

1. The lac operon controls

- a. Conjugation between bacteria
- b. Chromatin organization
- c. Gene transcription
- d. Excision repair
- e. Termination of translation

2. Transfer of DNA between bacteria using a narrow tube called a pilus is called

- a. Transformation
- b. Transduction
- c. Operation
- d. Conjugation
- e. Conformation

3. Which of the following plant structures allows for gas exchange?

- a. Xylem
- b. Phloem
- c. Cuticle
- d. Meristem
- e. Stomata

4. Which of the following extraembryonic membranes is an important source of nutrition in many non-human animal species but NOT in humans?

- a. Amnion
- b. Allantois
- c. Yolk sac
- d. Chorion
- e. Placenta

5. A child is born with type A blood and his mother has type A. Which of the following is NOT a possible combination of genotypes for the mother and father?

- a. IAIA and ii
- b. IAi and ii
- c. IA i and IB i
- d. IAi and IBIB
- e. IAIB and IBi

6. Which of the following statements is NOT true about all living things?

- a. They undergo growth and development.

- b. They are the products of evolution.
- c. Their composition includes carbon, hydrogen, oxygen, and nitrogen.
- d. They are made of cells or cell products.
- e. They have a cell wall as an outer boundary.

7. Which occurs in meiosis I but not in meiosis II?

- a. Diploid daughter cells are produced
- b. Chromosomes without chromatids line up at the equator
- c. Centromeres divide
- d. Synapsis of homologous chromosomes occurs
- e. The spindle apparatus forms

8. In some tropical rain forests, a very large biomass of primary producers is supported by soils that exhibit much lower levels of phosphorus and other key nutrients compared to temperate forests. Which of the following statements best explains the high levels of productivity on nutrient-poor soils in some tropical rain forests?

- a. Plants growing under conditions of high temperatures use a different pathway for photosynthesis that requires the use of less nutrients.
- b. Warm temperatures and high levels of moisture allow decomposers to recycle nutrients rapidly for reuse by primary producers.
- c. High rainfall in tropical forests creates many streams that contain and distribute high levels of dissolved salts.
- d. Plants in tropical forests grow very slowly and are extremely efficient at extracting nutrients from the soil.

9. Which of the following best describes the accepted model of DNA replication?

- a. the semiconservative model, in which the two strands of the parental double helix separate, and each provides the template for building a new strand that attaches to the parental strand
- b. the dispersive model, in which a parental DNA molecule replaces segments of its double helix with new genetic material, making the original segments available to assemble new DNA molecules
- c. the conservative model, in which the parental DNA remains intact while providing a template for an identical double helix to be synthesized adjacent to it
- d. the additive model, in which nucleotide chains assemble into double helix configurations, and the segments are linked to correspond to the parental DNA sequence

Use the information below to answer the question that follows.

Darwin made two distinct claims when proposing his theory of evolution. Darwin's first claim was that all modern species have evolved from ancestral forms. The second claim was that natural selection is the main mechanism for evolutionary change.

10. Which of the following observations best supports Darwin's claim that all modern species have evolved from ancestral forms?

- a. Similar complex structures, such as the eye, are present in a wide variety of unrelated organisms.
- b. Early embryos of all vertebrate groups, such as mammals, reptiles, and fish, are very similar.
- c. Variation occurs in all species, and this variation may help determine the survival of an individual.
- d. All species appear to be well adapted to the environment in which they live.

11. Which hormone(s) produce follicular growth?

- a. Estrogen and follicle stimulating hormone
- b. Follicle stimulating hormone and luteinizing hormone
- c. Estrogen and luteinizing hormone
- d. Estrogen, follicle stimulating hormone and luteinizing hormone
- e. Only follicle stimulating hormone

12. Which species is most likely to become extinct?

- a. the white tiger beetle, found throughout the mid-Atlantic United States
- b. Kirtland's warbler, which breeds only in a small area of Michigan
- c. the jack-in-the-pulpit, found throughout the eastern United States and Canada
- d. the northeastern pygmy shrew, found throughout New Jersey and Pennsylvania
- e. goldfish, found throughout the United States and Canada

13. Which of the following most closely matches the correct order of main events of cellular respiration?

- a. glycolysis, pyruvate enters mitochondrion, Krebs cycle, major ATP production, electron transport
- b. glycolysis, major ATP production, pyruvate enters mitochondrion, electron transport, Krebs cycle
- c. glycolysis, Krebs cycle, electrons transport system, major ATP production
- d. Krebs cycle, electron transport, major ATP production, glycolysis
- e. major ATP production, pyruvate enters mitochondrion, Krebs cycle, electron transport

14. Which of these sequences correctly describes the cell cycle?

- a. $\rightarrow G_1 \rightarrow G_2 \rightarrow S \rightarrow \text{prophase} \rightarrow \text{metaphase} \rightarrow \text{anaphase} \rightarrow \text{telophase} \rightarrow$
- b. $\rightarrow S \rightarrow G_2 \rightarrow \text{prophase} \rightarrow \text{metaphase} \rightarrow \text{anaphase} \rightarrow \text{telophase} \rightarrow G_1 \rightarrow$

- c. $\rightarrow G_1 \rightarrow S \rightarrow G_2$ prophase $\rightarrow$ anaphase $\rightarrow$ metaphase $\rightarrow$ telophase $\rightarrow$
d. $\rightarrow$ prophase $\rightarrow$ metaphase $\rightarrow$ telophase $\rightarrow$ anaphase $\rightarrow G_1 \rightarrow S \rightarrow G_2 \rightarrow$
e. $\rightarrow G_1 \rightarrow S \rightarrow G_2 \rightarrow$ metaphase $\rightarrow$ prophase $\rightarrow$ anaphase $\rightarrow$ telophase $\rightarrow$

15. All of the following are parts of the male parts of a flower except:

- a. Stamens
- b. Ovules
- c. Pollen
- d. Anthers
- e. All of these are associated with the male parts

16. Complete the exercise that follows.

A series of steps is required to complete the process of protein synthesis.

Using your knowledge of the transmission of genetic information and protein synthesis in eukaryotes:

- describe the processes of transcription and translation in protein synthesis, including the roles of DNA, mRNA, and tRNA; and
- explain how the 20 amino acids found in proteins are formed by only four nucleotide bases.

17. Complete the exercise that follows.

The human body consists of several types of systems, including:

- respiratory system
- circulatory system
- digestive system

Select one of the systems listed above, and using your knowledge of human body systems:

- identify the system you selected and list the main components of that system;
- describe a primary function of the system in the body; and
- briefly describe how the system you selected interacts with one of the other body systems listed.