

ACE – “Academic Challenge”  
Biology Test (Sectional) – 2022

1. Loose delicate fibers of connective tissue are called \_\_\_\_ fibers.
  - a. collagenous
  - b. elastic
  - c. reticular
  - d. keratin
  - e. albumin
  
2. Viruses belong to the kingdom \_\_\_\_.
  - a. Plantae
  - b. Fungi
  - c. Protista
  - d. Monera
  - e. None of the above are correct.
  
3. Biodiesel, heart valves and genetically modified organisms are all products of \_\_\_\_.
  - a. nanotechnology
  - b. biotechnology
  - c. cloning
  - d. HUGO
  - e. gene therapy
  
4. Which organelle is most closely associated with translation during the formation of a protein?
  - a. ribosome
  - b. lysosome
  - c. nucleus
  - d. chromatin
  - e. cell wall
  
5. Which is **not** the correct association?
  - a. Pectoralis major – chest
  - b. Deltoid – shoulder
  - c. Gluteus maximus – buttocks
  - d. Tibialis anterior – arm
  - e. Frontalis – forehead
  
6. The section of the *Allium* root tip that would represent the most variety of mitotic cells is called the \_\_\_\_ region.
  - a. elongation
  - b. apical
  - c. meristematic
  - d. cap
  - e. differentiation

7. In Deuterostomes, the mesoderm gives rise to all of the following, **except** \_\_\_\_.
- skeletal system
  - muscles
  - heart
  - kidneys
  - nervous system
8. Which functional group is **not** correctly matched with a chemical where it can be found?
- sulfhydryl – proteins
  - aldehydes – acetone
  - phosphates – ATP
  - amino group – amino acids
  - carboxyl – amino acids
9. Membrane proteins have different functions. Which of the following is **not** a function of a membrane protein?
- cell recognition
  - creates a selectively permeable barrier
  - active transport
  - intercellular junction
  - anchoring
10. A cDNA library contains DNA with \_\_\_\_ made by using \_\_\_\_.
- exons; reverse transcriptase
  - introns; reverse transcriptase
  - both exons and introns; Taq polymerase
  - both exons and introns; reverse transcriptase
  - exons; Taq polymerase
11. Which of the following is correct about a woman that express an X-linked trait?
- She received the allele from both their mother and father.
  - If she has a son, her son will express the X-linked trait.
  - If she has a daughter, her daughter will express the X-linked trait.
  - Both a and b are correct.
  - All of the above answers are correct.
12. Which scientist is **not** correctly matched to his or her discovery?
- Frederick Griffith – Transformation
  - Matthew Meselson and Franklin Stahl – DNA replication is semiconservative
  - Rosalind Franklin – X-ray diffraction image of DNA
  - Erwin Chargaff – identified the transformation material as DNA
  - Alfred Hershey and Martha Chase – DNA is the genetic material

13. Which is **not** a correct association?
- estuaries – where fresh water meets the ocean
  - watershed – the area land drained by runoff
  - guttation – roots absorb water
  - transpiration – the loss of water vapor from land plants
  - aquifers – underground caverns where groundwater is stored
14. Which of the following is **not** a simple fruit?
- apple
  - green bean
  - milkweed
  - peach
  - tomato
15. Which of the following is **not** a prezygotic barrier preventing fertilization?
- hybrid inviability
  - habitat isolation
  - temporal isolation
  - mechanical isolation
  - behavioral isolation
16. Covid 19 virus can be transferred by \_\_\_\_.
- air born particles
  - liquid droplets
  - surface contact
  - Both a and b are correct.
  - All of the above are correct.
17. Algae belong to the kingdom \_\_\_\_.
- Archaea
  - Fungi
  - Protista
  - Plantae
  - Animalia
18. Which is **not** a correct association?
- Isomer – molecules with the same molecular formula, but a different structural formula
  - Buffer – substances that resists changes in pH
  - Isotope – an element with a different atomic mass
  - Oxidation – substances that gain electrons
  - Electrolytes – substances that dissolve in water as ions that can conduct an electric current

19. Match the characteristic in **Column A** with the organism associated with them in **Column B**.

**Column A**

1. Peptidoglycan
2. Pseudopodia
3. Flagella
4. Cilia
5. Cellulose

**Column B**

- i. *Euglena*
- ii. *Paramecium*
- iii. *E. coli*
- iv. *Zea mays*
- v. *Amoeba*

- a. 1 – ii; 2 – v; 3 – i; 4 – iii; 5 – iv
- b. 1 – iii; 2 – v; 3 – i; 4 – ii; 5 – iv
- c. 1 – i; 2 – iv; 3 – iii; 4 – ii; 5 – v
- d. 1 – iii; 2 – iv; 3 – i; 4 – i; 5 – v
- e. 1 – ii; 2 – v; 3 – iii; 4 – i; 5 – iv

20. Genomic imprinting depends on\_\_\_\_\_.

- a. if the trait is a dominant trait
- b. if the trait is a recessive trait
- c. if the trait is an X-linked trait
- d. which parent the gene is inherited from
- e. which pregnancy it is for the mother

21. The scientific method is important when designing an experiment. Which of the following is **not** a correct association for either the scientific method or experimental design?

- a. dependent variable – variable observed, such as counted or measured
- b. independent variable – variable that is different for the experimental group
- c. control variable – variables that are kept the same for both the experimental group and the control group
- d. hypothesis – tentative explanation
- e. theory – same as a hypothesis

22. All of the following are greenhouse gases **except** \_\_\_\_\_.

- a. carbon dioxide
- b. methane
- c. nitrogen
- d. nitrous oxide
- e. hydrochlorofluorocarbon

23. \_\_\_\_\_ can be described as brownish red found in the center of the tree.

- a. Sapwood
- b. Heartwood
- c. Periderm
- d. Secondary phloem
- e. Secondary xylem

24. If a somatic cell has 24 chromosomes in a somatic cell, how many tetrads would there be during Prophase I?
- 6
  - 12
  - 24
  - 48
  - None of the above answers are correct.
25. Which of the following is **not** an abiotic factor?
- water
  - solar radiation
  - fire
  - temperature
  - All of the above are abiotic factors.
26. If purple flowers (P) are dominant to white flowers (p) and green pods (G) are dominant to yellow pods (g), what would be the phenotype ratio for a cross between a white flower, yellow pod plant with a purple flower with green pod plant that is heterozygous for both traits?
- 1 : 2 : 1
  - 3 : 1
  - 9 : 3 : 3 : 1
  - 1 : 1 : 1 : 1
  - 4 : 0
27. When monomers chemically link together, \_\_\_\_\_ is removed.
- carbon dioxide
  - water
  - salt
  - ammonia
  - alcohol
28. Which is **not** a correct association?
- Endoplasmic reticulum – assembles cell membranes
  - Golgi complex – cis face, trans face, medial face
  - Centrioles – microfilaments
  - Lysosomes – pH 5
  - Glyoxysomes – enzymes that convert stored fat to sugars
29. \_\_\_\_\_ are found at the same loci on homologous chromosomes.
- Alleles
  - Kinetochores
  - Centromeres
  - Gene linkages
  - Proteases

30. Which of the following statements is **not** true?
- Anaerobic respiration can use nitrates as a final electron acceptor.
  - Fermentation yields a net total of 2 ATP.
  - Aerobic respiration yields more than 30 ATP per glucose molecule.
  - Fermentation does not require oxygen.
  - Aerobic respiration always requires a mitochondrion.
31. RNA polymerase binds to the \_\_\_\_\_ of DNA.
- operator region
  - operon region
  - promoter region
  - repressor gene
  - inducer gene
32. Match the larva type in **Column A** with the animal that produces them in **Column B**.
- | <b>Column A</b> | <b>Column B</b> |
|-----------------|-----------------|
| 1. nauplius     | i. sponge       |
| 2. trochophore  | ii. cnidarian   |
| 3. planula      | iii. crustacean |
| 4. veliger      | iv. polychaete  |
| 5. parenchymula | v. gastropod    |
- 1 – ii; 2 – v; 3 – i; 4 – iii; 5 – iv
  - 1 – iii; 2 – v; 3 – i; 4 – ii; 5 – iv
  - 1 – i; 2 – iv; 3 – iii; 4 – ii; 5 – v
  - 1 – iii; 2 – iv; 3 – ii; 4 – v; 5 – i
  - 1 – ii; 2 – v; 3 – iii; 4 – iv; 5 – i
33. Nitrogen has an atomic number of 5 and hydrogen has an atomic number of 1. How many hydrogens will covalently bond with a nitrogen atom?
- 1
  - 2
  - 3
  - 4
  - 5
34. Trichome have many functions. Which of the following is **not** one of the functions?
- absorption
  - protection
  - secretion
  - photosynthesis
  - excretion

35. Which pathogen is **not** matched to a disease it may cause?

- a. *Yersinia pestis* – Plague
- b. *Bordetella pertussis* – Whooping cough
- c. *Borrelia burgdorferi* – Lyme disease
- d. *Mycobacterium leprae* – Leprosy
- e. *Helicobacter pylori* – Botulism

36. Using the following codon – amino acid table, translate the following DNA sequence: **T A C C C T G A G A T A**

Codon	Amino acid abbreviation
UAC	Tyr
AUG	Met
CCU	Pro
AUA	Ile
CUC	Leu
GGA	Gly
UAU	Tyr

- a. Met – Gly – Leu – Tyr
- b. Tyr – Leu – Pro – Ile
- c. Met – Gly – Pro – Ile
- d. Met – Pro – Tyr – Leu
- e. Tyr – Gly – Leu – Ile

37. Which chemical is **not** matched properly to the cellular activity?

- a.  $\text{FADH}_2$  – Citric acid cycle
- b. NADPH – Light dependent reaction
- c. NADH – Glycolysis
- d. ATP – Formation of acetyl coenzyme A
- e. Carbohydrates – Calvin cycle

38. The tertiary structure of a protein may be associated with \_\_\_\_\_.

- a. hydrogen bonds
- b. disulfide bridges
- c. hydrophobic interactions
- d. ionic bonds
- e. All of the above may contribute to the tertiary structure of a protein.

39. Which of the following is **not** associated with DNA replication?

- a. Okazaki fragments
- b. DNA ligase
- c. RNA primer
- d. Ribozymes
- e. Helicase

40. Which of the following scientists have not received a Nobel Prize?
- Beadle and Tatum
  - Alfred Hershey
  - Barbara McClintock
  - Rosalind Franklin
  - Linus Pauling
41. Which of the following cell types are not matched to the tissue system in which they belong?
- cork cambium – vascular tissue system
  - guard cells – dermal tissue system
  - collenchyma cells – ground tissue system
  - tracheids – vascular tissue system
  - sieve tube elements – vascular tissue system
42. Which of the following is **not** associated with tapeworms?
- scolex
  - proglottid
  - cercariae
  - strobila
  - hermaphroditic
43. Low density lipoprotein is brought into the cell by \_\_\_\_\_.
- phagocytosis
  - exocytosis
  - pinocytosis
  - cotransport
  - receptor-mediated endocytosis
44. Which of the following is a genetic disorder caused by nondisjunction?
- Hemophilia A
  - Phenylketonuria
  - Turner syndrome
  - Tay-Sacs disease
  - Huntington's disease
45. In a population of 100 individuals, 16 members express the recessive trait. Using the Hardy-Weinberg Principle, how many individuals are expected to be heterozygous in the population?
- 50
  - 48
  - 36
  - 32
  - None of the above are correct.



46. Which chemical is **not** correctly matched to the class of organic molecule in which it is found?
- chitin – carbohydrate
  - steroid – lipid
  - carotenoids – lipid
  - glycogen – protein
  - ATP – nucleic acid
47. Hydrogen bonds are important for \_\_\_\_.
- characteristics of water
  - protein's shape
  - DNA structure
  - cellulose
  - All of the above are correct.
48. An apoenzyme is \_\_\_\_.
- the protein portion of some enzymes
  - also known as a cofactor
  - an inorganic molecule
  - a carrier molecule for electrons
  - Both a and b are correct.
49. Which of the following metabolic pathways is **not** matched to the location in a eukaryotic cell where it would occur?
- Citric acid cycle – mitochondrial matrix
  - Calvin cycle – stoma
  - Photophosphorylation – thylakoid
  - Glycolysis – cytosol
  - Fermentation – cytosol
50. Hypertonic solutions \_\_\_\_.
- cause animal cells to burst
  - increase turgor pressure in plant cells
  - cause animal cells to crenate or shrivel
  - allow some protists to use their contractile vacuole
  - allow cells to remain the same size