

1. What enzyme does HIV use to convert RNA to DNA?  
 A. DNA gyrase  
 B. RNA polymerase  
 C. **Reverse transcriptase**  
 D. DNA helicase
  
2. The promoter region of a prokaryotic gene is located \_\_\_\_\_ to the gene and is the binding site for \_\_\_\_\_.  
 A. 3'...DNA polymerase  
 B. 3'...RNA polymerase  
 C. 5'...DNA polymerase  
 D. **5'...RNA polymerase**
  
3. Which of the following is TRUE of prokaryotes?  
I. Simultaneous transcription and translation  
II. Presence of intron sequences  
III. Circular DNA  
  
 A. I and II only  
 B. **I and III only**  
 C. II and III only  
 D. I, II, and III
  
4. Integral transmembrane proteins are proteins imbedded in the cell membrane. Which of the following amino acids would you MOST expect to find in the transmembrane region of such proteins?  
 A. Lysine  
 B. Serine  
 C. **Tryptophan**  
 D. Arginine
  
5. When the base composition of DNA from bacterium *Mycobacterium tuberculosis* was determined, 18% of the bases were found to be adenine. What is the G + C content in *M. tuberculosis*?  
 A. 18%  
 B. 32%  
 C. 36%  
 D. 64%
  
6. The frequency of individuals affected with an autosomally recessive inherited disorder is 1 in 4. Assuming that the population affected by this disease is in Hardy-Weinberg equilibrium, what is the proportion of carrier individuals in this population?  
 A. 12.5%  
 B. 25%  
 C. **50%**  
 D. 100%
  
7. The velocity of action potential conduction across a nerve axon is increased by the presence of the myelin sheath. In the *peripheral nervous system*, what cell myelinates the axon?  
 A. Oligodendocyte  
 B. Astrocyte  
 C. **Schwann cell**  
 D. Microglial cell
  
8. The cell bodies of afferent (sensory) nerves involved in somatic reflexes are located in the  
 A. **Dorsal root ganglion**  
 B. Ventral root ganglion  
 C. Spinal nerve  
 D. Grey matter of spinal cord

9. Rods and cones are associated with \_\_\_\_\_ and \_\_\_\_\_ vision, respectively.  
 A. Light/dark...color  
 B. Color...light/dark  
 C. Near...far  
 D. Far...near
10. Populations that are likely to be living at a density near the limit of their resources, are characterized as  
 A. *r*-selected  
 B. *p*-selected  
 C. *Q*-selected  
 D. ***K*-selected**
11. In many types of cancer, the function of the *p53* gene is lost. Wild-type *p53* is MOST likely to be a  
 A. proto-oncogene  
 B. **tumor suppressor**  
 C. positive regulator of cell cycle progression  
 D. gene required for DNA replication
12. What glycolytic product is shuttled to the mitochondria in aerobic respiration?  
 A. Acetyl-CoA  
 B. Fumarate  
 C. Succinyl-CoA  
 D. **Pyruvate**
13. During human development, which process leads to the formation of three germ layers?  
 A. **gastrulation**  
 B. neurelation  
 C. morulation  
 D. cephalization
14. Telomerase is responsible for \_\_\_\_\_ the size of telomeres, and its function is often \_\_\_\_\_ in carcinogenesis.  
 A. maintaining ... decreased  
 B. **maintaining ... increased**  
 C. decreasing ... decreased  
 D. decreasing ... increased
15. Which of the following is NOT a mode of natural selection?  
 A. stabilizing selection  
 B. **sexual selection**  
 C. directional selection  
 D. diversifying selection
16. Protostomes have \_\_\_\_\_ and \_\_\_\_\_ types of cleavage.  
 A. **spiral ... determinate**  
 B. spiral ... indeterminate  
 C. radial ... determinate  
 D. radial ... indeterminate
17. Which of the following is NOT a characteristic of all chordates?  
 A. notochord  
 B. **vertebrae**  
 C. pharyngeal slits  
 D. postanal tail
18. In cardiac muscle, calcium ions can move freely between adjacent cells through which of the following?  
 A. tight junctions  
 B. **gap junctions**  
 C. calcium pumps  
 D. plasmodesmata

19. Unlike most polypeptide hormones, steroid hormones are unique in that they
- A. Activate gene transcription
  - B. **Diffuse across cell membranes**
  - C. Can bind proteins
  - D. Can be used as therapeutic drugs
20. In superoxide dismutase 1, an enzyme implicated in amyotrophic lateral sclerosis (Lou Gehrig's disease), a copper ion is bound to the active site and is important for enzyme activity. In this enzyme, copper most likely functions as a(n)
- A. coenzyme
  - B. **cofactor**
  - C. allosteric activator
  - D. allosteric inhibitor
21. The order of normal blood flow through the human heart is
- A. right ventricle, right atrium, lungs, left ventricle, left atrium, body
  - B. right ventricle, right atrium, body, left ventricle, left atrium, lungs
  - C. **right atrium, right ventricle, lungs, left atrium, left ventricle, body**
  - D. right atrium, right ventricle, body, left atrium, left ventricle, lungs
22. Allopatric speciation refers to species formed after which type of separation:
- A. niche
  - B. temporal
  - C. behavioral
  - D. **geographic**
23. Which two functional groups are always found in amino acids?
- A. Amine and sulfhydryl
  - B. Sulfhydryl and carboxyl
  - C. **Carboxyl and amine**
  - D. Alcohol and aldehyde
24. Movement of ions across the membrane from higher to lower concentrations through a channel protein is an example of
- A. Simple diffusion
  - B. **Facilitated diffusion**
  - C. Active transport
  - D. Osmosis
25. Which group of plants has vascular tissue but does not produce seeds?
- I. Mosses
  - II. Ferns
  - III. Gymnosperms
- A. I
  - B. **II**
  - C. III
  - D. II & III
26. Which of the following is true for transport in xylem?
- A. The primary force involved is osmotic pressure
  - B. Xylem is the primary site for transport of sucrose
  - C. **Movement through xylem depends mainly on transpiration**
  - D. All of the above
27. Predation is considered a \_\_\_\_\_ interaction, while Mutualism is considered a \_\_\_\_\_ interaction.
- A. +/+, +/+
  - B. +/0, -/-
  - C. -/-, +/+
  - D. +/-, +/+

28. Which of the following organisms is **INCORRECTLY** paired with its trophic level?
- A. Human - tertiary consumer
  - B. **Beetle - secondary consumer**
  - C. Grass - primary producer
  - D. Cyanobacteria - primary producer
29. Which of the following is an example of habituation?
- A. Chickadees learning new songs when they shift to living in large winter flocks from small family groups.
  - B. Stalking and attacking litter mates by lion cubs.
  - C. Hydra initially contract when gently touched, but soon stop responding.
  - D. Yearly migration of golden plovers from Arctic breeding grounds to southeastern South America.
30. Suppose gene "C" is the gene for color. Its dominant allele has the effect of allowing the production of fur color while its recessive allele interrupts color production. At another locus, there exists another gene that influences color, at which black (B) is dominant to brown (b). What is the relationship between these genes called?
- A. **Epistatic**
  - B. Peralogous
  - C. Dominant
  - D. Antagonistic
31. During migrations, some birds use which of the following as reference frameworks?
- I. The sun
  - II. Constellations
  - III. Earth's magnetic field
- A. I only
  - B. I and II only
  - C. I and III only
  - D. I, II, and III
32. Generally, there are more species per square kilometer in which of the following types of ecosystem?
- A. Temperate grassland
  - B. Arctic tundra
  - C. Boreal forest
  - D. **Coral reef**
33. RUBP is used and PGA is formed in:
- A. glycolysis
  - B. the Kreb's cycle
  - C. light reaction of photosynthesis
  - D. **dark reaction (Calvin cycle) of photosynthesis**
34. Which is **TRUE** of the dark reaction (Calvin cycle) of photosynthesis?
- A. It uses oxygen
  - B. **It uses carbon dioxide**
  - C. It produces sucrose
  - D. Both b and c are correct
35. In the fern life cycle, the dominant generation is the:
- A. haploid gametophyte
  - B. diploid gametophyte
  - C. haploid sporophyte
  - D. **diploid sporophyte**