

Hallmarks of Advanced Biology

Advanced Biology · Practice Test · 20 Questions

1. Which of the following organelles is primarily responsible for the synthesis of steroid hormones and detoxification of drugs and poisons?

- A) Golgi apparatus
- B) Rough endoplasmic reticulum
- C) Smooth endoplasmic reticulum
- D) Lysosomes

2. The process of transcription, where RNA is synthesized from a DNA template, occurs in which cellular compartment in eukaryotes?

- A) Cytoplasm
- B) Ribosome
- C) Nucleus
- D) Mitochondria

3. What is the primary function of telomeres in eukaryotic chromosomes?

- A) Initiating DNA replication
- B) Preventing chromosome fusion
- C) Protecting coding regions from degradation
- D) Serving as binding sites for transcription factors

4. Which of the following describes the process by which a cell engulfs large particles or other cells from its external environment?

- A) Pinocytosis
- B) Exocytosis
- C) Facilitated diffusion
- D) Phagocytosis

5. The chemiosmotic theory, explaining ATP synthesis during cellular respiration and photosynthesis, centers around the establishment of a proton gradient across which membrane?

- A) Plasma membrane
- B) Nuclear envelope
- C) Mitochondrial inner membrane
- D) Golgi membrane

6. In the context of protein folding, what is a chaperone protein?

- A) A protein that binds to DNA and regulates gene expression
- B) An enzyme that breaks down proteins
- C) A protein that assists in the proper folding of other proteins
- D) A protein involved in cell signaling

7. Which mechanism allows for the generation of genetic diversity in both prokaryotes and eukaryotes through the exchange of genetic material between different individuals?

- A) DNA replication
- B) Mitosis
- C) Meiosis
- D) Horizontal gene transfer (in prokaryotes) or sexual reproduction (in eukaryotes)

8. What is the role of ubiquitin in cellular processes?

- A) Catalyzing peptide bond formation
- B) Targeting proteins for degradation by the proteasome
- C) Directing mRNA to ribosomes
- D) Facilitating DNA repair

9. The ABO blood group system in humans is an example of which type of inheritance pattern?

- A) Autosomal recessive
- B) Autosomal dominant
- C) X-linked
- D) Codominance and multiple alleles

10. What is the fundamental unit of heredity passed from parent to offspring?

- A) Allele
- B) Gene
- C) Chromosome
- D) Genome

11. Which type of signaling molecule travels through the bloodstream to target cells located far from the site of release?

- A) Paracrine signal
- B) Autocrine signal
- C) Endocrine signal
- D) Juxtacrine signal

12. The phenomenon where the expression of one gene is affected by the expression of one or more other genes is known as:

- A) Pleiotropy
- B) Epistasis
- C) Linkage
- D) Mendelian inheritance

13. What is the primary role of ribosomes in protein synthesis?

- A) Transcribing DNA into mRNA
- B) Carrying amino acids to the ribosome
- C) Catalyzing the formation of peptide bonds between amino acids
- D) Ensuring the correct sequence of nucleotides in mRNA

14. Which bacterial structure is often used as a target for antibiotics that inhibit cell wall synthesis?

- A) Plasma membrane
- B) Cytoplasm
- C) Peptidoglycan layer
- D) Ribosomes

15. The process by which a fertilized egg develops into a multicellular organism is called:

- A) Gametogenesis
- B) Fertilization
- C) Embryogenesis
- D) Histogenesis

16. What is the driving force behind the net movement of water across a selectively permeable membrane from a region of high water concentration to a region of low water concentration?

- A) Active transport
- B) Osmosis
- C) Diffusion
- D) Facilitated diffusion

17. Which class of enzymes is responsible for transferring a phosphate group from one molecule to another?

- A) Hydrolases
- B) Ligases
- C) Kinases
- D) Oxidoreductases

18. The evolution of antibiotic resistance in bacteria is a classic example of:

- A) Genetic drift
- B) Gene flow
- C) Natural selection
- D) Artificial selection

19. What is the primary site of cellular respiration, where the majority of ATP is generated in eukaryotic cells?

- A) Endoplasmic reticulum
- B) Golgi apparatus
- C) Mitochondria
- D) Lysosomes

20. Which of the following describes the ability of a single gene to have multiple phenotypic effects?

- A) Epistasis
- B) Pleiotropy
- C) Codominance
- D) Polygenic inheritance