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EGYPTIAN
SCHOLASTIC
TEST

EST II

BIOLOGY

LEVEL

UP

2025 EDITION

CLASSIFIED

Classified

**QUESTIONS
BANK**

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Chapter 1: Biochemistry

1. A solution with a pH of 2 is _____ times more acidic than one with a pH of 5.
 - (A) 3
 - (B) 10
 - (C) 100
 - (D) 1,000
 - (E) 10,000

 2. All of the following are correct about enzymes EXCEPT
 - (A) the mechanism by which enzymes work is known as lock and key
 - (B) they are proteins
 - (C) they denature at high temperatures
 - (D) they are assisted by vitamins and minerals
 - (E) enzymes are not degraded during a reaction

 3. All of the following are correct about water EXCEPT
 - (A) water is a molecule
 - (B) there is little attraction between water molecules
 - (C) the covalent bonds between oxygen and hydrogen are polar or unbalanced
 - (D) the reason that water and lipids do not mix is because water is a polar molecule while lipids are nonpolar
 - (E) water has a relatively high heat of vaporization because of strong intermolecular attractions

 4. Which is NOT a characteristic of water?
 - (A) Water has a high specific heat.
 - (B) Water has a high heat of vaporization.
 - (C) Water exhibits strong cohesion tension.
 - (D) Water is less dense than ice.
 - (E) Water is known as a universal solvent.

 5. The pH of blood in humans
 - (A) is lowest at birth and gradually increases with age up to a maximum level
 - (B) is different for men and women
 - (C) varies with the activity level of the individual
 - (D) is highest at birth and gradually decreases to a minimum level
 - (E) is normally 7.4 and resists change at all times

 6. Which of the following is NOT a carbohydrate?
 - (A) Glucose
 - (B) Lactose
 - (C) Insulin
 - (D) Starch
 - (E) Sucrose

 7. Which of the following is NOT a polysaccharide?
 - (A) Cellulose
 - (B) Glycogen
 - (C) Chitin
 - (D) Glycerol
 - (E) Starch

 8. Which of the following is correctly matched?
 - (A) Proteins—nucleotides
 - (B) Lipids—glycerol
 - (C) Carbohydrates—amino acids
 - (D) DNA—glucose
 - (E) None of the above is correctly matched
- Question 9-15**
- Choose from these structural formulas below
- (A)

(B)

(C)
- (D)

(E)
9. This is a monosaccharide.
 10. This is necessary for growth and repair of tissue.
 11. This combines with fatty acids to form lipids.
 12. This is used as a quick energy source.
 13. This is linked to cardiovascular disease.
 14. This is an important part of any protein.
 15. This consists of a sugar, a phosphate, and a nitrogenous base

Chapter1: Biochemistry Cont.

Questions 16-18

Match the description to the property of water.

- (A) Water exhibits strong cohesion tension.
- (B) Water has a high heat of vaporization.
- (C) Water has a high specific heat.
- (D) Ice is less dense than water.
- (E) Water is a universal solvent.

16. Water moves up tall trees because this is true.

17. Sweating is a cooling process because of this characteristic of water.

18. Fish can live through the winter in a lake that has ice floating on the surface.

19. Isotopes differ from each other only in

- (A) the number of electrons
- (B) the number of protons
- (C) the number of neutrons
- (D) how they react chemically
- (E) the size of the atom

20. All of the following are correct about enzymes EXCEPT

- (A) enzymes are organic catalysts
- (B) enzymes lower the energy of activation
- (C) enzymes are assisted by cofactors
- (D) enzymes are affected by changes in temperature but not changes in pH
- (E) enzymes are larger than the substrates they work on

21. A polysaccharide found in plants whose function is storage is

- (A) starch
- (B) glycogen
- (C) chitin
- (D) glucagon
- (E) cellulose

22. Enzymes function because of their particular shape or conformation. Which level of protein structure is most directly responsible for the shape of a protein?

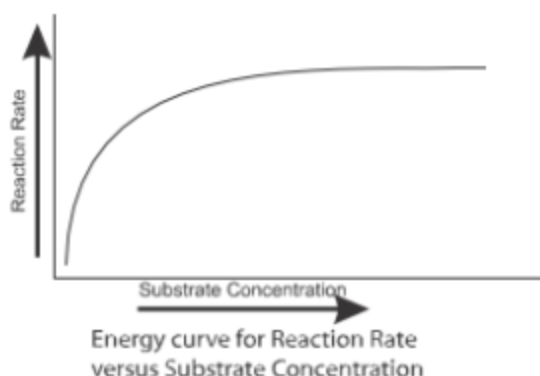
- (A) Primary
- (B) Secondary
- (C) Tertiary
- (D) Quaternary
- (E) Cannot be determined

23. The radioisotope 1-131 is used to diagnose and treat diseases of the

- (A) brain
- (B) thyroid
- (C) pancreas
- (D) lungs
- (E) stomach

Chapter1: Biochemistry Cont.

24. In the reaction rate versus substrate concentration graph below, the curve plateaus because



- (A) a noncompetitive inhibitor is present.
- (B) a competitive inhibitor is present.
- (C) all the substrate has been converted to product.
- (D) the active site is saturated with substrate.
- (E) the cofactor is locked in an inactive conformation.

25. Which of the following terms does NOT refer to an example of a weak force of interaction between two molecules?

- (A) covalent bond
- (B) Van der Waals bond
- (C) hydrophobic bond
- (D) electrostatic bond
- (E) hydrogen bond

26. The element found in all amino acids that is NOT found in carbohydrates is

- (A) sulfur.
- (B) carbon.
- (C) oxygen.
- (D) hydrogen.
- (E) nitrogen.

27. Which of the following would NOT have hydrophilic properties?

- (A) OH
- (B) molecules in aqueous solution
- (C) long hydrocarbon chains
- (D) ionized molecules
- (E) polar molecules

28. Which of the following is NOT found in DNA?

- (A) uracil
- (B) thymine
- (C) phosphate
- (D) adenine
- (E) deoxyribose sugar

29. Elements used for making molecules found in living systems must

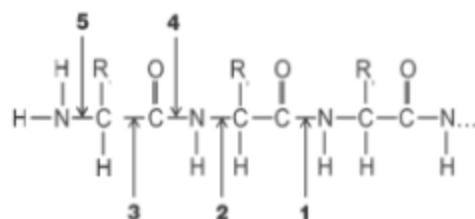
- (A) contain nitrogen and sulfur.
- (B) be hydrophilic.
- (C) be covalent.
- (D) be water soluble and ionic.
- (E) be suitable and available.

30. Which of the following is NOT a property of water?

- (A) hydrophilic properties
- (B) hydrophobic properties
- (C) very good solvent
- (D) density as a solid is less than that as a liquid
- (E) strong surface tension

31. Which of the following are weak forces usually associated with biological molecules?

- (A) hydrogen bonds
- (B) electrostatic interactions
- (C) covalent bonds
- (D) ionic bonds
- (E) both (A) and (B)



32. Which arrow(s) point to a peptide bond?

- (A) 1
- (B) 1 and 4
- (C) 2
- (D) 3
- (E) 2 and 5

Chapter1: Biochemistry Cont.

33. As a reaction proceeds, reactants form a transition state, which then forms the products.

An enzyme affects the energy of the

- (A). products only
- (B). reactants only
- (C). transition state only
- (D). products and reactants
- (E). transition state and products

34. Which term most nearly means substrate?

- (A). Reactant
- (B). Product
- (C). Activation energy
- (D). Active site
- (E). Inhibitor

35. Which of these describes a characteristic of the induced-fit model but not the lock-and-key model?

- (A). The substrate binds to the active site.
- (B). The enzyme lowers the activation energy of the reaction.
- (C). The enzyme is changed by the substrate.
- (D). The substrate is chemically changed by the enzyme.
- (E). The enzyme is altered by the reaction.

36. Which of these is likely to reduce enzyme activity?

- I. Increasing pH level
- II. Decreasing temperature
- III. Placing enzyme in a nonpolar liquid

- (A). I only
- (B). II only
- (C). III only
- (D). I and II
- (E). I, II, and III

Chapter: Biochemistry Answer

1	D	14	B	27	C
2	A	15	E	28	A
3	B	16	A	29	E
4	D	17	B	30	B
5	E	18	D	31	E
6	C	19	C	32	B
7	D	20	D	33	C
8	B	21	A	34	A
9	A	22	C	35	C
10	B	23	B	36	E
11	D	24	D		
12	A	25	A		
13	C	26	E		

Chapter 2: The Cell (Cytology)

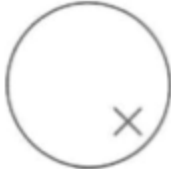
Questions 1-3

Choose from the terms below.

- (A) Smooth endoplasmic reticulum
- (B) Nucleolus
- (C) Ribosomes
- (D) Lysosomes
- (E) Golgi apparatus

1. The site of protein production C
2. Found in large quantities in white blood cells and other phagocytizing cells
3. The site of RNA production
4. Which of the following would most likely be the diameter of a eukaryotic cell?
 - (A) 1.0 μm
 - (B) 100 μm
 - (C) 1000 μm
 - (D) 1.0 nm
 - (E) 10 nm
5. One difference between a plant cell and an animal cell is
 - (A) only plant cells have chloroplasts while only animal cells have mitochondria
 - (B) only plant cells have large vacuoles
 - (C) only animal cells have nucleoli
 - (D) only animal cells have plasma membranes
 - (E) animal cells form a cleavage furrow when they divide
6. All of the following are true of the electron microscope EXCEPT
 - (A) the resolution is greater than that using a light microscope
 - (B) the magnification can be greater than 100,000x
 - (C) living specimens can be studied in great detail
 - (D) a narrow beam of electrons forms an image
 - (E) it takes hours to prepare a specimen for viewing
7. All of the following are correct about prokaryotes EXCEPT
 - (A) they have one chromosome
 - (B) they contain ribosomes
 - (C) they are smaller than eukaryotic cells
 - (D) they can be either anaerobic or aerobic
 - (E) they contain small mitochondria
8. The phase-contrast microscope
 - (A) uses a beam of electrons to form an image
 - (B) was developed by Robert Hooke
 - (C) was developed by Anton van Leeuwenhoek
 - (D) is commonly used to study genes
 - (E) is useful in examining unstained, living tissue
9. Which would be best to study the structure of thousands of mitochondria?
 - (A) Dissecting instruments and the scanning electron microscope
 - (B) Dissecting instruments and the transmission electron microscope
 - (C) Ultracentrifuge and the transmission electron microscope
 - (D) Ultracentrifuge and the scanning electron microscope
 - (E) Dissecting tools and the light microscope
10. What would occur if a plant cell were placed into a strong hypertonic solution?
 - (A) Nothing would happen because the cell wall would prevent any movement of water or salt.
 - (B) It would shrink because water would flow toward the more concentrated solution.
 - (C) It would swell because salt would flow into the cell.
 - (D) It would shrink because water would flow into the cell.
 - (E) It would swell because water and salt would flow down the gradient and into the cell.
11. Which process requires energy?
 - (A) Passive diffusion
 - (B) Facilitated diffusion of calcium through a channel
 - (C) Water flowing into a paramecium in a lake
 - (D) A contractile vacuole removing water from an amoeba
 - (E) Osmosis of water into a cell
12. The ability to respond to stimuli is
 - (A) called irritability
 - (B) called locomotion
 - (C) characteristic of nerve cells only
 - (D) characteristic of multicellular organisms only
 - (E) regulation

Chapter2: The Cell (Cytology) Cont.

13. All of the following are true of the smooth endoplasmic reticulum EXCEPT
- (A) it connects the rough endoplasmic reticulum to the Golgi apparatus
 - (B) it detoxifies the cell
 - (C) it synthesizes steroids
 - (D) it manufactures proteins
 - (E) it synthesizes lipids
14. Microtubules
- (A) form the cleavage furrow in a dividing cell
 - (B) enable an amoeba to send out a pseudopod
 - (C) are made of actin and help support the shape of a cell
 - (D) are hollow tubes that make up cilia and flagella
 - (E) are made of myosin and are key to skeletal muscle contraction
15. "Nine plus two" refers to the
- (A) configuration of microtubules in cilia and flagella
 - (B) configuration of microtubules in centrioles and spindle fibers
 - (C) configuration of microfilaments in cilia and flagella
 - (D) configuration of microfilaments in centrioles and spindle fibers
 - (E) configuration of myosin filaments in skeletal muscle
16. According to the theory of endosymbiosis,
- (A) autotrophic cells were the first to evolve
 - (B) heterotrophic cells were the first to evolve
 - (C) chloroplasts evolved from mitochondria
 - (D) mitochondria evolved from chloroplasts
 - (E) chloroplasts and mitochondria evolved when free-living prokaryotes permanently took up residence inside larger prokaryotic cells
17. The circle indicates the position of the letter X as seen in the field of your compound light microscope. To get the letter X into the center of the field, you would have to move the slide
- (A) to the right and down
 - (B) to the left and up
 - (C) to the left and down
 - (D) to the right and up
 - (E) it depends on the brand of microscope
- 
18. All of the following are correct about mitochondria EXCEPT
- (A) they are the site of cellular respiration
 - (B) they contain their own DNA
 - (C) they are the site of photosynthesis
 - (D) they can self-replicate
 - (E) they contain an outer double membrane
19. All of the following are correct about plant cells EXCEPT
- (A) they usually contain one large vacuole
 - (B) lysosomes contain hydrolytic enzymes for intracellular digestion
 - (C) they store pigments in chromoplasts
 - (D) they may have secondary cell walls in addition to primary cell walls
 - (E) they have no centrioles
20. Which of the following involves growing living cells?
- (A) Freeze fracture
 - (B) Freeze-etching
 - (C) Cell fractionation
 - (D) Tissue culture
 - (E) Apoptosis
21. Which of the following is NOT involved in the synthesis of proteins?
- (A) rough ER
 - (B) smooth ER
 - (C) Golgi body
 - (D) ribosomes
 - (E) RNA
22. Which of the following produces ATP during aerobic respiration?
- (A) chloroplast
 - (B) nucleus
 - (C) ER
 - (D) mitochondrion
 - (E) ribosomes

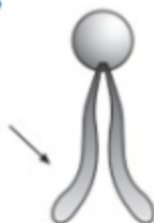
Chapter2: The Cell (Cytology) Cont.

23. If the concentration of a solute differs across a membrane permeable only to water, water will move across the membrane by
- (A) facilitated transport.
 - (B) osmosis.
 - (C) phagocytosis.
 - (D) active transport.
 - (E) exocytosis.
24. The _____ is a rigid structure that gives the cell support in plants.
- (A) vacuole
 - (B) cell wall
 - (C) microfilament
 - (D) nucleus
 - (E) centriole
25. Which of the following often distinguishes plant cells from animal cells?
- (A) centrioles
 - (B) nucleus
 - (C) chromatin
 - (D) rough ER
 - (E) bilayer plasma membrane
26. Which of these cell structures contains one or more membranes?
- I. Ribosome
 - II. Plasma membrane
 - III. Endoplasmic reticulum
 - IV. Golgi body
- (A). II only
 - (B). IV only
 - (C). I and II
 - (D). I, II, and III
 - (E). II, III, and IV
27. Cyanobacteria are photosynthetic prokaryotes. Which organelles do cyanobacteria cells contain?
- I. Chloroplasts
 - II. Nucleus
 - III. Ribosomes
- (A). I only
 - (B). II only
 - (C). III only
 - (D). I and II only
 - (E). I and III only

Chapter2: The Cell (Cytology) Cont.

28. Which of these BEST describes the part of the molecule shown?

- (A). It is hydrophilic.
- (B). It forms the outer layer of the plasma membrane.
- (C). It is composed of phosphate atoms.
- (D). It contains nonpolar covalent bonds.
- (E). It is capable of hydrogen bonding.



29. A plant cell is placed in a hypotonic solution. As a result, the cell will

- (A). lyse
- (B). swell but remain intact
- (C). shrivel
- (D). remain unchanged
- (E). take up solutes

30. A solute cannot move into a cell by crossing the phospholipid bilayer of the membrane. It can, however, enter through a membrane protein. The fact that solute molecules are entering the cell MOST LIKELY indicates that

- (A). energy is being expended by the cell
- (B). the solute is moving against its concentration gradient
- (C). the solute molecules are hydrophilic
- (D). the cell is in a hypotonic solution
- (E). solute concentration is higher inside than outside the cell

Chapter: The Cell (Cytology) Answer

1	c	11	D	21	B
2	D	12	A	22	D
3	B	13	D	23	B
4	B	14	D	24	B
5	E	15	A	25	A
6	C	16	E	26	E
7	E	17	A	27	C
8	E	18	C	28	D
9	C	19	B	29	B
10	B	20	D	30	C

Chapter3: The Cell Division

Questions 1-6

- (A) Mitotic cell division
(B) Meiotic cell division
- The human liver can be induced to regenerate when liver cells become damaged and need to be replaced.
 - A fertilized egg grows into a fetus and then a baby during a nine-month gestation period.
 - Human males begin to produce sperm at puberty.
 - A fertilized ovum undergoes rapid cell division immediately after it is fertilized by a sperm cell.
 - A cut on your skin heals.
 - A cancerous tumor grows larger.
 - Which of the following does NOT occur by mitosis?
(A) Growth
(B) Production of gametes
(C) Repair
(D) Development of an embryo
(E) Cleavage furrow forms in animal cells

Questions 8-9



- How many chromosomes are in this cell?
(A) 0
(B) 2
(C) 3
(D) 4
(E) Cannot be determined
- How many chromatids are in this cell?
(A) 0
(B) 2
(C) 3
(D) 4
(E) Cannot be determined

10. In which stage in the life of a cell is the nucleolus visible?

- (A) Prophase
(B) Anaphase
(C) Telophase
(D) Cytokinesis
(E) Interphase

11. Which of the following is NOT found in plant cells?

- (A) Cell plate
(B) Cleavage furrow
(C) Middle lamella
(D) Centromere
(E) Chromatids

12. If a cell has 12 chromosomes at the beginning of meiosis, how many chromosomes will it have at the end of meiosis?

- (A) 6
(B) 12
(C) 24
(D) 48
(E) It varies with the species.

13. If a cell has 12 chromosomes at the beginning of mitosis, how many will it have at the end of mitosis?

- (A) 6
(B) 12
(C) 24
(D) 48
(E) It varies with the species.

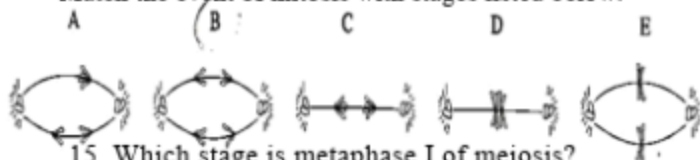
14. All of the following are true of meiosis in plants EXCEPT

- (A) Crossing-over occurs during prophase.
(B) There is no replication of chromosomes between meiosis I and meiosis II.
(C) Spindle fibers are attached to the centriole.
(D) Synapsis occurs during prophase.
(E) Homologous pairs of chromosomes line up on the metaphase plate in meiosis I

Chapter3: The Cell Division Cont.

Questions 15-17

Match the event of mitosis with stages listed below.



15. Which stage is metaphase I of meiosis?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

16. Which stage is metaphase II of meiosis?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

17. Which stage is anaphase II of meiosis?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

18. Cells that retain the ability to divide indefinitely and which can differentiate into any type of cell are called

- (A) cyclins
- (B) divisible cells
- (C) stem cells
- (D) internal regulators
- (E) external regulators

19. Chromosomes become visible for the first time during

- (A) interphase
- (B) prophase
- (C) metaphase
- (D) anaphase
- (E) telophase

20. Chromosomes replicate during

- (A) interphase
- (B) prophase
- (C) metaphase
- (D) anaphase
- (E) telophase

21. Which of the following stages of the cell cycle occurs immediately prior to mitosis?

- (A) G1
- (B) G2
- (C) S
- (D) M
- (E) cytokinesis

Questions 22–24 refer to the following choices. Decide which best matches the descriptions below.

- (A) interphase
- (B) prophase
- (C) metaphase
- (D) anaphase
- (E) telophase

22. Chromosomes replicate.

23. Cytokinesis begins.

24. Chromosomes are pulled to opposite poles of the cell.

Chapter3: The Cell Division Cont.

25. A cell contains multiple nuclei with identical genetic information. This cell most likely formed by going through
- (A). multiple rounds of mitosis, but no cytokinesis
 - (B). multiple rounds of the M phase, but no rounds of the S phase
 - (C). multiple rounds of cytokinesis, but no rounds of mitosis
 - (D). multiple rounds of the cell cycle, but no rounds of mitosis
 - (E). multiple rounds of the S phase, but no other phases of the cell cycle
26. What is the correct sequence of these events in the cell cycle?
- I. Nuclear membrane dissolves.
 - II. Cell size increases.
 - III. Two daughter cells form.
 - IV. DNA replicates.
- (A). I, IV, II, III
 - (B). I, IV, III, II
 - (C). II, I, IV, III
 - (D). II, IV, I, III
 - (E). IV, II, III, I

Chapter: The Cell Division Answer

1	A	11	B	21	B
2	A	12	A	22	A
3	B	13	B	23	E
4	A	14	C	24	D
5	A	15	D	25	A
6	A	16	E	26	D
7	B	17	B		
8	B	18	C		
9	D	19	B		
10	E	20	A		

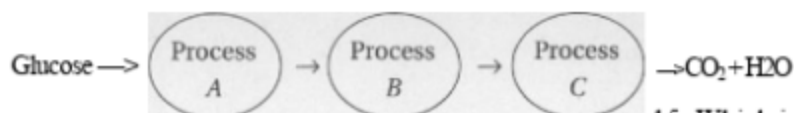
Chapter4/5: Cellular Respiration and Photosynthesis

- All of the following are correct about cell respiration EXCEPT
 - it is an oxidative process
 - all plant and animal cells carry out respiration all the time
 - it consists of glycolysis, Krebs cycle, and the electron transport chain
 - oxygen molecules are pumped across the cristae membrane to the outer compartment
 - most ATP is produced during cell respiration as a result of the electron transport chain and chemiosmosis
- Glycolysis
 - produces water
 - requires oxygen
 - involves an electron transport chain
 - is the breakdown of glucose to produce pyruvic acid
 - produces carbon dioxide
- The electron transport chain is located in the
 - cytoplasm
 - cristae of the mitochondria
 - outer compartment of mitochondria
 - inner matrix
 - Golgi body
- Each NADH molecule carrying protons to the electron transport chain can produce molecules of ATP.
 - 1
 - 2
 - 3
 - 20
 - an unlimited number of
- Which of the following is the most important thing that occurs during cell respiration?
 - CO_2 is produced during the Krebs cycle.
 - Protons and electrons combine with oxygen to form water.
 - Oxygen is released.
 - A proton gradient is created.
 - ATP is produced.
- The loss of electrons is known as
 - reduction
 - oxidation
 - redox
 - electron transport chain
 - lysis
- The immediate result of the electron transport chain is
 - water is produced
 - ATP is produced
 - lactic acid is produced
 - glucose is broken down into 2 pyruvic acid molecules
 - a proton gradient is created
- The role of oxygen in aerobic respiration is
 - to transport CO_2
 - as the final proton and electron acceptor in the electron transport chain
 - to transport electrons in glycolysis
 - to provide electrons for the electron transport chain
 - most important in the Krebs cycle
- Which of the following is a waste product of aerobic cell respiration?
 - Water
 - Carbon dioxide
 - ATP
 - I only
 - II only
 - I and II only
 - III only
 - I, II, and III

Chapter 4/5: Cellular Respiration and Photosynthesis

Questions 10-15

The three circles represent three major processes in aerobic respiration.



10. Process A represents

- (A) glycolysis
- (B) the Krebs cycle
- (C) the electron transport chain
- (D) alcohol fermentation
- (E) lactic acid fermentation

11. Process A occurs in

- (A) mitochondria
- (B) chloroplasts
- (C) the nucleus
- (D) the cytoplasm
- (E) different organelles in different cells

12. Process C represents

- (A) glycolysis
- (B) the Krebs cycle
- (C) the electron transport chain
- (D) alcohol fermentation
- (E) lactic acid fermentation

13. Which of the following is correct about these processes?

- (A) Process A requires energy.
- (B) Process B requires energy.
- (C) Process C requires energy.
- (D) Process A depends on a gradient.
- (E) Process B releases oxygen.

14. Which is true about process C?

- (A) It requires water.
- (B) It is universal. It is the way all organisms produce energy.
- (C) It involves the membrane structure ATP synthetase.
- (D) It only occurs in animals, not plants.
- (E) It results in the by-product pyruvic acid.

15. Which is true about process B?

- (A) It produces the most energy of all the processes.
- (B) It produces energy by chemiosmosis.
- (C) Its production of energy is explained by the laws of diffusion.
- (D) The raw material is pyruvic acid.
- (E) It releases carbon dioxide.

16. Which of the following probably evolved first?

- (A) the Krebs cycle
- (B) chemiosmosis
- (C) glycolysis
- (D) the electron transport chain
- (E) the citric acid cycle

17. All of the following are correct about ATP synthetase EXCEPT

- (A) it is a molecule located within the cristae membrane
- (B) it spins like a turbine
- (C) it binds a phosphate to a molecule of ADP
- (D) it is an important component of glycolysis
- (E) its function depends on a proton gradient

18. The breakdown of glucose into pyruvic acid occurs during the process of

- (A) glycolysis
- (B) lactic acid fermentation
- (C) the Krebs cycle
- (D) the electron transport chain
- (E) alcohol fermentation

19. Choose the pair that is correctly matched.

- (A) Krebs cycle—cytoplasm
- (B) Electron transport chain—outer compartment of mitochondria
- (C) Glycolysis—cristae membrane
- (D) Glycolysis—mitochondria
- (E) Electron transport chain—cristae membrane

Chapter4/5: Cellular Respiration and Photosynthesis Cont.

20. During strenuous exercise, skeletal muscles use up..... and produce large amounts of, which causes pain and fatigue in the muscle.
- (A) pyruvic acid—carbon dioxide
 - (B) carbon dioxide—pyruvic acid
 - (C) pyruvic acid—lactic acid
 - (D) oxygen—lactic acid
 - (E) glycogen—carbon dioxide

Questions 21-25

Choose from the terms below:

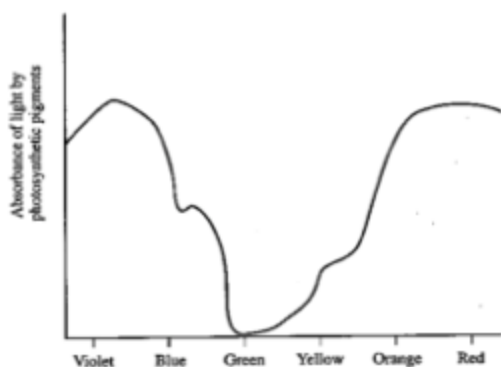
- (A) Oxygen
 - (B) Protons
 - (C) PGAL
 - (D) NADPH
 - (E) ATP
21. Provides the energy for the light-independent reactions
22. A sugar synthesized during photosynthesis
23. Released as a waste product from the light-dependent reactions
24. A molecule that carries H₂ from the light-dependent reactions to the Calvin cycle
25. Pass through ATP synthetase channels
26. The oxygen that plants give off
- (A) comes from the light-dependent reactions of photosynthesis
 - (B) comes from the light-independent reaction of photosynthesis
 - (C) is a by-product of respiration
 - (D) comes from carbon dioxide that plants absorb
 - (E) is carried from the Calvin cycle to the light reactions by NADP
27. All of the following statements are correct about photosynthesis EXCEPT
- (A) water provides hydrogen for carbon fixation
 - (B) the light-independent reactions occur in the stroma
 - (C) the light-independent reactions normally occur at night in most plants
 - (D) the light-dependent reactions occur in the thylakoid membranes
 - (E) the thylakoid membranes are part of the grana
28. All of the following statements are correct about the light-dependent reactions of photosynthesis EXCEPT
- (A) carotenoids are accessory pigments
 - (B) they take place in the grana
 - (C) when light strikes chlorophyll a, electrons enter an electron transport chain
 - (D) PGAL, a 3-carbon sugar, is produced
 - (E) they take place within the thylakoid membranes

Chapter4/5: Cellular Respiration and Photosynthesis Cont.

29. All of the following statements about photolysis are correct EXCEPT

- (A) it occurs during the light-independent reaction
- (B) it releases oxygen
- (C) it provides hydrogen for carbon fixation
- (D) it supplies electrons to chlorophyll *a*
- (E) it is the process of splitting apart molecules of water

30. Here is an absorption spectrum for an unknown substance. What color is the substance?



- (A) Red
- (B) Blue
- (C) Green
- (D) Yellow
- (E) Violet

Questions 31-35

Indicate which of the following events occurs during

- (A) Light-dependent reactions
- (B) Light-independent reactions

- 31. Oxygen is released
- 32. Carbon fixation occurs
- 33. ATP is produced
- 34. Electrons flow through an electron transport chain
- 35. Calvin cycle occurs

36. The oxygen given off by plants comes from

- (A) ATP
- (B) NADP
- (C) chlorophyll *a*
- (D) PGAL
- (E) water

37. Which of the following is not a photosynthetic pigment?

- (A) Chlorophyll *a*
- (B) Chlorophyll *b*
- (C) Carotenoid
- (D) Bromothymol blue
- (E) Phycobilins

38. Carotenoids absorb all colors of light EXCEPT

- (A) green
- (B) blue
- (C) yellow
- (D) red
- (E) violet

39. The initial role of chlorophyll in photosynthesis is to

- (A) synthesize sugar
- (B) absorb light energy
- (C) fix carbon dioxide
- (D) synthesize carbon
- (E) convert ADP to ATP

40. Which of the following is produced by both cellular respiration and the light-dependent reactions of photosynthesis?

- (A) glucose
- (B) ATP
- (C) CO₂
- (D) pyruvic acid
- (E) oxygen

41. Which of the following is true about enzymes?
 (A) They always work alone.
 (B) They are consumed in a reaction.
 (C) They are amino acid polymers.
 (D) They always require a coenzyme.
 (E) They are classified as inorganic catalysts.
42. Which of the following has a vitamin as a building block?
 (A) apoenzyme
 (B) alloenzyme
 (C) metallic ion
 (D) lipoprotein
 (E) coenzyme
43. Which enzyme would the microbes in the gut of a termite need to have in order to metabolize the cell walls of the wood that termites eat?
 (A) cellulase
 (B) esterase
 (C) protease
 (D) pepsin
 (E) trypsin
44. The reds, oranges, and yellows of the leaves of deciduous trees that become evident in the fall are from
 (A) carotenoids.
 (B) ATP.
 (C) leaf decay.
 (D) chlorophylls.
 (E) overabundance of water.
45. Which of the following is a product of cyclic photophosphorylation?
 (A) carbon dioxide
 (B) oxygen
 (C) ATP
 (D) NADH
 (E) Acetyl CoA
46. The role of oxygen in aerobic respiration is
 (A) to couple with C to form CO_2 in chemiosmosis.
 (B) to form ATP.
 (C) to contribute H^+ to the Krebs's cycle.
 (D) to make PGAL.
 (E) to accept electrons from the Electron Support Chain.
47. Photosynthesis is
 (A) light driven.
 (B) photo driven.
 (C) anabolic.
 (D) enzyme moderated.
 (E) all of the above.
48. The light reactions of photosynthesis take place here.
 49. The Calvin cycle of photosynthesis takes place here.
 50. The site of carbon fixation.
51. How does the ATP synthase enzyme function in the cell?
 (A). It uses energy to move ions against their concentration gradient by removing a phosphate group from ATP.
 (B). It uses the power of ions moving against their concentration gradient to add a phosphate group to ADP.
 (C). It uses the power of ions moving down their concentration gradient to add a phosphate group to ADP.
 (D). It uses the power of ions moving against their concentration gradient to remove a phosphate group from ATP.
 (E). It uses the power of ions moving down their concentration gradient to remove a phosphate group from ATP.
52. Which choice matches each description below to the correct stage of aerobic respiration?
 I. Produces most of the ATP
 II. Produces carbon dioxide (CO_2)
 III. Uses oxygen (O_2)
 (A). I = chemiosmosis; II = electron transport chain; III = citric acid cycle
 (B). I = chemiosmosis; II = citric acid cycle; III = electron transport chain
 (C). I = citric acid cycle; II = chemiosmosis; III = electron transport chain
 (D). I = electron transport chain; II = chemiosmosis; III = citric acid cycle
 (E). I = electron transport chain; II = citric acid cycle; III = chemiosmosis
53. Which of these produces a three-carbon sugar from carbon dioxide?
 (A). Photosystem I
 (B). Photosystem II
 (C). Electron transport chain
 (D). Calvin cycle
 (E). Citric acid cycle

Questions 48–50 refer to the following choices. Decide which best matches the description below.

- (A) stroma
 (B) thylakoid
 (C) vacuole
 (D) stomates
 (E) lamella

Chapter4/5: Cellular Respiration and Photosynthesis Cont.

54. Which of these releases carbon dioxide?

- I. Lactic acid fermentation
- II. Alcohol fermentation
- III. Aerobic respiration
- IV. Photosynthesis

- (A). I and II
- (B). I and III
- (C). II and III
- (D). II and IV
- (E). III and IV

55. All of the following take place in the thylakoid of the chloroplast EXCEPT

- (A). NADP⁺ is reduced to create NADPH
- (B). hydrogen ions are pumped against their concentration gradient
- (C). ATP is produced by the ATP synthase enzyme
- (D). excited electrons transfer energy to an electron transport chain
- (E). carbon dioxide molecules are converted to a three-carbon sugar

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Chapter: Cellular Respiration and Photosynthesis Answers

1	D	11	D	21	E
2	D	12	C	22	C
3	B	13	A	23	A
4	C	14	C	24	D
5	E	15	E	25	B
6	B	16	C	26	A
7	E	17	D	27	C
8	B	18	A	28	D
9	C	19	E	29	A
10	A	20	D	30	C

31	A	41	C	51	C
32	B	42	E	52	B
33	A	43	A	53	D
34	A	44	A	54	C
35	B	45	C	55	E
36	E	46	E		
37	D	47	E		
38	C	48	B		
39	B	49	A		
40	B	50	A		

Chapter6: Classical Genetics

- A hybrid red flower (Rr) is crossed with a white flower. What percentage of the offspring will be red?
 - 0%
 - 25%
 - 50%
 - 75%
 - 100%
- A red flower is crossed with a white flower, and all the offspring are pink. What law of inheritance does this follow?
 - Dominance
 - Segregation
 - Incomplete dominance
 - Law of independent assortment
 - Codominance
- Which of the following crosses best demonstrates the law of segregation?
 - $AA \times aa$
 - $aa \times aa$
 - $Aa \times aa$
 - $Aa \times Aa$
 - $AA \times AA$
- If two pink Japanese four o'clock flowers (Rr) are crossed, what is the chance that an offspring will be pink?
 - 0%
 - 25%
 - 50%
 - 75%
 - 100%
- A couple has two children. One child has blood type A, and the other child has blood type O. What are all the possible blood types of the parents?
 - Either both have type A, or one has type A and the other has type O, or one has type A and the other has type B.
 - There is only one possibility. Both parents have type A blood.
 - There is only one possibility. Both parents have type O blood.
 - There is only one possibility. One parent has type A, and the other has type O.
 - It is not possible to determine from the information given.
- Which is true about blood type?
 - Type A is dominant over type B.
 - Type B is dominant over type A.
 - Type O is dominant over types A and B.
 - Type AB is dominant over types A and B.
 - Types A and B are dominant over type O.
- A man with hemophilia marries a woman who has normal hemoglobin and is not a carrier. Which of the following is true?
 - None of their children will have the disease nor will they be carriers.
 - All the boys will have the disease.
 - All the girls will have the disease.
 - All the boys will be carriers.
 - All the girls will be carriers.
- If a man is color-blind and his wife is a carrier, which of the following is true?
 - Each girl has a 50% chance of being color-blind.
 - No girl will be color-blind because girls cannot be color-blind.
 - All the boys will be carriers.
 - All the girls will be carriers.
 - All children will be either a carrier or color-blind.

Chapter6: Classical Genetics Cont.

Questions 9-14

Refer to the list below of inherited diseases.

- (A) Phenylketonuria
- (B) Cystic fibrosis
- (C) Huntington's disease
- (D) Hemophilia
- (E) Down syndrome

9. Results from a mutation of chromosomes
10. Characterized by a buildup of fluid in the lungs
11. If no dietary change is instituted at birth, mental retardation will result
12. Autosomal dominant disease of the nervous system that results in death
13. Sex-linked recessive disorder
14. Onset is usually in middle age
15. A man with Klinefelter's syndrome has 47 chromosomes and has three sex chromosomes, XXY. This abnormality came about as a result of
 - (A) crossing-over
 - (B) deletion of a chromosome
 - (C) addition of a chromosome
 - (D) nondisjunction
 - (E) mutation in a gene

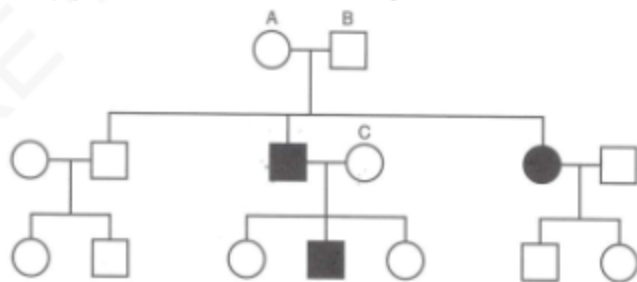
16. A testcross is done to
 - (A) determine if crossover has occurred
 - (B) prevent sex-linked traits from being passed on
 - (C) determine if a person has Huntington's disease
 - (D) prevent crossover from occurring
 - (E) determine if an organism exhibiting the dominant phenotype is carrying a recessive allele for that trait

17. A farmer planted 1,000 seeds of corn. The offspring were 544 tall with yellow seeds, 188 tall with green seeds, 183 short with yellow seeds, and 64 short with green seeds. What were the genotypes of the parents?

- (A) TTYyX tyy
- (B) TtYy X tyy
- (C) tyy X tyy
- (D) tyy x TtYy
- (E) TtYy x TtYy

18. The Genotype ratio from a monohybrid cross is

- (A) 1:1:1 homozygous dominant : hybrid : homozygous recessive
- (B) 3:1 homozygous dominant : hybrid
- (C) 1:2:1 homozygous dominant : hybrid : homozygous recessive
- (D) 3:1 hybrid : homozygous recessive
- (E) cannot be stated universally



19. Which is true of the shaded-in trait?
 - (A) The trait is autosomal recessive.
 - (B) The trait is autosomal dominant.
 - (C) The trait is sex-linked dominant.
 - (D) The trait is sex-linked recessive.
 - (E) The trait is inherited as incomplete dominance.
20. What is the most likely genotype for person C?
 - (A) AA
 - (B) Aa
 - (C) aa
 - (D) X-X-
 - (E) X-X

Chapter6: Classical Genetics Cont.

21. Which of the following is NOT indicated by Mendel's experiments?
- (A) incomplete dominance
 - (B) segregation
 - (C) recessive
 - (D) dominant
 - (E) independent assortment
22. A ratio of 3:1 in the phenotype of an organism occurs when
- (A) the alleles are incompletely dominant.
 - (B) only recessive traits are involved.
 - (C) only dominant traits are involved.
 - (D) alleles segregate during meiosis.
 - (E) crossing over has occurred in Anaphase II.
23. Colorblindness in humans is
- (A) caused by a recessive allele.
 - (B) in equal proportion in both sexes.
 - (C) caused in females by a heterozygous genotype.
 - (D) inherited by males from their male parent.
 - (E) caused in males by a homozygous genotype.
24. Trisomy 21 in humans is the result of
- (A) pleiotropy.
 - (B) polygenic inheritance.
 - (C) epistasis.
 - (D) x-inactivation.
 - (E) nondisjunction.
25. Homologous chromosomes line up in pairs in
- (A) metaphase of mitosis.
 - (B) metaphase I.
 - (C) metaphase II.
 - (D) interphase.
 - (E) prophase of mitosis.
26. In a heterozygous monohybrid cross, the dominant trait can be expressed in the phenotype of the F₁ of the time.
- (A) 0 percent
 - (B) 25 percent
 - (C) 33 percent
 - (D) 75 percent
 - (E) 100 percent
27. Which of the following would be the result of a true dihybrid cross?
- (A) AABB
 - (B) AABb
 - (C) AaBb
 - (D) AaBB
 - (E) aaBb
28. Which of the following would indicate a test cross, where T represents the dominant, tall, trait and t represents the recessive, short, trait?
- (A) Tall × TT
 - (B) Tall × Tt
 - (C) Tall × tt
 - (D) TT × Tt
 - (E) short × tt
29. _____ refers to one gene affecting many traits.
- (A) Polygenesis
 - (B) Pleiotropy
 - (C) Linkage
 - (D) Epistasis
 - (E) Nondisjunction
30. Which of the following blood types are possible if the parents are A and O blood types?
- (A) A and O
 - (B) B and O
 - (C) AB only
 - (D) O only
 - (E) A, B, and O

Chapter6: Classical Genetics Cont.

31. In fruit flies, brick-red eye color is dominant to a bright orange color called cinnabar. A fruit fly with heterozygous eye color genotype is crossed with homozygous recessive fruit fly. What is the probability of inheritance for the cinnabar phenotype and the heterozygous genotype?
- (A). Cinnabar phenotype = 1.0; Heterozygous genotype = 0
 - (B). Cinnabar phenotype = 0; Heterozygous genotype = 1.0
 - (C). Cinnabar phenotype = 0.5; Heterozygous genotype = 0.5
 - (D). Cinnabar phenotype = 0.25; Heterozygous genotype = 0.5
 - (E). Cinnabar phenotype = 0.5; Heterozygous genotype = 0.75
32. A woman expresses an X-linked recessive disorder. Which of these conclusions can DEFINITELY be made about the woman's parents?
- I. Her mother passed on an allele for the disorder.
 - II. Her father expresses the same disorder.
 - III. Her mother does not express the disorder.
- (A). I only
 - (B). II only
 - (C). I and II only
 - (D). II and III only
 - (E). I, II, and III
33. Which of these is an example of polygenic inheritance?
- (A). Epistasis
 - (B). Dominance
 - (C). Segregation
 - (D). Pleiotropy
 - (E). Independent assortment

Chapter: Classical Genetics Answers

1	c	14	C	27	C
2	D	15	D	28	C
3	D	16	E	29	B
4	C	17	E	30	A
5	A	18	C	31	C
6	E	19	A	32	C
7	E	20	B	33	A
8	A	21	A		
9	E	22	D		
10	B	23	A		
11	A	24	E		
12	C	25	B		
13	D	26	D		

Chapter 7: Molecular Genetics

- All of the following about the structure of DNA are correct EXCEPT
 - DNA is a polymer
 - DNA contains deoxyribose
 - the two strands are connected by hydrogen bonding
 - adenine bonds to guanine
 - nucleotides consist of a sugar, phosphate, and nitrogenous base
 - If guanine makes up 28 percent of the nucleotides in a sample of DNA from an organism, then thymine would make up _____ percent of the nucleotides.
 - 0
 - 22
 - 28
 - 44
 - 56
 - All of the following statements about RNA are correct EXCEPT
 - there are three kinds of RNA: mRNA, rRNA, and tRNA
 - RNA stands for ribonucleic acid
 - RNA is single stranded
 - RNA contains the nitrogen bases C, G, A, and T
 - RNA contains the sugar ribose
 - DNA can be cut into small pieces with
 - introns
 - exons
 - PCR
 - restriction enzymes
 - RNA
 - If the sequence of a strand of DNA is AAATAACCGGGGATC, then the sequence on the corresponding mRNA strand is
 - AAAUAACCGGGGATC
 - TTTATTGGCCCCTAG
 - UUUTUUGGCCCCUAG
 - TTTUTTGGCCCCTAG
 - UUUAUUGGCCCCUAG
 - All of the following are correct about RNA processing EXCEPT
 - it is a rare occurrence and results in mutations
 - introns are removed
 - it occurs after transcription
 - the initial transcript is longer than the final transcript
 - it occurs in the nucleus
- Questions 7-13**
Choose from the terms below.
- Translation
 - Transcription
 - Replication
 - RNA processing
 - None of the above
- Synthesis of RNA
 - Requires RNA polymerase
 - Synthesis of DNA
 - Removal of introns, noncoding regions of DNA
 - Involves the formation of a polypeptide chain
 - Occurs during interphase of the cell cycle
 - Requires DNA polymerase
 - Polyploidy results from
 - nondisjunction
 - aneuploidy
 - Down syndrome
 - infection with a virus
 - RNA processing

Chapter7: Molecular Genetics

Questions 15-19

Choose from the terms below.

- (A) Gel electrophoresis
- (B) Restriction enzymes
- (C) Polymerase chain reaction
- (D) Recombinant DNA
- (E) RNA processing

15. Referred to as molecular scissors
16. Used to separate large molecules of DNA on the basis of their rate of movement through an agarose gel in an electric field
17. Taking DNA from two sources and combining them into one cell
18. Could cure cystic fibrosis
19. An automated technique by which a tiny piece of DNA can be rapidly amplified
20. 97 percent of the human genome
- (A) does not code for anything and is known as junk
 - (B) codes for about 30,000 genes
 - (C) codes for about 3 billion genes
 - (D) is located in the mitochondria
 - (E) has been cut up by restriction enzymes
21. Which of the bonding examples below is NOT possible?
- (A) a DNA adenine to a DNA thymine
 - (B) a DNA adenine to an RNA thymine
 - (C) a DNA guanine to an RNA cytosine
 - (D) a DNA adenine to an RNA uracil
 - (E) a DNA guanine to a DNA cytosine
22. Which of the following replaces guanine in RNA?
- (A) adenine
 - (B) thymine
 - (C) cytosine
 - (D) uracil
 - (E) none of the above

23. Which of the following statements is true about mutations?

- (A) Rates tend to be very high in most populations.
- (B) generally lethal
- (C) irreversible
- (D) Only certain gene locations are affected.
- (E) source of genetic variation

24. For the DNA strand 5-A-C-C-G-T-G-A-C-A-T-T-G-3, the correct complement DNA would be

- (A) 3-T-G-G-C-A-C-T-G-T-A-A-C-5.
- (B) 5-T-G-G-C-A-C-T-G-T-A-A-C-3.
- (C) 3-U-G-G-C-A-G-U-G-U-A-A-C-5.
- (D) 5-A-C-C-G-U-G-A-C-A-U-U-G-3.
- (E) 3-T-C-C-G-A-G-T-G-T-A-A-C-5.

25. The portion of the DNA molecule that can vary is its

- (A) sugar.
- (B) base.
- (C) deoxyribose.
- (D) ribose.
- (E) phosphate.

26. An mRNA is 429 nucleotides long. The number of amino acids in the polypeptide chain formed from this mRNA is

- (A) 143.
- (B) 142.
- (C) 141.
- (D) 429.
- (E) 428.

Chapter7: Molecular Genetics Cont.

27. Which of the following is NOT consistent with Griffith's experiments?

- (A) injected mixture of R-strain and live S-strain: mouse dies
- (B) injected mixture of heat-killed S-strain and live R-strain mouse lives
- (C) injected heat-killed S-strain: mouse lives
- (D) injected R-strain: mouse lives
- (E) injected S-strain: mouse dies

28. Which of the following is a semi-conservative process?

- (A) DNA replication
- (B) non-disjunction
- (C) translation
- (D) transcription
- (E) crossing over

29. The genetic code table shows the amino acids that correspond to mRNA codons. Each codon is read from 3' (first nucleotide) to 5' (third nucleotide).

A DNA template strand is shown. Which amino acid sequence will be assembled from the mRNA associated with this strand?

		Second mRNA Nucleotide					
		U	C	A	G		
First mRNA Nucleotide (5' end)	U	UUU (Phe) UUC (Phe) UUA (Leu) UUG (Leu)	UCU (Ser) UCC (Ser) UCA (Ser) UCG (Ser)	UAU (Tyr) UAC (Tyr) UAA STOP UAG STOP	UGU (Cys) UUC (Cys) UGA STOP UGG (Trp)	U C A G	
	C	CUU (Leu) CUC (Leu) CUA (Leu) CUG (Leu)	CCU (Pro) CCC (Pro) CCA (Pro) CCG (Pro)	CAU (His) CAC (His) CAA (Gln) CAG (Gln)	CGU (Arg) CGC (Arg) CGA (Arg) CGG (Arg)	U C A G	
	A	AUU (Ile) AUC (Ile) AUA (Met) AUG (Met)	ACU (Thr) ACC (Thr) ACA (Thr) ACG (Thr)	AAU (Asp) AAC (Asp) AAA (Lys) AAG (Lys)	AGU (Ser) AGC (Ser) AGA (Arg) AGG (Arg)	U C A G	
	G	GUU (Val) GUC (Val) GUA (Val) GUG (Val)	GCU (Ala) GCC (Ala) GCA (Ala) GCG (Ala)	GAU (Asp) GAC (Asp) GAA (Glu) GAG (Glu)	GGU (Gly) GGC (Gly) GGA (Gly) GGG (Gly)	U C A G	

DNA template strand: 5'-GCG ACA TAC ACT-3'

- (A) Ala-Cys-Met
- (B) Arg-Cys-Met
- (C) Ala-Thr-Tyr-Thr
- (D) Ala-Thr-Tyr-Trp
- (E) Arg-Thr-Tyr-Thr

30. Which answer choice matches the functions listed below to the correct RNA types?

- I. Interprets a codon as an amino acid
- II. Binds to a gene transcript
- III. Contains information for assembling a protein

- (A) I. mRNA; II. rRNA; III. tRNA
- (B) I. mRNA; II. tRNA; III. rRNA
- (C) I. rRNA; II. mRNA; III. tRNA
- (D) I. tRNA; II. mRNA; III. rRNA
- (E) I. tRNA; II. rRNA; III. mRNA

31. An original cell replicates its DNA. The cell undergoes mitosis and cell division, and one of the daughter cells replicates its DNA. Which of these BEST describes the DNA of the second-generation daughter cells?

- (A) One of the cells will contain DNA consisting of one strand from the original cell.
- (B) One of the cells will contain DNA consisting of two strands from the original cell.
- (C) Both of the cells will contain DNA consisting of one strand from the original cell.
- (D) Both of the cells will contain DNA consisting of two strands from the original cell.
- (E) Neither of the cells will contain DNA consisting of strands from the original cell.

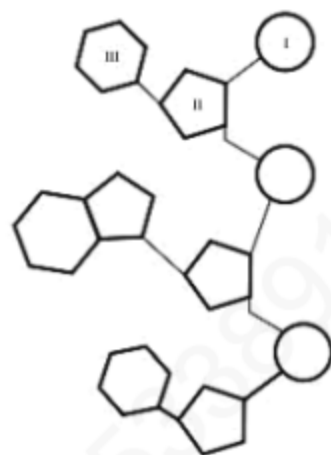
32. The partial sequence of a single DNA strand is shown. What will be the sequence of the complementary strand produced during DNA replication?

3'-ATGCTGAACT-5'

- (A) 5'-ATGCTGAACT-3'
- (B) 5'-CGTAGTCCAG-3'
- (C) 5'-GACCTGATGC-3'
- (D) 5'-GCATCAGGTC-3'
- (E) 5'-TACGACTTGA-3'

33. Which of these labels matches the structure of the partial RNA strand shown?

- (A) I. phosphate; II. ribose; III. nitrogen base
- (B) I. phosphate; II. nitrogen base; III. ribose
- (C) I. nitrogen base; II. phosphate; III. ribose
- (D) I. ribose; II. nitrogen base; III. phosphate
- (E) I. ribose; II. phosphate; III. nitrogen base



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Chapter: Molecular Genetics Answers

1	D	14	A	27	B
2	B	15	B	28	A
3	D	16	A	29	B
4	D	17	D	30	E
5	E	18	D	31	A
6	A	19	C	32	E
7	B	20	A	33	A
8	B	21	B		
9	C	22	E		
10	D	23	C		
11	A	24	A		
12	C	25	B		
13	C	26	B		

Chapter8: Evolution

1. All of the following statements about evolution are true EXCEPT
- (A) evolution occurs more rapidly at some times than at others
 - (B) evolution is directed by changes in the environment
 - (C) evolution is not always from the simple to the complex but may act in such a way that complex forms give rise to simpler ones
 - (D) single organisms, as well as populations, do commonly evolve
 - (E) evolution is not always a slow, gradual process
2. According to the Hardy-Weinberg theory, which of the following represents a homozygous dominant individual?
- (A) p
 - (B) q
 - (C) p^2
 - (D) q^2
 - (E) $2pq$
3. All of the following are part of the Hardy-Weinberg theorem, which describes a stable, nonevolving population, EXCEPT
- (A) natural selection exists
 - (B) mating must be random
 - (C) no mutations can occur in the population
 - (D) the population must be isolated from others
 - (E) the population must be large
4. Which of the following is a transition fossil?
- (A) Reptiles
 - (B) Amphibians
 - (C) *Archaeopteryx*
 - (D) Fish
 - (E) Apes
5. All of the following are part of Darwin's theory of natural selection EXCEPT
- (A) populations tend to overpopulate
 - (B) in any population, there is unequal ability among individuals to survive and to reproduce
 - (C) only the best-fit individuals survive and get to pass on their genes
 - (D) overpopulation leads to a struggle for existence
 - (E) organisms change in response to a need in the environment
6. All the following are true of homologous structures EXCEPT
- (A) they demonstrate common ancestry
 - (B) an example is the wing of the bat and a person's arm
 - (C) an example is the wing of the bat and the wing of a fly
 - (D) they are not the same thing as analogous structures
 - (E) an example is the whale's lateral fin and a person's arm
- Questions 7-12**
- Choose from the list of terms below.
- (A) Charles Darwin
 - (B) Lamarck
 - (C) Stephen J. Gould and Niles Eldridge
 - (D) Oparin and Haldane
 - (E) Hardy-Weinberg
7. Inheritance of acquired traits
8. Use and disuse
9. Theory of punctuated equilibrium
10. Populations tend to overpopulate
11. Hypothesized that under conditions that existed in early Earth, organic molecules could form
12. Survival of the fittest
13. The age of Earth according to scientific evidence is closest to
- (A) 4,000 years old
 - (B) 600 years old
 - (C) 6,000 years old
 - (D) 4 million years old
 - (E) 4 billion years old

Chapter8: Evolution Cont.

14. Pangaea is a
- (A) transition fossil
 - (B) molecule that is commonly analyzed and used to show which organisms are related
 - (C) species of bacteria that is resistant to all antibiotics
 - (D) vestigial structure
 - (E) single supercontinent that existed 250 million years ago

15. Which of the following is an example of divergent evolution?
- (A) Wildebeests separated from each other by a newly formed river are now separate species.
 - (B) Whales and fish have a streamlined appearance because they evolved in the same environment.
 - (C) Insects and the flowers they pollinate have evolved together over millions of years.
 - (D) Polydactyly, having extra fingers, is common in the Amish of Pennsylvania.
 - (E) Change occurs in the gene pool due to chance.

Questions 16-20

Choose from the terms below.

- (A) Geographic isolation
- (B) Polyploidy
- (C) Reproductive isolation
- (D) Adaptive radiation
- (E) Directional selection

16. Darwin discovered 14 species of finches on the Galapagos Islands that all evolved from one original species of finch
17. Having extra sets of chromosomes in every cell
18. The peppered moths are one example
19. Two populations of one species evolved into two separate species after being separated for millions of years by a canyon
20. A very small dog and a very large dog cannot mate because of the enormous size difference of the two animals

21. Darwin's Natural Selection includes all of the following EXCEPT

- (A) Variation can be due to mutations.
 - (B) The difference in survivability between organisms may be due to variation.
 - (C) Not all organisms may survive, due to competition.
 - (D) Organisms produce more offspring than can survive.
 - (E) Some organisms will be more fit to survive than others.
22. Which of these form the basis of natural selection?
- I. Random mating
 - II. Limited environmental resources
 - III. Stable genotype frequencies over time
- (A) I only
 - (B) II only
 - (C) III only
 - (D) I and II
 - (E) II and III

23. The graph shows the distribution of fur color in a population of rodents. Over time, the environment changes so that it includes only light and dark rocks, with little vegetation. How will natural selection affect the distribution of phenotypes in this population?



- (A). The mean will shift toward the right, and the center of the curve will be higher.
- (B). The mean will shift toward the left, and the center of the curve will be higher.
- (C). The mean will shift toward the right, and the center of the curve will be lower.
- (D). The mean will remain the same, and the center of the curve will be higher.
- (E). The mean will remain the same, and the center of the curve will be lower.

Chapter8: Evolution Cont.

24. A recessive allele accounts for 60% of the alleles of a gene in a population. What proportion of the individuals in this population are heterozygous?

- (A). 0.16
- (B). 0.24
- (C). 0.36
- (D). 0.48
- (E). 0.6

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Chapter: Evolution

1	D	11	D	21	A
2	C	12	A	22	B
3	A	13	E	23	E
4	C	14	E	24	D
5	E	15	A	25	
6	C	16	D	26	
7	B	17	B		
8	B	18	E		
9	C	19	A		
10	A	20	C		

Chapter9: Biological Diversity (Taxonomy)

Questions 1-9

Refer to the terms below.

- (A) Prokaryotes
 - (B) Fungi
 - (C) Plants
 - (D) Animals
 - (E) Protista
1. Contains the most diverse eukaryotic organisms
 2. Heterotrophs whose cell walls consist of chitin
 3. Included in the domain Bacteria
 4. Heterotrophs that reproduce sexually with a dominant diploid stage
 5. All are autotrophic eukaryotes
 6. The Archaea domain includes these
 7. The heterotrophic part of any lichen
 8. Includes amoebas, paramecia, and euglenas
 9. Eukaryotic cells that play a vital role in recycling nutrients in an ecosystem
 10. All of the following are true of Protista EXCEPT
 - (A) all are heterotrophs
 - (B) all are eukaryotes
 - (C) they include amoeba, paramecia, and euglena
 - (D) some move by pseudopods, some by cilia, and some by flagella
 - (E) they include the widest variety of organisms of any kingdom
 11. Which of the following contains organisms capable of surviving extreme conditions of heat and salt concentration?
 - (A) Archaea
 - (B) Animalia
 - (C) Protista
 - (D) Fungi
 - (E) Plants

Chapter9: Biological Diversity (Taxonomy) Cont.

Questions 12-17

Refer to this list of animals below.

- (A) Platyhelminthes
- (B) Nematodes
- (C) Chordates
- (D) Echinoderms
- (E) Cnidarians

12. Roundworms, all are parasites

13. Include the flatworm planaria

14. Jellyfish and hydra

15. All organisms in the phyla contain stinging cells

16. Include mammals

17. Include monotremes and marsupials

18. All of the following are characteristics of primates

EXCEPT

- (A) opposable thumbs
- (B) front-facing eyes
- (C) nurture their young for a long time
- (D) examples are dolphins and whales
- (E) usually have single births

19. The ectoderm becomes the

- (A) nervous system
- (B) digestive organs
- (C) blood
- (D) bones
- (E) muscles

20. The endoderm becomes the

- (A) skin
- (B) digestive organs
- (C) blood
- (D) bone
- (E) muscle

21. Which of the following is found in all viruses?

- (A) protein coat
- (B) cell membrane
- (C) membrane-bound organelles
- (D) ER
- (E) mitochondrial DNA

22. Which of the following categories includes the most distantly related organisms?

- (A) family
- (B) species
- (C) class
- (D) genus
- (E) order

23. Viruses are

- (A) always viewed with a light microscope.
- (B) are an enzyme-nucleus mix.
- (C) obligate, intracellular parasites.
- (D) cellular.
- (E) host independent.

24. An invertebrate is found in a freshwater setting and studies show it to have three developmental body layers and a cuticle covering its outer body. It belongs in the same phylum as the

- (A) hydra.
- (B) leeches.
- (C) sea stars.
- (D) sponges.
- (E) crustaceans

25. Which of the following have a visceral mass and a muscular foot?

- (A) Medusoids
- (B) Annelida
- (C) Aschelminthes
- (D) Mollusca
- (E) Arthropoda

26. Which of the following is radially symmetrical and possesses nematocysts?

- (A) Porifera
- (B) Coelenterates
- (C) Mollusca
- (D) Amphibians
- (E) Polychaetes

Chapter9: Biological Diversity (Taxonomy) Cont.

27. A unicellular organism contains a Golgi body and ribosomes but lacks a cell wall. It is heterotrophic, ingesting food via phagocytosis. What kingdom does this organism belong to?

- (A). Animalia
- (B). Eubacteria
- (C). Fungi
- (D). Protista
- (E). Archaea

28. Which of these features are found in the phylum that includes centipedes?

- I. Ventral nerve cord
- II. Segmented body
- III. Calcium- rich shell
- IV. Jointed limbs

- (A). I and II
- (B). I and IV
- (C). II and III
- (D). I, II, and IV
- (E). II, III, and IV

29. Which of these is a tetrapod that is NOT an amniote?

- A. Ostrich
- B. Shark
- C. Rattlesnake
- D. Salamander
- E. Kangaroo

Chapter: Biological Diversity Answers

1	E	11	A	21	A
2	B	12	B	22	C
3	A	13	A	23	C
4	D	14	E	24	E
5	C	15	E	25	D
6	A	16	C	26	B
7	B	17	C	27	D
8	E	18	D	28	D
9	B	19	A	29	D
10	A	20	B		

Chapter10: Plants (Organismal Biology)

1. All of the following are correct about plants EXCEPT

- (A) gymnosperms have cones
- (B) tracheophytes have xylem and phloem
- (C) moss is a bryophyte
- (D) bryophytes must live in a moist environment
- (E) some plants have cell walls made of chitin instead of cellulose

Questions 2-7

Choose from the terms below.

- (A) Monocot
- (B) Dicot

2. Vascular bundles scattered throughout the stem

3. Parallel veins in leaves

4. Seed splits in two

5. Taproots

6. Daisies, carrots, and roses are examples

7. Grasses such as lawn grass, wheat, rice, and corn are examples

8. All of the following are modifications for a dry environment EXCEPT

- (A) stomata' crypts
- (B) sporopollenin
- (C) seeds
- (D) flowers
- (E) pollen

9. Angiosperms are

- (A) monocots
- (B) seedless plants
- (C) plants with no vascular tissue
- (D) flowering plants
- (E) plants that reproduce only asexually

10. All of the following pairs are matched correctly EXCEPT

- (A) gymnosperm—cone bearing
- (B) ferns—seedless
- (C) flowering plants—reproduce by spores
- (D) bryophytes—moss
- (E) dicot—peanut

11. One pollen grain contains

- (A) one haploid nucleus
- (B) two haploid nuclei
- (C) three haploid nuclei
- (D) one diploid nucleus
- (E) two diploid nuclei

12. The hypocotyl becomes the

- (A) seed coat
- (B) anther
- (C) sepals
- (D) embryo
- (E) lower part of the growing plant

13. Where are sperm produced in a flowering plant?

- (A) Filament
- (B) Anther
- (C) Epicotyl
- (D) Pistil
- (E) Carpel

14. Which of the following is NOT an example of asexual reproduction?

- (A) Runners
- (B) Grafting
- (C) Seeds
- (D) Cuttings
- (E) Bulbs

15. All of the following are correct about bryophytes EXCEPT

- (A) there is no vascular tissue
- (B) they are so hardy that they can be found anywhere in nature
- (C) the gametophyte is dominant
- (D) archegonia produce eggs
- (E) an example is moss

Chapter10: Plants (Organismal Biology) Cont.

16. All of the following are correct about alternation of generations EXCEPT
- (A) in ferns, the sporophyte is dominant
 - (B) the sporophyte is diploid
 - (C) in flowering plants, the gametophyte is dominant
 - (D) the gametophyte is haploid
 - (E) like all plants, bryophytes show alternations of generations
- Questions 17-23**
- Choose from the terms below.
- (A) Auxins
 - (B) Gibberellins
 - (C) Abscisic acid
 - (D) Ethylene
 - (E) Cytokinins
17. Closes stomates during times of stress, inhibits growth
18. Is a gas
19. Enhances apical dominance
20. Induces bolting, the rapid growth of a floral stalk
21. An example is 2,4-D, a weed killer
22. Rooting powder is made of this
23. Promotes the ripening of fruit
24. Tropisms are caused by
- (A) ethylene
 - (B) stimulation from primitive nerve cells
 - (C) contraction of primitive muscle cells
 - (D) unequal distribution of abscisic acid
 - (E) unequal distribution of auxins
25. Absorption of nitrogen by a plant is most closely related to
- (A) cone formation in gymnosperms
 - (B) double fertilization
 - (C) geotropisms
 - (D) modified stomata
 - (E) symbionts that live in nodules on the roots of plants
26. The plant hormone responsible for fruit ripening is
- (A) abscisic acid.
 - (B) auxin.
 - (C) cytokinin.
 - (D) ethylene.
 - (E) gibberellin.
27. In flowering plants, sperm are produced by the
- (A) ovary.
 - (B) anther.
 - (C) microsporangium.
 - (D) sporophyte.
 - (E) generative nucleus.
28. Which of the following is not a type of plant stem?
- (A) corm
 - (B) node
 - (C) rhizome
 - (D) tendril
 - (E) tuber
29. Gymnosperms are NOT
- (A) seed plants.
 - (B) predominantly diploid.
 - (C) flowering plants.
 - (D) conifers.
 - (E) naked seed plants

Chapter10: Plants (Organismal Biology) Cont.

30. Which of these plant forms are diploid?
- I. Spore
 - II. Sporophyte
 - III. Gametophyte
- (A) . I only
(B) . II only
(C) . III only
(D) . I and II
(E) . II and III
31. Which of these correctly matches the plant cells to their tissue systems?
- I. Guard cell
 - II. Palisade mesophyll cell
 - III. Sieve- tube member
- (A). I = dermal; II = ground; III = vascular
(B). I = dermal; II = vascular; III = ground
(C). I = ground; II = dermal; III = vascular
(D). I = ground; II = vascular; III = dermal
(E). I = vascular; II = ground; III = dermal
32. Which of these is/are responsible for an increase in the thickness of a plant?
- I. Apical meristem
 - II. Vascular cambium
 - III. Cork cambium
- (A). I only
(B). II only
(C). III only
(D). I and II
(E). II and III
33. Which of these describes a difference between monocots and dicots?
- (A) . Monocot embryos form two leaves; dicot embryos form a single leaf.
(B) . Monocot flowers may consist of five petals; dicot flowers may consist of six petals.
(C) . Monocot leaves have a branching network of veins; dicot leaves have parallel veins.
(D) . Monocot roots consist of many small roots growing from a taproot; dicot roots lack a taproot.
(E) . Monocot vascular tissue is arranged randomly in the stem; dicot vascular tissue is arranged in a ring.
34. Which of these increase the movement of sap within the xylem?
- I. Water moves into guard cells' vacuoles.
 - II. Humidity increases in surrounding air.
 - III. Root endodermis prevents ions from entering xylem.
- (A). I only
(B). II only
(C). I and III
(D). II and III
(E). I, II, and III

Chapter: Plants Answers

1	E	18	D
2	A	19	A
3	A	20	B
4	B	21	A
5	B	22	A
6	B	23	D
7	A	24	E
8	D	25	E
9	D	26	D
10	C	27	B
11	C	28	B
12	E	29	C
13	B	30	B
14	C	31	A
15	B	32	E
16	C	33	E
17	C	34	A

Chapter11: Plants (Organismal Biology)

Questions 1-13

- (A) Hydra
- (B) Grasshopper
- (C) Earthworm

1. The body plan is a polyp
2. Has an open circulatory system
3. Has a closed circulatory system
4. Has no circulatory system
5. Nervous system consists of a nerve net
6. Exchange of respiratory gases is through the moist skin
7. Uses its digestive tract to release nitrogenous wastes
8. Uses nephridia to remove nitrogenous wastes
9. All the members of this phylum have stinging cells
10. This animal has a transport system but lacks capillaries
11. Every cell in this animal is directly in contact with its environment
12. Exchanges respiratory gases through hemocoels
13. Sessile

14. All of the following are behavioral changes to regulate body temperature EXCEPT

- (A) shivering
- (B) elephants bathing and spraying water on themselves
- (C) animals huddling at night on the prairie
- (D) increasing blood flow to the fingers and toes
- (E) resting on a hot rock

15. Which of the following correctly identifies an advantage of an internal skeleton over an external one?

- (A) An internal skeleton supports the animal better.
- (B) An external skeleton can dissolve easily in wet climates.
- (C) An external skeleton does not grow with the animal's body.
- (D) The internal skeleton prevents infections better than an external one.
- (E) Animals with external skeletons are not as successful as animals with internal skeletons.

16. All of the following are correct about animal systems EXCEPT

- (A) the hydra has a two-way digestive system
- (B) earthworms are hermaphrodites
- (C) grasshoppers use their digestive tract to remove nitrogenous waste
- (D) the nitrogenous waste from the earthworm is uric acid
- (E) the grasshopper has chitinous plates in the gizzard that act like teeth

17. Ligaments connect to _____ ; tendons connect to

- (A) bone to muscle; bone to bone
- (B) bone to bone; muscle to bone
- (C) muscle to muscle; bone to muscle
- (D) tendons to muscle; ligaments to bone
- (E) tendons to bones; muscle to muscle

Chapter11: Animal Physiology (Organismal Biology)

Questions 18-22

- (A) Uric acid
- (B) Urea
- (C) Ammonia

18. Most toxic
 19. Excreted by humans and earthworms
 20. Excreted by the digestive tracts of insects and birds
 21. Excreted by the Malpighian tubules
 22. Excreted by nephridia
23. Digestion in protozoans is
- (A) extracellular.
 - (B) intracellular.
 - (C) intercellular.
 - (D) dorsal.
 - (E) none of the above.

Chapter: Animal Physiology Answers

1	A	11	A	21	A
2	B	12	B	22	B
3	C	13	A	23	B
4	A	14	D		
5	A	15	C		
6	C	16	D		
7	B	17	B		
8	C	18	C		
9	A	19	B		
10	B	20	A		

Chapter 12: Human Physiology (Organismal Biology)

1. All of the following are functions of the liver EXCEPT
- (A) cholesterol production
 - (B) recycles red blood cells
 - (C) site of bile production
 - (D) site of deamination of amino acids
 - (E) excretion of urea
2. Absorption of nutrients occurs in the
- (A) stomach
 - (B) beginning of the small intestine
 - (C) latter part of the small intestine
 - (D) colon
 - (E) rectum
3. Which pair is correctly matched?
- (A) Cardiac sphincter—small intestine
 - (B) Colon—villi
 - (C) Pancreas—bile
 - (D) *H. pylori*—ulcers
 - (E) Amylase—digests proteins
11. Gastric enzymes work best in an environment with a pH of
- (A) 3
 - (B) 6
 - (C) 7
 - (D) 8
 - (E) 11
12. Intestinal enzymes work best in an environment with a pH of
- (A) 2
 - (B) 6
 - (C) 7
 - (D) 8
 - (E) 11
13. The lacteal is found in the _____ and is involved with _____
- (A) stomach; release of hormones
 - (B) duodenum; hydrolysis of lipids
 - (C) villi; the absorption of fatty acids
 - (D) colon; the reabsorption of water
 - (E) liver; production of hydrolytic enzymes

Questions 4-10

Match the description to the parts of the human digestive system below.

- (A) Small intestine
 - (B) Stomach
 - (C) Esophagus
 - (D) Colon
 - (E) Mouth
4. Digestion of starch begins
5. Digestion of starch is completed
6. Digestion of proteins begins
7. Water absorption
8. Vitamin production
9. Organ of egestion
10. Contains villi

14. The digestive tract consists of _____ and _____ nervous system.

- (A) smooth muscle; autonomic
- (B) smooth muscle; somatic
- (C) skeletal muscle; autonomic
- (D) skeletal muscle; somatic
- (E) striated muscle; autonomic

15. Which of the following statements is correct about the heart?

- (A) The right ventricle pumps blood to the aorta.
- (B) The left ventricle pumps blood to the entire body.
- (C) The right atrium receives oxygenated blood from the lungs.
- (D) The right ventricle pumps blood to the right atrium.
- (E) The right ventricle has the thickest wall of all the chambers.

Chapter12: Human Physiology (Organismal Biology) Cont.

16. All of the following are correct about gas exchange in humans EXCEPT

- (A) hemoglobin carries oxygen and carbon dioxide in fairly equal amounts
- (B) breathing rate is regulated by the medulla of the brain
- (C) the purpose of the nose is to filter, warm, and moisten air
- (D) gas exchange occurs in alveoli
- (E) when carbon dioxide builds up in the blood, the pH lowers

17. All of the following are correct about human red blood cells EXCEPT

- (A) they live 120 days
- (B) they are called leukocytes
- (C) they do not have a nucleus
- (D) they are formed in the bone marrow
- (E) they carry oxyhemoglobin

18. All of the following are correct about human circulation EXCEPT

- (A) arteries have thick muscular walls
- (B) the pacemaker of the heart is the SA node
- (C) leukocytes fight disease
- (D) hemoglobin carries oxygen
- (E) the only artery carrying deoxygenated blood is the aorta

19. All of the following are related to blood clotting EXCEPT

- (A) fibrinogen
- (B) erythrocytes
- (C) thromboplastin
- (D) calcium ions
- (E) thrombocytes

20. All of the following are correct about the normal direction of blood flow EXCEPT

- (A) vena cava → right ventricle
- (B) right atrium → tricuspid valve
- (C) aortic semilunar valve → aorta
- (D) lungs → pulmonary vein
- (E) pulmonary vein → left atrium

21. Which of the following correctly follows the flow of blood in the human body?

- (A) Right ventricle— aorta— body— left atrium— left ventricle— pulmonary artery
- (B) Right ventricle— pulmonary artery— lungs— pulmonary vein— left atrium
- (C) Left atrium— left ventricle— pulmonary artery— pulmonary vein— right atrium
- (D) Left atrium— left ventricle— pulmonary artery— lungs— pulmonary vein— right atrium
- (E) Left ventricle— left atrium— aorta— lungs— pulmonary vein

Chapter 12: Human Physiology (Organismal Biology) Cont.

22. All of the following are correct about human circulation EXCEPT
- (A) blood in capillaries travels slowly to allow for diffusion of nutrients and wastes
 - (B) normal blood pressure is higher in males than in females
 - (C) the average heart rate and pulse is about 70 beats per minute
 - (D) your heart rate normally changes in response to physical activity
 - (E) arteries have thicker walls than veins

23. The largest amount of carbon dioxide is carried to the lungs by
- (A) leukocytes
 - (B) thrombocytes
 - (C) erythrocytes
 - (D) hemoglobin in red blood cells
 - (E) the plasma as the bicarbonate ion

24. All of the following are true about blood EXCEPT
- (A) white blood cells are formed in the bone marrow
 - (B) platelets are not cells but are cell fragments
 - (C) arteries contain valves to help in the pumping of blood
 - (D) the liquid portion of the blood is called plasma
 - (E) red blood cells live about 120 days

Questions 25-29

Match the hormone to the correct gland from which it comes.

- (A) Thyroxin
- (B) Oxytocin
- (C) Insulin
- (D) Thyroid-stimulating hormone
- (E) Adrenaline

- 25. Pancreas
- 26. Anterior pituitary
- 27. Posterior pituitary
- 28. Adrenal medulla
- 29. Thyroid

Questions 30-34

Match the hormone and its function. Use each letter once only.

- (A) Raises blood sugar
- (B) Lowers blood sugar
- (C) Stimulates the ovaries
- (D) Stimulates the uterine lining
- (E) Stimulates growth of long bones

30. Progesterone

31. HGH

32. Glucagon

33. FSH

34. Insulin

35. All of the following are correct about the endocrine system EXCEPT

- (A) endocrine glands are ductless
- (B) parathormone is the fight-or-flight hormone
- (C) the islet cells in the pancreas produce both glucagon and insulin
- (D) ecdysone controls metamorphosis in some insects
- (E) polypeptide hormones must bind with a receptor and trigger a secondary messenger

36. All of the following hormones are produced by the anterior pituitary EXCEPT

- (A) glucagon
- (B) follicle-stimulating hormone
- (C) human growth hormone
- (D) thyroid-stimulating hormone
- (E) adrenocorticotrophic hormone

Chapter12: Human Physiology (Organismal Biology) Cont.

37. The main target of antidiuretic hormone is the
- (A) liver
 - (B) kidney
 - (C) heart
 - (D) thyroid
 - (E) spleen
38. Tropic hormones
- (A) are secreted by the thyroid
 - (B) are secreted by the liver
 - (C) are released by the hypothalamus
 - (D) are released only in females
 - (E) are hormones that stimulate other glands
39. Which of the following is correct about the kidney?
- (A) Filtration occurs in the Bowman's capsule and is nonselective.
 - (B) Filtration is selective and occurs by active transport.
 - (C) Filtration is selective and occurs by passive transport.
 - (D) Reabsorption is selective and occurs by passive transport only.
 - (E) Reabsorption occurs in the glomerulus.
40. In humans, urea is
- (A) produced in the kidney and excreted by the skin
 - (B) produced in the liver and excreted mainly by the kidneys
 - (C) produced in the kidney from the metabolism of fats
 - (D) produced in the lungs as a by-product of exhaling
 - (E) accumulates in our bodies as we age
41. Which is true about the human circulatory system?
- (A) The pH varies throughout the day and night.
 - (B) Erythrocytes clot blood.
 - (C) Leukocytes fight germs.
 - (D) Blood type O is dominant.
 - (E) Humans have an open circulatory system.
42. ADH most directly affects the
- (A) glomerulus
 - (B) Bowman's capsule
 - (C) thymus
 - (D) lacteal
 - (E) collecting tubule of the nephron
43. The following are all correct about the nervous system EXCEPT
- (A) dendrites are sensory
 - (B) axons carry an impulse away from the cell body
 - (C) the parasympathetic nervous system is associated with fight-or-flight
 - (D) the central nervous system consists of the brain and spinal cord
 - (E) the interneuron is located in the spinal cord
44. Which would occur if the parasympathetic system were stimulated?
- (A) Increase in blood sugar
 - (B) Increase in digestion
 - (C) Increase in breathing rate
 - (D) Increase in adrenaline
 - (E) Increase in epinephrine
45. The walls of arteries consist of
- (A) striated muscle and are under voluntary control
 - (B) striated muscle and are not under voluntary control
 - (C) smooth muscle and are controlled by the somatic nervous system
 - (D) smooth muscle and are controlled by the autonomic nervous system
 - (E) a mixture of striated and smooth muscle under control of the autonomic nervous system

Chapter 12: Human Physiology (Organismal Biology) Cont.

46. Which of the following is the specialized absorptive structure in the intestine?
- (A) alveoli
 - (B) villi
 - (C) Bowman's capsule
 - (D) salivary glands
 - (E) pyloric sphincter
47. Which of the following tissues contains the highest number of mitochondria?
- (A) nervous
 - (B) skin
 - (C) connective
 - (D) muscle
 - (E) bone
48. Select the correct sequence for human circulation.
- (A) heart—vein—capillary—artery—heart
 - (B) heart—artery—lung—vein—body systems—heart
 - (C) heart—artery—lungs—vein—heart—body systems
 - (D) body system—lungs—heart—vein—capillary—artery
 - (E) heart—artery—lungs—body systems—vein—heart
49. The skeletal system does all of the following EXCEPT
- (A) support.
 - (B) transport.
 - (C) protect.
 - (D) digest.
 - (E) store.
50. Endocrine glands
- (A) secrete vitamins.
 - (B) cease functioning after adolescence.
 - (C) begin functioning in adolescence.
 - (D) have ducts.
 - (E) have no ducts.
51. Bile
- (A) activates pancreatic lipases.
 - (B) emulsifies fat droplets.
 - (C) congeals fat droplets.
 - (D) digests fats.
 - (E) is produced in the pancreas.
52. Which of the following enzymes acts on protein?
- (A) pepsin
 - (B) ptyalin
 - (C) amylase
 - (D) maltase
 - (E) sucrose
53. Which of the following is true about the blood?
- (A) Arteries carry oxygen-rich blood.
 - (B) Arteries carry oxygen-poor blood.
 - (C) Veins carry oxygen-rich blood.
 - (D) Veins carry oxygen-poor blood.
 - (E) None of the above is true.
54. Chemical digestion begins in the
- (A) mouth.
 - (B) esophagus.
 - (C) stomach.
 - (D) gall bladder.
 - (E) small intestine.

Chapter12: Human Physiology (Organismal Biology) Cont.

55. Which of these correctly matches each structure to the germ layer from which it arises?
- I. Femur
 - II. Brainstem
 - III. Lungs
- (A). I = endoderm; II = ectoderm; III = mesoderm
(B). I = endoderm; II = mesoderm; III = ectoderm
(C). I = ectoderm; II = endoderm; III = mesoderm
(D). I = mesoderm; II = endoderm; III = ectoderm
(E). I = mesoderm; II = ectoderm; III = endoderm
56. Which precedes an action potential traveling down the axon of a neuron?
- (A). Neurotransmitters bind to receptors on the dendrite of the neuron.
(B). Neurotransmitters are released from the axon terminals of the neuron.
(C). The action potential travels through the synapse from a nearby neuron.
(D). Vesicles in the axon terminal release their contents at the synapse.
(E). The cell body releases neurotransmitters down the length of the axon.
57. A nerve leading to the small intestine causes the rate of digestion to increase. This nerve MOST LIKELY belongs to which of the following systems and divisions?
- I. Autonomic
 - II. Sympathetic
 - III. Peripheral
 - IV. Enteric
- (A). I and II only
(B). II and III only
(C). I, II, and III
(D). I, III, and IV
(E). II, III, and IV
58. Which of these is the MOST LIKELY result of blood calcium levels falling too low?
- (A). The thyroid gland releases calcitonin, which binds to bone cells.
(B). The parathyroid glands release PTH, which binds to kidney cells.
(C). The thyroid gland releases thyroid hormone, which binds to small intestine cells.
(D). The pancreas releases glucagon, which binds to liver cells.
(E). The pituitary gland releases growth hormone, which binds to bone cells.
59. Which of these carries deoxygenated blood?
- I. Pulmonary veins
 - II. Anterior vena cava
 - III. Pulmonary arteries
- (A). I only
(B). II only
(C). III only
(D). I and II
(E). II and III

Chapter12: Human Physiology (Organismal Biology) Cont.

60. What sequence is followed by the path of blood from the heart?
- (A). Vena cava, right atrium, right ventricle, aorta, lungs
 - (B). Lungs, pulmonary vein, right atrium, right ventricle, aorta
 - (C). Vena cava, right atrium, right ventricle, lungs, pulmonary vein
 - (D). Vena cava, left atrium, left ventricle, lungs, pulmonary artery
 - (E). Left ventricle, lungs, pulmonary vein, pulmonary artery, right atrium
61. Which of these does NOT secrete any digestive enzyme?
- (A). Salivary glands
 - (B). Liver
 - (C). Pancreas
 - (D). Small intestine
 - (E). Stomach
62. Which of these describes an adaptation to an arid environment?
- (A). A short loop of Henle, which allows more filtrate to be removed from the blood
 - (B). A short loop of Henle, which allows less water to be removed from the filtrate
 - (C). A long loop of Henle, which allows more filtrate to be removed from the blood
 - (D). A long loop of Henle, which allows more water to be removed from the filtrate
 - (E). A long loop of Henle, which allows less filtrate to be removed from the blood

Chapter: Human Physiology (Organismal Biology) Answers

1	E	11	A	21	B
2	C	12	D	22	B
3	D	13	C	23	E
4	E	14	A	24	C
5	A	15	B	25	C
6	B	16	A	26	D
7	D	17	B	27	B
8	D	18	E	28	E
9	D	19	B	29	A
10	A	20	A	30	D

31	E	41	C	51	B
32	A	42	E	52	A
33	C	43	C	53	E
34	B	44	B	54	A
35	B	45	D	55	E
36	A	46	B	56	A
37	B	47	D	57	D
38	E	48	C	58	B
39	A	49	D	59	E
40	B	50	E	60	C
				61	B
				61	D

Chapter13: Reproduction and Development

1. Development of an embryo without fertilization is called

- (A) Budding
- (B) Parthenogenesis
- (C) Regeneration
- (D) Gastrulation
- (E) Organogenesis

2. All of the following are correct about asexual reproduction EXCEPT

- (A) it can create numerous offspring quickly
- (B) the offspring are genetically identical to the parent
- (C) it enables animals living in isolation to reproduce without a mate
- (D) there is no expenditure of energy maintaining reproductive systems or hormonal cycles
- (E) it is advantageous when the environment is changing and the organism is stressed

Questions 3-7

Refer to the list below of primary germ layers.

- (A) Ectoderm
 - (B) Endoderm
 - (C) Mesoderm
3. Gives rise to the lining of the digestive tract
 4. Gives rise to the brain and eye
 5. Gives rise to the blood
 6. Gives rise to the bone
 7. Gives rise to the viscera

Questions 8-11

Refer to the list below of parts of the male reproductive system.

- (A) Prostate gland
 - (B) Vas deferens
 - (C) Testes
8. Secretes semen directly into the urethra
 9. Duct that carries sperm during ejaculation
 10. Male gonads
 11. Site of meiosis

Questions 12-15

Choose from the list below of parts of the female reproductive system.

- (A) Uterus
 - (B) Cervix
 - (C) Endometrium
 - (D) Fallopian tube
 - (E) Ovary
12. Where fertilization normally occurs
 13. Where meiosis occurs
 14. Lining of the uterus
 15. Mouth of the uterus through which the baby passes

Questions 16-18

Refer to the terms below about the menstrual cycle.

- (A) Luteal phase
 - (B) Menstruation
 - (C) Ovulation
 - (D) Follicular phase
16. FSH stimulates the ovaries
 17. Follicle secretes estrogen and progesterone
 18. Secondary oocyte ruptures out of ovary
 19. The end of cleavage is marked by the formation of
 - (A) three embryonic layers
 - (B) the archenteron
 - (C) the blastula
 - (D) zygote
 - (E) the secondary oocyte

Chapter 13: Reproduction and Development

20. Gastrulation is marked by the formation of the
- (A) blastula
 - (B) secondary oocyte
 - (C) three embryonic layers
 - (D) blastocoel
 - (E) zygote
21. Which hormone is released by the anterior pituitary and directly causes ovulation?
- (A) Luteinizing hormone
 - (B) Progesterone
 - (C) Gonadotropic-releasing hormone (GnRH)
 - (D) Follicle-stimulating hormone
 - (E) Estrogen
22. Which hormone causes the lining of the uterus to thicken in preparation for implantation of the embryo?
- (A) Luteinizing hormone
 - (B) Progesterone
 - (C) Gonadotropic-releasing hormone (GnRH)
 - (D) Follicle-stimulating hormone
 - (E) Androgen
23. Which is the correct order of the stages of the menstrual cycle?
- (A) Follicular phase—ovulation—menstruation—luteal phase
 - (B) Ovulation—luteal phase—menstruation—follicular phase
 - (C) Follicular phase—ovulation—luteal phase—menstruation
 - (D) Luteal phase—ovulation—menstruation—follicular phase
 - (E) Luteal phase—follicular phase—ovulation—menstruation

Questions 24-25

Refer to the terms below that refer to the chick embryo.

- (A) Chorion
 - (B) Yolk sac
 - (C) Amnion
 - (D) Allantois
24. Analogous to the placenta; where nitrogenous waste accumulates
25. Encloses the embryo in protective fluid
26. Which correctly describes a process or event in the female reproductive cycle?
- (A). The cycle is regulated via a negative feedback loop.
 - (B). The corpus luteum releases an egg into a fallopian tube.
 - (C). Estrogen and progesterone cause a follicle to mature.
 - (D). Pituitary hormones cause the uterine lining to be shed monthly.
 - (E). The hormones that are released by a maturing follicle causes the uterine lining to build up.

**Chapter: Reproduction and Development
Answers**

1	B	18	C
2	E	19	C
3	B	20	C
4	A	21	A
5	C	22	B
6	C	23	C
7	B	24	D
8	A	25	C
9	B	26	E
10	C		
11	C		
12	D		
13	E		
14	C		
15	B		
16	D		
17	A		

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Chapter14: The Human Immune System

1. All of the following are part of the first line of defense of the immune system EXCEPT

- (A) leukocytes
- (B) skin
- (C) stomach acid
- (D) cilia
- (E) mucus

2. All of the following are true of the second line of defense EXCEPT

- (A) increased production of histamine
- (B) sneezing, redness, and itchy and runny nose and eyes
- (C) inflammatory response
- (D) stomach acid
- (E) phagocytes

3. All of the following are correct about the immune system EXCEPT

- (A) the first line of defense is nonspecific
- (B) the second line of defense is nonspecific
- (C) release of histamine is responsible for the inflammatory response
- (D) macrophages engulf huge numbers of microbes
- (E) T lymphocytes release antibodies

4. Which of the following is NOT part of the lymphatic system?

- (A) Tonsils
- (B) Spleen
- (C) Liver
- (D) Adenoids
- (E) Lymph nodes

5. Which of the following is true about histamine?

- (A) It is part of the body's first line of defense.
- (B) It kills germs by dissolving them.
- (C) It is a toxin released by microbes or germs.
- (D) It causes sneezing and a runny nose in an attempt to rid the body of germs.
- (E) It is part of the body's specific immune response.

Questions 6-10

Refer to terms below.

- (A) T lymphocytes
- (B) B lymphocytes
- (C) Macrophages
- (D) Antibodies
- (E) Histamine

6. Produce antibodies

7. Fight pathogens by hand-to-hand combat

8. Neutralize specific antigens

9. Use pseudopods to engulf large numbers of germs

10. Attacks and kills infected body cells

11. Certain danger in a blood transfusion comes when the

- (A) recipient has antigens to the donor blood
- (B) recipient has antibodies to the donor blood
- (C) donor has antibodies to the recipient's blood
- (D) donor has antigens to the recipient's antigens
- (E) donor's blood contains gamma globulin

12. A person with blood type A has

- (A) A antibodies circulating in the plasma
- (B) A antigens on the surface of the red blood cells
- (C) B antibodies on the surface of the red blood cells
- (D) A antigens circulating in the plasma
- (E) O antibodies circulating in the plasma

13. A person with AB blood type has

- (A) both A and B antigens on the surface of the red blood cells
- (B) both A and B antigens circulating in the plasma
- (C) O antigens circulating in the plasma
- (D) no antigens on the surface of the red blood cells
- (E) no antibodies on the surface of the red blood cells

Chapter14: The Human Immune System Cont.

14. Which is an example of passive immunity?

- (A) Lifelong immunity.
- (B) Babies who are nursing receive antibodies from their mothers.
- (C) You become resistant to a viral infection once you have recovered from it.
- (D) You become resistant to mumps after receiving the mumps vaccine.
- (E) People who have AIDS have antibodies against the virus but are still gravely ill.

15. Which of the following is CORRECT about the immune system?

- (A) Vaccines can cure certain common viral infections.
- (B) Allergies can be cured by antibiotics.
- (C) Multiple sclerosis is caused by an allergy.
- (D) Rheumatoid arthritis is an autoimmune disease.
- (E) Antibiotics can prevent many diseases.

16. All of the following are autoimmune diseases EXCEPT

- (A) arthritis
- (B) lupus
- (C) multiple sclerosis
- (D) AIDS
- (E) juvenile diabetes

17. Reverse transcriptase is an enzyme found in

- (A) macrophages
- (B) T lymphocytes
- (C) B lymphocytes
- (D) HIV virus
- (E) antibodies

18. Antibodies are

- (A) responsible for raising body temperature when you are ill
- (B) memory cells
- (C) plasma cells
- (D) specific
- (E) part of the first line of defense

19. Which is true about plasma cells?

- (A) When activated, they turn into memory cells.
- (B) They offer permanent resistance to disease.
- (C) They are produced from activated T cells; whereas memory cells are produced by activated B cells.
- (D) They fight antigens and die in battle.
- (E) They are found only in people who are infected with the AIDS virus.

Chapter14: The Human Immune System Cont.

20. Vasodilation

- (A) is triggered by histamine
- (B) means engulfing antigens
- (C) is caused by interferons
- (D) is part of an immunoglobulin
- (E) is an important part of the specific immune response

21. Which of these would a researcher test the blood for to determine if a person has been infected with a virus in the past?

- (A). Antigens
- (B). Antibodies
- (C). Macrophages
- (D). Pathogens
- (E). Natural killer cells

Chapter: The Human Immune System Answers

1	A	11	B	21	B
2	D	12	B		
3	E	13	A		
4	C	14	B		
5	D	15	D		
6	B	16	D		
7	A	17	D		
8	D	18	D		
9	C	19	D		
10	A	20	A		

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Chapter 15: Animal Behavior

Questions 1-7

Choose from the list of scientists below.

- (A) Niko Tinbergen
- (B) Karl von Frisch
- (C) B. F. Skinner
- (D) Konrad Lorenz
- (E) Ivan Pavlov

1. Described the waggle dance in honeybees
2. Imprinting
3. Trained dogs to salivate at the sound of a bell
4. Classical conditioning
5. Taught rats in cages to depress a lever to release food
6. Baby geese followed him everywhere
7. Explained fixed action pattern

Questions 8-12

Choose from the terms below.

- (A) Fixed action pattern
- (B) Habituation
- (C) Classical conditioning
- (D) Imprinting
- (E) Operant conditioning

8. Innate, highly stereotypical behavior that must continue until it is completed
9. Trial and error learning
10. Sequence of behaviors that is unchangeable and carried to completion once initiated
11. Initially, the amoeba moved away from the strong light; but after a while, it resumed its normal movement pattern
12. This is the way dogs are trained

13. A sophisticated process in which the responses of the organism are modified as a result of experience is called

- (A) fixed action pattern
- (B) habituation
- (C) imprinting
- (D) classical conditioning
- (E) learning

14. This behavior reduces an individual's reproductive fitness while increasing the fitness of the family.

- (A) Altruism
- (B) Agonistic behavior
- (C) Territoriality
- (D) Cooperation
- (E) Imprinting

15. You want to train your puppy to wait at the curb until you tell him to cross the road. Your friend advises you to give your dog a treat every time he does as you ask. Your friend is advising that you train the dog using

- (A) operant conditioning
- (B) classical conditioning
- (C) imprinting
- (D) fixed action pattern
- (E) habituation

is learning that occurs _____ 16.
during a sensitive or critical period

in early life and is irreversible for the length of the period.

- (A) Habituation
- (B) Operant conditioning
- (C) Trial and error learning
- (D) Imprinting
- (E) Classical conditioning

Chapter15: Animal Behavior Cont.

17. "Mary had a little lamb; its fleece was white as snow.
And everywhere that Mary went, the lamb was sure to go.
" The behavior of the lamb is best described as
- (A) habituation
 - (B) imprinting
 - (C) operant conditioning
 - (D) classical conditioning
 - (E) fixed action pattern
18. Fixed action patterns are initiated by external stimuli called
- (A) fixed action pattern
 - (B) sign stimuli
 - (C) agonistic behavior
 - (D) dominance hierarchies
 - (E) sensitive periods
19. Animals that help other animals are expected to be
- (A) stronger than other animals
 - (B) related to the animals they help
 - (C) male
 - (D) female
 - (E) disabled in some way
20. An animal that sacrifices itself for its relatives is exhibiting
- (A) operant conditioning
 - (B) kin selection
 - (C) classical conditioning
 - (D) imprinting
 - (E) habituation
21. Which of the following is an instinct?
- (A) caring for offspring
 - (B) habituation
 - (C) operant conditioning
 - (D) associative behavior
 - (E) observational learning
22. All of the following are associated with mating behavior EXCEPT
- (A) aggressive behavior.
 - (B) releaser pheromones.
 - (C) search image.
 - (D) territoriality.
 - (E) visual communication
23. Which of the following is NOT a means of animal communication?
- (A) auditory
 - (B) chemical
 - (C) instinctual
 - (D) tactile
 - (E) visual

Chapter: Animal Behavior Answers

1	B	18	B
2	D	19	B
3	E	20	B
4	E	21	A
5	C	22	C
6	D	23	C
7	A		
8	A		
9	E		
10	A		
11	B		
12	E		
13	E		
14	A		
15	A		
16	D		
17	B		

Chapter16: Ecology.

1. All the organisms of one species living in one area are known as a(n)

- (A) community
- (B) population
- (C) species
- (D) ecotype
- (E) detritivore

2. All the organisms living in one area are known as a(n)

- (A) community
- (B) population
- (C) species
- (D) ecotype
- (E) detritivore

Questions 3-8

Choose from the terms below.

- (A) Herbivore
- (B) Producer
- (C) Primary consumer
- (D) Secondary consumer
- (E) Decomposer

3. Converts solar energy to chemical bond energy

4. Has the greatest mass in any food chain

5. Fungi are an example of this

6. Contains the most pesticides of any organism on the list

7. A primary consumer is also this

8. Has the least biomass in a food chain

9. All of the following are correct about the food chain EXCEPT

- (A) bacteria and fungi act as decomposers that recycle nutrients
- (B) producers are always at the bottom of any food chain
- (C) energy is lost at each trophic level
- (D) food chains never have more than 4 or 5 trophic levels
- (E) pesticides tend to be concentrated at the producer level because producers have the largest mass in a food chain

Questions 10-18

Choose from the names of the biomes below.

- (A) Tropical rain forest
- (B) Taiga
- (C) Temperate grasslands
- (D) Marine
- (E) Tundra

10. Called the permafrost

11. Characteristic organisms: large mammals including black bear and elk, and conifer forests

12. Smallest number of species

13. Covers less than 4 percent of Earth's land surface but produces 20 percent of Earth's food

14. Largest biome

15. Most diversity of species

16. Rapidly decreasing due to human interaction

17. Most stable biome

18. Provides most of Earth's oxygen

19. Epiphytes are

- (A) a climax community of plants in the desert
- (B) photosynthetic plants that grow on trees rather than supporting themselves
- (C) vegetation found in grasslands
- (D) decomposers in the taiga
- (E) animals found in the tundra

20. Eutrophication refers to

- (A) the process that causes the depletion of the ozone layer
- (B) global warming
- (C) the process that happens to a lake that absorbs too many nutrients
- (D) the invasion of new species that causes damage to an ecosystem
- (E) the process whereby one species outcompetes another species

Chapter 16: Ecology

Questions 21-24

Choose from the terms below.

- (A) Mutualism
- (B) Parasitism
- (C) Commensalism
- (D) None of the above
- (E) A, B, and C

21. Both organisms benefit
22. One organism benefits; the other organism is not affected by the first organism
23. Example of symbiosis
24. Example of Batesian mimicry
25. The result of the action of decomposers is
 - (A) decrease in ammonia
 - (B) increase in transpiration
 - (C) nitrogen fixation
 - (D) decrease in oxygen
 - (E) increase in oxygen

Questions 26-29

Choose from the terms below about the nitrogen cycle.

- (A) Nitrogen-fixing bacteria
- (B) Denitrifying bacteria
- (C) Nitrifying bacteria

26. These live in the roots of legumes
27. Convert the ammonium ion into nitrates
28. Convert nitrates into free nitrogen in the atmosphere
29. Convert free nitrogen from the atmosphere into the ammonium ion
30. Which of the following shows the correct order of the biomes as you move from the equator to the North Pole in the western hemisphere?
 - (A) Tropical rain forest—desert—temperate rain forest—taiga—tundra
 - (B) Tundra—taiga—temperate deciduous forest—desert—tropical rain forest
 - (C) Desert—taiga—tundra—temperate deciduous forest—tropical rain forest
 - (D) Tundra—temperate deciduous forest—taiga—desert—tropical rain forest
 - (E) Desert—tropical rain forest—temperate deciduous forest—taiga—tundra

Questions 31-34 refer to the following relationships:

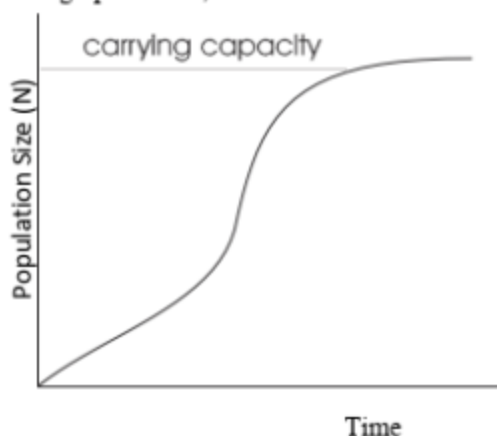
- (A) predator-prey
- (B) commensalism
- (C) mutualism
- (D) parasitism
- (E) camouflage

31. A cow produces milk daily after grazing in a large pasture owned and maintained by the farmer.
32. Remora fish attach themselves to the underside of a shark, and while the shark feeds, the remora darts out for shreds of the shark's food that are left floating in the water.
33. A walking stick resembles the branches it resides on.
34. Lacking a digestive system, tapeworms live in the intestines of their host.
35. Which of the following organisms in the food chain has the largest biomass?

- (A) plants
- (B) grasshopper
- (C) mouse
- (D) owl
- (E) snake

Chapter16: Ecology Cont.

36. In the graph below, the curve indicates the

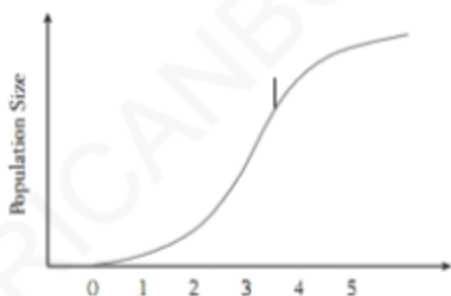


- (A) biotic potential.
- (B) carrying capacity.
- (C) density-dependent effect.
- (D) density-independent effect.
- (E) sigmoid curve.

37. Which of the following biomes is characterized by the driest conditions?

- (A) tundra
- (B) taiga
- (C) temperate deciduous forest
- (D) grasslands
- (E) tropical rain forest

38. Which of these best describes the population growth shown in the graph?



- (A) On day 1, the resources of the population limit its growth.
- (B) On day 2, the birthrate per individual is greater than on day 1.
- (C) On day 3, the population size is equal to K.
- (D) On day 4, the curve is most similar an exponential growth curve.
- (E) On day 5, the number of deaths approaches the number of births.

39. Compared to a country that has undergone demographic transition, a country that has NOT undergone this transition has which of the following?

- I. Higher birthrate
- II. Lower death rate
- III. Higher growth rate

- (A) I only
- (B) I and II
- (C) I and III
- (D) II and III
- (E) I, II, and III

Chapter16: Ecology Answers

1	B	18	D
2	A	19	B
3	B	20	C
4	B	21	A
5	E	22	C
6	D	23	E
7	A	24	D
8	D	25	D
9	E	26	A
10	E	27	C
11	B	28	B
12	E	29	A
13	A	30	A
14	D	31	C
15	A	32	B
16	A	33	E
17	D	34	D
		35	A
		36	E
		37	A
		38	E
		39	C

