Chapter 2: Cell Physiology

MULTIPLE CHOICE

1. Which component is NOT always found in a typical human cell?
   a. cytosol
   b. DNA
   c. flagellum
   d. plasma membrane

   ANS: C PTS: 1 REF: 24 BLM: Remember

2. Which structure is NOT located in the cytosol of the cell?
   a. ER
   b. lysosome
   c. mitochondrion
   d. nucleolus

   ANS: D PTS: 1 REF: 25 BLM: Remember

3. Which organelle is NOT covered by a membrane?
   a. Golgi body
   b. lysosome
   c. mitochondrion
   d. ribosome

   ANS: D PTS: 1 REF: 25 BLM: Remember

4. Which statement concerning cells is NOT correct?
   a. Cells serve as the living building blocks of the body.
   b. The average human cell is about 100 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 colourless and transparent so they must be stained for visualization under a microscope.

   ANS: B PTS: 1 REF: 23 BLM: Remember

5. Which statement regarding the plasma membrane is NOT correct?
   a. It serves as a mechanical barrier to hold in the contents of the cell.
   b. It selectively controls movement of molecules between the ECF and the ICF.
   c. It contains proteins that provide receptor sites for membrane functions.
   d. It has cholesterol to determine the fluidity of the membrane.

   ANS: A PTS: 1 REF: 32 BLM: Remember

6. Which statement is correct for the rough endoplasmic reticulum?
   a. It does not contain ribosomes.
   b. It synthesizes proteins for export from the cell or for use in construction of a new cellular membrane.
   c. It is abundant in cells that specialize in lipid metabolism.
   d. It is abundant in liver cells.

   ANS: B PTS: 1 REF: 25 BLM: Remember

7. The rough ER is a membranous system. With what is it associated?
   a. chromosomes
   b. lysosomes
   c. microfilaments
   d. ribosomes

   ANS: D PTS: 1 REF: 25 BLM: Remember

8. Of the organelles below, which occurs in the lowest numbers within a typical human cell?
   a. mitochondria
   b. vaults
   c. peroxisomes
   d. nuclei

   ANS: D PTS: 1 REF: 24 BLM: Remember

9. What can be found within the nucleus?
   a. deoxyribonucleic acid
   b. cytosol
   c. plasma membrane
   d. endoplasmic reticulum

   ANS: A PTS: 1 REF: 24 BLM: Remember

10. Which statement is NOT correct regarding ribosomes?
    a. They are composed of RNA.
    b. They assemble polypeptides.
    c. They may be bound to endoplasmic reticulum.
    d. They are covered by a membrane.

    ANS: D PTS: 1 REF: 25 BLM: Remember

11. Which statement is correct for smooth endoplasmic reticulum?
    a. It is most abundant in cells specialized for protein secretion.
    b. It gives rise to transport vesicles containing newly synthesized molecules wrapped in a layer of smooth ER membrane.
    c. It consists of stacks of relatively flattened sacs called cisternae.
    d. It has many ribosomes.

    ANS: B PTS: 1 REF: 25 BLM: Remember

12. Which structure is NOT associated with the secretion of proteins produced by ER?
    a. Golgi complex
    b. smooth ER
    c. transport vesicles
    d. lysosomal membrane

    ANS: D PTS: 1 REF: 25 BLM: Remember

13. Which statement is NOT correct regarding the Golgi complex?
    a. It sorts and directs products to their final destination.
    b. It modifies proteins chemically.
    c. It produces secretory vesicles.
    d. It is responsible for protein synthesis.

    ANS: D PTS: 1 REF: 53 BLM: Remember

14. Which of the following does NOT apply to lysosomes?
    a. They contain powerful hydrolytic enzymes.
    b. They generate hydrogen peroxide.
    c. They remove useless parts of the cell.
    d. They attack foreign materials engulfed by the cell by means of endocytosis.

    ANS: B PTS: 1 REF: 25 BLM: Remember

15. Which of the following refers to extrusion of materials to the exterior of the cell through the plasma membrane?
    a. endocytosis
    b. exocytosis
    c. phagocytosis
    d. pinocytosis

    ANS: B PTS: 1 REF: 53 BLM: Remember

16. Which of the following refers to the form of endocytosis in which whole cells such as bacteria are brought in?
    a. exocytosis
    b. pinocytosis
    c. receptor-mediated endocytosis
    d. phagocytosis

    ANS: D PTS: 1 REF: 51 BLM: Remember

17. What does the SNARE complex provide?
    a. recognition of foreign proteins in the cell
    b. binding of correct enzyme with correct substrate
    c. means to deliver vesicles to an appropriate site
    d. receptor-mediated endocytosis

    ANS: C PTS: 1 REF: 53 BLM: Higher Order

18. Which statement does NOT correctly characterize mitochondria?
    a. They have an inner fluid filled space called the cristae.
    b. They possess their own DNA.
    c. They are the site for cell respiration.
    d. Their inner membranes possess electron carriers.

    ANS: A PTS: 1 REF: 25 BLM: Remember

19. Where do the citric acid cycle reactions occur?
    a. cytoplasm
    b. cytosol
    c. inner-mitochondrial membrane
    d. mitochondrial matrix

    ANS: D PTS: 1 REF: 27 BLM: Remember

20. What accounts for the most ATP production?
    a. Kreb's cycle
    b. citric acid cycle
    c. NADH
    d. electron transport and oxidative phosphorylation

    ANS: D PTS: 1 REF: 26 BLM: Higher Order

21. In aerobic respiration process of the cells, where is CO_2 released?
    a. during glycolysis
    b. in the electron transport chain
    c. during Kreb's cycle
    d. during fermentation

    ANS: C PTS: 1 REF: 31 BLM: Higher Order

22. 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.

    ANS: C PTS: 1 REF: 27 BLM: Higher Order

23. What is the carbon-based end product (chain) of glycolysis?
    a. NADH
    b. ATP
    c. pyruvic acid
    d. $FADH_2$

    ANS: C PTS: 1 REF: 27 BLM: Higher Order

24. Why does anaerobic respiration take place when O_2 is unavailable?
    a. to continue releasing at least some energy from molecules and generate ATP
    b. to prevent cell death
    c. to make use of available glucose
    d. to prevent protein breakdown

    ANS: A PTS: 1 REF: 31 BLM: Higher Order

25. What does chemiosmosis do?
    a. releases CO_2
    b. extracts energy from an H^+ concentration gradient
    c. reduces NAD
    d. ferments pyruvic acid to lactic acid

    ANS: B PTS: 1 REF: 30 BLM: Higher Order

26. Which statement is correct for the electron transport chains?
    a. They are "circuits" for small amounts of electricity to pass through.
    b. They are made of proteins.
    c. They deliver energy to cytochrome to pump H^+ into the intermembrane space.
    d. They do not need oxygen to be available.

    ANS: C PTS: 1 REF: 29 BLM: Higher Order

27. Where are cristae found?
    a. lysosome
    b. mitochondrion
    c. nucleolus
    d. nucleus

    ANS: B PTS: 1 REF: 25 BLM: Remember

28. Which of the following is NOT a correct association?
    a. ATP/high-energy bonds
    b. electron transport chain/mitochondrion
    c. glycolysis/anaerobic
    d. pyruvic acid/five-carbon molecule

    ANS: D PTS: 1 REF: 26 BLM: Higher Order

29. Which statement is correct for an anaerobic condition?
    a. Oxygen is plenty.
    b. The degradation of glucose cannot proceed beyond glycolysis.
    c. Mitochondrial processing of nutrient molecules takes place.
    d. It produces a high yield of oxygen molecules.

    ANS: B PTS: 1 REF: 31 BLM: Remember

30. What is the universal energy currency in cells?
    a. ATP
    b. glucose
    c. glycogen
    d. insulin

    ANS: A PTS: 1 REF: 24 BLM: Remember

31. Which statement regarding the citric acid cycle is NOT correct?
    a. It occurs in the mitochondrial matrix.
    b. Carbon dioxide is released.
    c. Several ATP molecules are produced for each cycle.
    d. Acetyl CoA and oxaloacetic CoA acid initially react to form citric acid.

    ANS: C PTS: 1 REF: 27 BLM: Remember

32. Which molecule directly enters the citric acid cycle?
    a. acetyl CoA
    b. adenosine diphosphate
    c. citric acid
    d. oxaloacetic acid

    ANS: A PTS: 1 REF: 27 BLM: Remember

33. What is the function of ATP synthase?
    a. to act enzymatically
    b. to build membranes
    c. to carry hydrogen
    d. to synthesize ATP

    ANS: D PTS: 1 REF: 29 BLM: Remember

34. Which statement is correct for NADH?
    a. It is an energy carrier.
    b. It plays a role in cellular respiration.
    c. It is used in glycolysis.
    d. It is used in the citric acid cycle.

    ANS: A PTS: 1 REF: 29 BLM: Higher Order

35. What is the purpose of glycolysis?
    a. to produce citric acid
    b. to liberate energy from glucose
    c. to produce large numbers of ATP
    d. to trap energy in $FADH_2$

    ANS: B PTS: 1 REF: 26 BLM: Remember

36. What is the definition of *aerobic*?
    a. in the blood
    b. with carbon dioxide
    c. with oxygen
    d. without carbon dioxide

    ANS: C PTS: 1 REF: 26 BLM: Remember

37. Which statement is NOT correct about vaults?
    a. They may play a role in drug resistance.
    b. Their shape resembles octagonal barrels.
    c. They are smaller than ribosomes.
    d. They are a type of organelle.

    ANS: C PTS: 1 REF: 25 BLM: Remember

38. Which element is NOT a part of the cytoskeleton?
    a. inclusions
    b. intermediate filaments
    c. microfilaments
    d. microtubular lattice

    ANS: A PTS: 1 REF: 25 BLM: Remember

39. Which statement is correct regarding the bending movements of cilia and flagella?
    a. They are accomplished by alternate solation and gelation of the cytosol.
    b. They involve the alternate assembly and disassembly of actin filaments.
    c. They are produced by the sliding of adjacent microtubule doublets past one another.
    d. They are important in providing motility for many organisms but are not of any use in humans.

    ANS: C PTS: 1 REF: 25 BLM: Remember

40. Which organelles contain oxidative enzymes?
    a. peroxisomes and lysosomes
    b. mitochondria and nucleus
    c. lysosomes and vaults
    d. ribosomes and microtublues

    ANS: A PTS: 1 REF: 25 BLM: Remember

41. Which statement is correct for glycolysis?
    a. It yields two molecules of ATP for each molecule of glucose processed.
    b. It always requires oxygen.
    c. It takes place in the mitochondrial matrix.
    d. It takes place in the mitochondrial inner membrane cristae.

    ANS: A PTS: 1 REF: 26 BLM: Higher Order

42. Which statement is correct for ATP synthase?
    a. It transports hydrogen ions from the matrix to the intermembrane space of the mitochondrion.
    b. It is activated by the flow of hydrogen ions from the intermembrane space to the matrix.
    c. It enzymatically converts ATP to ADP.
    d. It yields two molecules of ATP.

    ANS: B PTS: 1 REF: 29 BLM: Remember

43. Which statement is correct for Nicotimamide adenine dinucleotide (NAD)?
    a. It converts ADP + Pi to ATP.
    b. It is found in the cytosol.
    c. It is a hydrogen carrier molecule.
    d. It is found in the cytosol and is a hydrogen carrier molecule.

    ANS: C PTS: 1 REF: 27 BLM: Remember

44. Which of the following is NOT an action of the cytosol?
    a. duplication of chromosomes
    b. enzymatic regulation of intermediary metabolism
    c. storage of fat and glycogen
    d. synthesis of proteins for use in the cytosol

    ANS: A PTS: 1 REF: 25 BLM: Remember

45. What is the function of the microtrabecular lattice?
    a. to maintain asymmetrical cell shapes
    b. to suspend and functionally link the largest cytoskeletal elements and organelles
    c. to provide cellular contractile systems
    d. to serve as mechanical stiffeners

    ANS: B PTS: 1 REF: 25 BLM: Remember

46. Which of the following is NOT true of the cytoskeleton?
    a. It supports the plasma membrane and is responsible for the particular shape, rigidity, and spatial geometry of each different cell type.
    b. It probably plays a role in regulating cell growth and division.
    c. Its elements are all rigid and permanent structures.
    d. It is responsible for cell contraction and cell movements.

    ANS: C PTS: 1 REF: 34 BLM: Remember

47. In which cells are actin and myosin filaments commonly found?
    a. epithelial cells
    b. muscle cells
    c. nerve cells
    d. red blood cells

    ANS: B PTS: 1 REF: 24 BLM: Remember

48. Which statement regarding microfilaments is NOT correct?
    a. They serve as mechanical stiffeners for microvilli.
    b. They are composed of actin subunits.
    c. They are the smallest elements of the cytoskeleton.
    d. They form mitotic spindles.

    ANS: D PTS: 1 REF: 25 BLM: Remember

49. Which of the following is correct about intermediate filaments?
    a. They comprise mitotic spindles.
    b. They are important in cell regions subject to mechanical stress.
    c. They comprise cilia.
    d. They comprise flagella.

    ANS: B PTS: 1 REF: 25 BLM: Remember

50. Which statement is FALSE?
    a. The number of mitochondria per cell varies depending on the energy needs of each particular cell type.
    b. DNA is enclosed within the cell nucleus and mitochondria.
    c. The mitochondria DNA in our cells are copies of our parent's.
    d. Mitochondria DNA has a limited ability to repair.

    ANS: C PTS: 1 REF: 25 BLM: Higher Order

51. Which of the following organelles is NOT membrane-bound?
    a. lysosome
    b. ribosome
    c. mitochondrion
    d. perioxisomes

    ANS: B PTS: 1 REF: 25 OBJ: Remember
    BLM: Remember

TRUE/FALSE

1. Electron microscopes are about 100 times more powerful than light microscopes.

   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. The nucleus indirectly governs most cellular activities by directing the kinds and amounts of various enzymes and other proteins that are produced by the cell.

   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 are one site of protein synthesis.

    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. Secretory vesicles are about 200 times larger than transport vesicles.

    ANS: T PTS: 1

15. Coated vesicles enclose a representative mixture of proteins present in the Golgi sac before budding off.

ANS: F PTS: 1

16. All cell organelles are renewable.

ANS: T PTS: 1

17. Mitochondria are presumably descendants of primitive bacterial cells.

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 extracellular fluids.

ANS: F PTS: 1

20. The peroxisomes mainly generate hydrogen peroxide.

ANS: T PTS: 1

21. Glycolysis generates ATP from glucose with high efficiency.

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. Oxidative phosphorylation generates the most ATP per glucose molecule.

ANS: T PTS: 1

25. Dynein is a mitochondrial enzyme.

ANS: F PTS: 1

26. Cytokinesis is the division of the nucleus during mitosis.

ANS: F PTS: 1

27. Amoeboid movement is accomplished by transitions of the cytosol between a gel and a solid 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 micro trabecular lattice that persists after the surface skin cells die.

    ANS: F PTS: 1

29. Cilia in the respiratory tract beat in the same direction to sweep inspired particles up and out of the airways.

    ANS: T PTS: 1

30. Hockey is a winter sport that uses only aerobic energy supply.

    ANS: F PTS: 1

31. Lack of aerobic exercise can have negative health implications, such as heart disease and high blood pressure.

    ANS: T PTS: 1

COMPLETION

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

   ANS:
   plasma membrane, nucleus, cytoplasm
   nucleus, cytoplasm, plasma membrane
   cytoplasm, plasma membrane, nucleus

   PTS: 1

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

   PTS: 1

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

   ANS: Messenger

   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 signal-recognition protein recognizes both the _____ on the ribosome and the _____ on the ER then delivers the proper ribosome to the proper site on the rough ER for binding.

   ANS: leader sequence, ribophorin

   PTS: 1

7. Insulin is a long _____ chain.

   ANS: polypeptide

   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 _____ions.

   ANS: calcium

   PTS: 1

10. Products destined for intracellular transport are packaged in _____, whereas products for export are packaged in _____.

    ANS: coated vesicles, secretory vesicles

    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. _____, an enzyme found in peroxisomes, decomposes potentially toxic hydrogen peroxide.

    ANS: Catalase

    PTS: 1

17. ADP and Pi are formed from the breakdown of the molecule _____.

    ANS:
    adenosine triphosphate
    ATP

    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 _____ and _____ molecules.

    ANS:
    water, oxygen
    oxygen, water

    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: pyruvic acid

    PTS: 1

22. The metabolism of acetyl CoA into the citric acid cycle depends on the availability of _____ for the cell.

    ANS: oxygen

    PTS: 1

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

    ANS: mitochondrion

    PTS: 1

24. Adipose tissue stores _____.

    ANS: fat

    PTS: 1

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

    ANS: Microtubules

    PTS: 1

26. Microfilaments are composed of the protein _____.

    ANS: actin

    PTS: 1

27. One of the diseases caused by neurofilament abnormalities is _____.

    ANS: amyotropic lateral sclerosis

    PTS: 1

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

    ANS: basal body

    PTS: 1

MATCHING

Indicate which of the characteristics applies to each item by using the answer code (options may be used more than once or not at all).

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
3. ANS: A PTS: 1
4. ANS: B PTS: 1
5. ANS: C PTS: 1
6. ANS: A PTS: 1
7. ANS: C PTS: 1

Complete the sentences by matching the appropriate vesicle(s) by using the answer code (options may be used more than once or not at all).

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
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 by using the answer code (options may be used more than once or not at all).

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

16. houses the cell's DNA
17. responsible for cell shape and movement
18. 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. site of intermediary metabolism
22. permit incompatible chemical reactions to occur simultaneously in the cell
23. separates contents of the cell from its surroundings
24. 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 by using the answer code (options may be used more than once or not at all).

a. ER
b. Golgi complex
c. lysosome
d. peroxisome
e. mitochondrion
f. vault
g. free ribosome
h. microtubule
i. microfilament

25. contains powerful oxidative enzymes important in detoxifying various wastes
26. an important component of cilia and flagella
27. one continuous extensive organelle consisting of a network of tubules and flattened filament
28. removes unwanted cellular debris and foreign material
29. 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. shaped like an octagonal barrel

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

Match the term to its description by using the answer code (options may be used more than once or not at all).

a. flagella
b. cilia
c. microvilli

34. 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. 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 by using the answer code (options may be used more than once or not at all).

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

41. the largest of the cytoskeletal elements
42. present in parts of the cell subject to mechanical stress
43. smallest element visible with a conventional electron microscope
44. consist of actin
45. organizes the glycolytic enzymes in a sequential alignment
46. form the mitotic spindle
47. essential for creating and maintaining an asymmetrical cell shape
48. composed of tubulin
49. provide a pathway for axonal transport
50. 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

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 the correct characteristic by using the answer code.

a. dynamin
b. tubulin
c. kinesin
d. actin
e. ribophorin

53. causes pinching off of endocytic vesicles
54. serve as binding sites for ribosomes
55. comprises intermediate filaments
56. comprises microtubules
57. provides for transport of vesicles

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

ESSAY

1. Describe the pathway that newly synthesized polypeptides take en route for secretion.

   ANS:
   Student responses will vary.

   PTS: 1

2. Describe aerobic cellular respiration from a mechanistic point of view.

   ANS:
   Student responses will vary.

   PTS: 1

3. How is ATP synthesized via electron transport and oxidative phosphorylation?

   ANS:
   Student responses will vary.

   PTS: 1

4. Describe the major aspects of the cytoskeleton.

   ANS:
   Student responses will vary.

   PTS: 1

5. Describe the structure and function of cilia and flagella.

   ANS:
   Student responses will vary.

   PTS: 1

PROBLEM

1. Michael is using the electron microscope at the hospital to review the structures of skeletal muscle cells. He notices that the skeletal muscle cells have many nuclei and are loaded with mitochondria. Why is this so?

   ANS:
   Student responses will vary.

   PTS: 1

SHORT ANSWER

1. Describe the differences between rough ER and smooth ER.

   ANS:
   Student responses will vary.

   PTS: 1

