

## Chapter 1      Biochemistry and the Unity of Life

### Matching Questions

Use the following to answer questions 1–10:

Choose the correct answer from the list below. Not all of the answers will be used.

- a) uracil
- b) cytoplasm
- c) protein
- d) thymine
- e) carbohydrate
- f) sugar–phosphate units
- g) cell wall
- h) transcription
- i) glycogen
- j) lipid
- k) central dogma
- l) phagocytosis
- m) endoplasmic reticulum
- n) translation
- o) prokaryotes
- p) eukaryotes
- q) lysosome

1. DNA is made from the building blocks adenine, guanine, cytosine, and \_\_\_\_\_.
  
2. \_\_\_\_\_: Unbranched polymer that, when folded into its three-dimensional shape, performs much of the work of the cell.
  
3. \_\_\_\_\_: Scheme that describes the flow of information from one strand of DNA to a new strand of DNA.

4. \_\_\_\_\_: Process where large amounts of material are taken into the cell.
  
5. The transfer of information from DNA to RNA is called \_\_\_\_\_.
  
6. \_\_\_\_\_ are cells that are composed of multiple specialized compartments.
  
7. \_\_\_\_\_: Class of biological macromolecules with many functions, such as forming barriers between cell organelles, serving as a metabolic fuel, and cell-to-cell signaling.
  
8. \_\_\_\_\_: Highly organized region of the cell where glycolytic metabolism occurs.
  
9. \_\_\_\_\_: Responsible for protein processing and xenobiotic metabolism.
  
- 10.. \_\_\_\_\_: Filled with proteases and other digestive enzymes.

**Fill-in-the-Blank Questions**

11. Organisms are known to be highly uniform at the \_\_\_ level.  
Ans: molecular    Section: Introduction

12. After hydrogen and oxygen, the next most common element in living systems is \_\_\_\_.
13. A chemical that can dissolve in water is said to be \_\_\_\_.
14. A nucleotide consists of one or more \_\_\_\_ groups, a 5-carbon ribose sugar, and a nitrogen-containing aromatic ring group.
15. The most common carbohydrate fuel is \_\_\_\_.
16. Heritable information is packaged into discrete units called \_\_\_\_.
17. A group of enzymes called \_\_\_\_ catalyze replication.
18. Although all cells in an organism have the same DNA, tissues differ due to selective \_\_\_\_.
19. The basic unit of life is considered the \_\_\_\_.
20. Secretory vesicles fuse with the plasma membrane to release material outside of the cell via \_\_\_\_.

### Multiple-Choice Questions

21. The structure of DNA described by Watson and Crick included:  
A) a double helix.  
B) the sugar-phosphate backbone aligned in the center of the helix.  
C) the base pairs that are stacked on the inside of the double helix.  
D) A and B.  
E) A and C.
- ed of a polymer  
s?

E) None of the above.

23. What gives proteins such a dominant role in biochemistry?
- A) the variation in protein sizes
  - B) the ability to act as a blueprint
  - C) their ability to self-replicate
  - D) their ability to spontaneously fold into complex three-dimensional structures
  - E) All of the above.

24. Proteins are chiefly composed of which of the following?
- A) carbohydrate and amino acids
  - B) long unbranched amino acid polymers
  - C) peptide bonds formed between lipid moieties
  - D) aggregated amino acids
  - E) A and B

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25. How a protein folds is determined by:
- A) whether the environment is hydrophobic or hydrophilic.
  - B) the location in the cell in which the protein is located.
  - C) the pH of the cytoplasm.
  - D) the order of the amino acids found in the sequence.
  - E) All of the above.

26. The half-life of which of the following is likely to be shortest?
- A) protein
  - B) lipid
  - C) carbohydrate
  - D) DNA
  - E) RNA
27. The central dogma describes:
- A) the formation of cells from individual components.
  - B) the selective expression of genes.
  - C) the flow of information between DNA, RNA, and protein.
  - D) the work of polymerases on RNA and DNA.
  - E) All of the above.
28. Translation takes place on/in the:
- A) ribosomes.
  - B) smooth endoplasmic reticulum.
  - C) nucleus.
  - D) DNA polymerases.
  - E) DNA parent strand.
29. Which of the following organelles has a double membrane?
- A) nucleus
  - B) endoplasmic reticulum
  - C) mitochondria
  - D) plasma membrane
  - E) A and C
  - F) All of the above.

30. The main function of the plasma membrane is to:
- A) provide the interior of the cell an enclosed environment that no molecules may cross.
  - B) provide a selectively permeable barrier with the aid of transport proteins.
  - C) give eukaryote and prokaryote cells structural strength.
  - D) allow only the free passage of water in and out of the cell.
  - E) None of the above.
31. Filaments and microtubules are components of a network called the:
- A) chloroplast.
  - B) cytoplasm.
  - C) cytoskeleton.
  - D) cell wall.
  - E) B and D.
32. Poisons that kill an organism as a result of a loss of high-energy ATP molecules are most likely to target which organelle?
- A) mitochondria
  - B) cytoskeleton
  - C) cytoplasm
  - D) endoplasmic reticulum
  - E) nucleus
33. A secreted protein would be processed through organelles in the following order:
- A) nucleus; secretory vesicle; Golgi complex.
  - B) cytoplasm; Golgi complex; cytosol; secretory vesicle.
  - C) endoplasmic reticulum; cytoplasmic reticulum; Golgi complex.
  - D) nucleus; cytoplasm; endoplasmic reticulum; Golgi complex; secretory vesicle.
  - E) None of the above.
34. Extracellular material is taken into the cell via which process?
- A) exocytosis
  - B) phagocytosis

- C) lysosome-mediated endocytosis
- D) reverse secretory mechanism
- E) phago-cytosolic internalization

35. The rigid material that provides structural support to a plant cell is/are called the:

- A) plant cytoskeleton.
- B) plasma membrane.
- C) cell wall.
- D) chloroplast anchor proteins.
- E) microfilaments and microtubules.

36. In studying secreted proteins, you find that Substance X inhibits the secretion of a labeled protein. However, you do find a fully synthesized, folded, and glycosylated proteins in the cell. Where is the most likely site in the synthesis and secretion of proteins for Substance X to act?

- A) nucleus during translation
- B) budding of the secretory granule
- C) translation on the ribosome
- D) enzyme modification in the Golgi
- E) All of the above.

37. Below is the scheme known as the central dogma. Each of the arrows (A, B, C) represents a particular process in gene expression. A, B, and C, respectively, are:



- A) replication, transcription, translation.
- B) reverse transcription, transcription, translation.
- C) transcription, translation, replication.
- D) replication translation, expression.
- E) None of the above.