19. Selectively controls movement of molecules between the intracellular fluid and the extracellular fluid.
- 20. Consists of organelles and cytosol.
- 21. Is/are site of intermediary metabolism.
- 22. Perform specific functions within the cell.
- 23. Composed mostly of lipids with variable proteins.
- 24. Is/are the site of fat and glycogen storage.

- | | |
|------------|--------|
| 16. ANS: B | PTS: 1 |
| 17. ANS: F | PTS: 1 |
| 18. ANS: E | PTS: 1 |
| 19. ANS: A | PTS: 1 |
| 20. ANS: C | PTS: 1 |
| 21. ANS: D | PTS: 1 |
| 22. ANS: E | PTS: 1 |
| 23. ANS: A | PTS: 1 |
| 24. ANS: D | PTS: 1 |

Match the term to its description.

- a. ER
- b. Golgi complex
- c. Lysosome
- d. Peroxisome
- e. Mitochondrion
- f. Free ribosome
- g. Microtubule
- h. Microfilament

- 25. Contains powerful oxidative enzymes important in detoxifying various wastes.
- 26. Is/are an important component of cilia and flagella.
- 27. Is/are one continuous extensive organelle consisting of a network of tubules and flattened filament.
- 28. Removes unwanted cellular debris and foreign material.
- 29. Is/are the powerhouse of the cell.
- 30. Acts as a mechanical stiffener.
- 31. Synthesizes proteins for use in the cytosol.
- 32. Consists of stacks of flattened sacs.
- 33. Is/are shaped like an octagonal barrel.

- | | |
|------------|--------|
| 25. ANS: D | PTS: 1 |
| 26. ANS: G | PTS: 1 |
| 27. ANS: A | PTS: 1 |
| 28. ANS: C | PTS: 1 |
| 29. ANS: E | PTS: 1 |
| 30. ANS: H | PTS: 1 |
| 31. ANS: F | PTS: 1 |
| 32. ANS: B | PTS: 1 |
| 33. ANS: F | PTS: 1 |

Match the term to its description.

- a. flagella
- b. cilia
- c. microvilli

- 34. Are hair-like motile protrusions.
- 35. Increase the surface area of the small intestine epithelium.
- 36. Sweep mucus and debris out of respiratory airways.
- 37. Increase the surface area of the kidney tubules.
- 38. Enable sperm to move.
- 39. Are whip-like appendages.
- 40. Guide egg to oviduct.

- | | |
|------------|--------|
| 34. ANS: B | PTS: 1 |
| 35. ANS: C | PTS: 1 |
| 36. ANS: B | PTS: 1 |
| 37. ANS: C | PTS: 1 |
| 38. ANS: A | PTS: 1 |
| 39. ANS: A | PTS: 1 |
| 40. ANS: B | PTS: 1 |

Match the term to its description.

- a. microtubules
- b. microfilaments
- c. intermediate filaments
- d. microtrabecular lattice

- 41. Are/is the largest of the cytoskeletal elements.
- 42. Are/is present in parts of the cell subject to mechanical stress.
- 43. Are/is the smallest element(s) visible with a conventional electron microscope.
- 44. Consist(s) of actin.
- 45. Organize(s) the glycolytic enzymes in a sequential alignment.
- 46. Form(s) the mitotic spindle.
- 47. Are/is essential for creating and maintaining an asymmetrical cell shape.
- 48. Are/is composed of tubulin.
- 49. Provide(s) a pathway for axonal transport.
- 50. Are/is visible only with a high-voltage electron microscope.
- 51. Play(s) a key role in muscle contraction.
- 52. Slide past each other to cause ciliary bending.

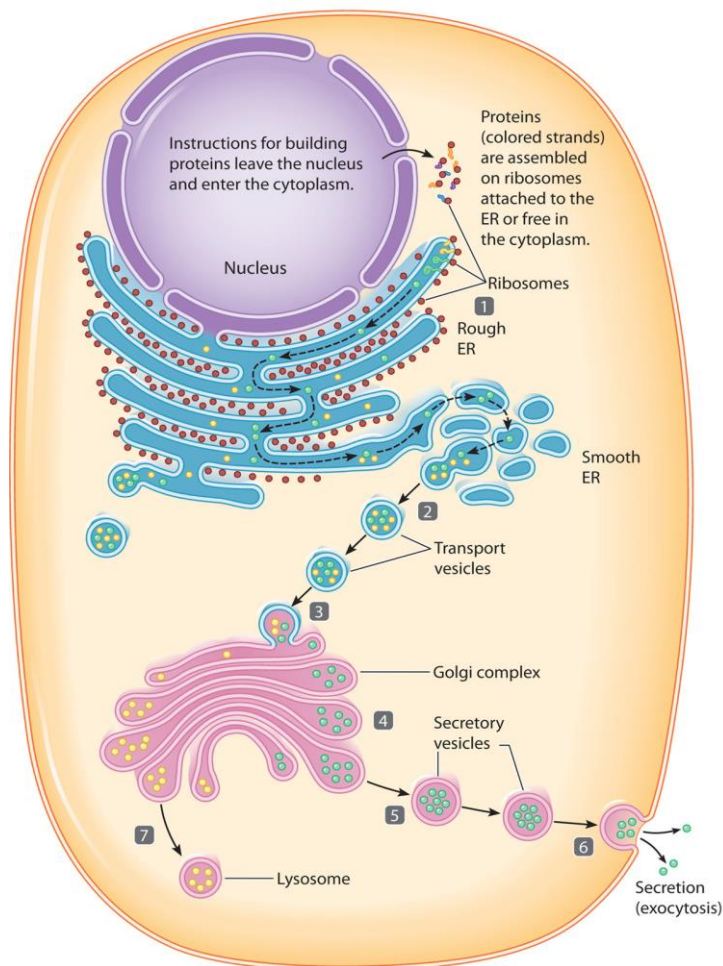
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|------------|--------|
| 41. ANS: A | PTS: 1 |
| 42. ANS: C | PTS: 1 |
| 43. ANS: B | PTS: 1 |
| 44. ANS: B | PTS: 1 |
| 45. ANS: D | PTS: 1 |
| 46. ANS: A | PTS: 1 |
| 47. ANS: A | PTS: 1 |
| 48. ANS: A | PTS: 1 |
| 49. ANS: A | PTS: 1 |
| 50. ANS: D | PTS: 1 |
| 51. ANS: B | PTS: 1 |
| 52. ANS: A | PTS: 1 |

Match the cellular protein with its correct characteristic.

- a. dynamin
- b. tubulin
- c. kinesin
- d. actin

- 53. Causes pinching off of endocytic vesicles.
- 54. Found along with myosin in muscle.
- 55. Comprises intermediate filaments.
- 56. Comprises microtubules.
- 57. Provides for transport of vesicles.

- | | |
|------------|--------|
| 53. ANS: A | PTS: 1 |
| 54. ANS: D | PTS: 1 |
| 55. ANS: D | PTS: 1 |
| 56. ANS: B | PTS: 1 |
| 57. ANS: C | PTS: 1 |



The accompanying figure relates to the secretion process for proteins by the endoplasmic reticulum. Match the steps highlighted in the figure (steps 1-7) with the statements using the letter key below.

- a. Step 1
- b. Step 2
- c. Step 3
- d. Step 4
- e. Step 5
- f. Step 6
- g. Step 7

- 58. The transport vessel fuses with the Golgi complex.
- 59. Secretory vesicle fuses with the plasma membrane and empties content to the cell's exterior.
- 60. Lysosome also bud off the Golgi complex.
- 61. Rough ER synthesizes protein to be secreted.
- 62. Vesicle move through the Golgi where modification and sorting takes place.
- 63. Secretory vesicles bud off the Golgi complex and remain in the cytosol.
- 64. The smooth ER packages the secretory product into transport vesicles.

58. ANS: C	PTS: 1	OBJ: ART
59. ANS: F	PTS: 1	
60. ANS: G	PTS: 1	
61. ANS: A	PTS: 1	
62. ANS: D	PTS: 1	
63. ANS: E	PTS: 1	
64. ANS: B	PTS: 1	

ESSAY

1. Compare the structure and function of lysosomes and peroxisomes.

ANS:

Lysosomes serve as the intracellular digestive system. They contain hydrolytic enzymes and, in addition to breaking down raw ingredients, they also remove worn-out organelles.

Peroxisomes contain oxidative enzymes and perform detoxifying activities by removing hydrogen atoms from certain organic molecules. Lysosomes serve as the intracellular digestive system. They contain hydrolytic enzymes, and in addition to breaking down raw ingredients, they also remove worn-out organelles.

PTS: 1

2. Explain the relationship between Golgi complex and exocytosis.

ANS:

Vesicles with their selected cargo destined for different sites are wrapped in membranes containing different surface proteins. These surface proteins allow the vesicles to “dock” and unload their cargo at the proper location within the cell. Once a vesicle has docked at its target it opens and empties its content. Secretory vesicles release their contents out of the cell in a process called exocytosis.

PTS: 1

3. Compare the following terms: cellular respiration, oxidative phosphorylation and chemiosmosis.

ANS:

Cellular respiration refers to the collection of intracellular reactions in which nutrient molecules are broken down to form ATP. During the process, oxygen is utilized and carbon dioxide is produced. Oxidative phosphorylation is the process by which ATP is synthesized using the energy released by electrons as they are transferred to oxygen; it takes place at the mitochondrial inner membrane. Chemiosmosis encompasses the last steps of oxidative phosphorylation and involves the production of ATP via the activation of ATP synthase. This enzyme is activated as H^+ moves into the mitochondrial matrix.

PTS: 1

4. Describe the major aspects of the cytoskeleton.

ANS:

The cytoskeleton is composed of microtubules, microfilaments, and intermediate filaments. Microtubules serve a variety of functions including maintaining the shape of cells, coordinating complex intracellular movements, and serving as the main structural component of cilia and flagella. Microfilaments play a major role in cellular contractile systems, including muscle contraction. Intermediate filaments resist mechanical stress placed on cells.

PTS: 1

5. Describe the structure and function of mitochondria.

ANS:

Mitochondria are enclosed by a double membrane—an outer membrane that surrounds the organelle itself and an inner membrane that contains numerous folds, called cristae. The innermost cavity formed by the cristae is called the matrix and is filled with a gel-like solution. These organelles play a major role in ATP production. Citric acid cycle reactions occur in the matrix, and oxidative phosphorylation reactions take place on the inner membrane.

PTS: 1