

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

- Dendrochronology is the study of _____.
 - fruit dispersal
 - tree rings both visible and microscopic
 - root structure
 - leaf arrangement on a tree
 - leaf types
- The human urinary bladder is lined with _____ epithelium.
 - simple squamous
 - stratified columnar
 - transitional
 - simple cuboidal.
 - pseudo stratified columnar
- Which of the following is **not** correct concerning endospores?
 - A bacterium may produce multiple endospores.
 - An endospore may be produced when water is lost.
 - An endospore may survive very hot conditions.
 - Only some bacterial species produce endospores.
 - A bacterium may produce an endospore when it lacks nutrients.
- Which of the following associations is **incorrect**?
 - Silent mutation – codes for the same amino acid
 - Nonsense mutation – codes for a stop codon
 - Frameshift mutation – bases can be either added or deleted from DNA
 - Missense mutation – bases are deleted from DNA
 - Base-pair substitution – only one DNA base changes
- Which enzyme is **not** matched to its substrate or the type of reaction?
 - catalase – hydrogen peroxide
 - sucrase – sucrose
 - lysozyme – breaks down bacterial cell walls
 - pepsin – breaks peptide bonds
 - kinase – transfer sulfate groups
- Which is an **incorrect** statement about a pedigree analysis?
 - The male symbol is a square.
 - An autosomal recessive trait may skip a generation.
 - Siblings are connected by a vertical line.
 - A horizontal line connects the parents.
 - The generations are designated by Roman numerals.
- Neoplasm is also known as a/an _____.
 - tumor
 - stem cell
 - germ cell
 - aneuploidy
 - nuclear pore

8. Molecular systematics is based on the analysis of ____.
- DNA sequences
 - RNA sequences
 - Amino acid sequences
 - All of the above are correct.
 - Only a and b are correct.
9. Which scientist is **not** correctly matched to their discovery?
- Endosymbiosis theory - Lynn Margulis
 - Stated all plants are made up of cells - Matthias Schleiden
 - Cells come from other cells. - Rudolf Virchow
 - Germ theory - Louis Pasteur
 - Hand washing can help stop the spread of infections. - Joseph Lister
10. Which of the following is **not** needed for aerobic respiration?
- oxygen
 - glucose
 - NADP+
 - ADP
 - water
11. Density - dependent factors can ____.
- increase death rate
 - decrease death rate
 - increase birth rate
 - decrease birth rate
 - All of the above are correct.
12. Which of the following is **not** a Protostome?
- sea anemones
 - rotifers
 - squids
 - leeches
 - flukes
13. Which is **not** a correct association between plant tissue type and cell type?
- vascular tissue - companion cell
 - dermal tissue - trichome
 - ground tissue - scleroid
 - ground tissue - collenchyma cell
 - All of the above are correct associations.
14. Mitochondria plays a part in apoptosis by ____.
- interfering with energy production
 - releasing cytochrome c in the cytoplasm after the mitochondria is injured
 - activating enzymes that cause cell destruction
 - All of the above are true.
 - None of the above are true.

15. Use the following table and determine the mass of a mole of carbonic acid (H_2CO_3).

Element	Number of protons	Numbers of neutrons	Number of electrons
Hydrogen	1	0	1
Carbon	6	6	6
Oxygen	8	8	8

- a. 15 grams
 - b. 29 grams
 - c. 32 grams
 - d. 62 grams
 - e. 74 grams
16. Which association is **not** correct?
- a. Transduction - bacteriophage transmits DNA from one bacterium to another bacterium
 - b. Transformation - DNA is taken up by a bacterium from the environment
 - c. Conjugation - a plasmid is exchanged between a bacterium via a sex pilus
 - d. Photoheterotrophs - use organic compounds as their carbon source
 - e. All of the above are true associations.
17. Chlorophyll a ____.
- a. is important for the light-dependent reaction
 - b. has a yellow green appearance
 - c. is considered an accessory pigment
 - d. is located in the stroma of the chloroplast
 - e. All of the above are true.
18. Which animal is **not** matched to the Order in which they belong?
- a. Manatee - Sirenia
 - b. Anteater - Rodentia
 - c. Zebra - Perissodactyla
 - d. Hedgehog - Insectivora
 - e. Bat - Chiroptera
19. Which of the following is **not** a correct association?
- a. mycorrhizae - mutualism
 - b. host tree and epiphytes - commensalism
 - c. lamprey - parasite
 - d. Schistosome - parasite
 - e. Microbiota - pathogen

20. Match the plant hormones in **Column A** with their functions in **Column B**.

Column A

1. Abscisic acid
2. Cytokinins
3. Auxins
4. Gibberellins
5. Ethylene

Column B

- i. Fruit ripening
- ii. Seed germination
- iii. Stem elongation
- iv. Cell division
- v. Seed dormancy

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

21. Which vaccine type is **not** correctly matched to the disease it helps prevent?

- a. Live Attenuated vaccine - Chickenpox
- b. Inactivated vaccine - Hepatitis A
- c. Conjugated vaccine - *Haemophilus influenza* type b
- d. Nucleic acid vaccine - MMR
- e. Toxioids - Tetanus

22. Which statement is **incorrect**?

- a. Simple proteins only contain amino acids.
- b. Peptidoglycan is a polysaccharide.
- c. A phospholipid is an example of a complex lipid.
- d. A conjugated protein contains amino acids and other organic or another component.
- e. Uracil, thymine, and cytosine are pyrimidines.

23. The Entner-Douoroff Pathway produces all of the following, **except**?

- a. FADH_2
- b. NADPH
- c. NADH
- d. ATP
- e. Pyruvic acid

24. Which of the following environmental characteristics makes fungi and bacteria different?

- a. Fungi usually like environments of pH of 5.
- b. Fungi can withstand higher osmotic pressure.
- c. Fungi can usually grow in environments with low moisture content.
- d. Fungi can grow with less nitrogen than many bacteria.
- e. All of the above are true.

25. Endoliths _____.

- a. are bacteria that grow inside rocks
- b. do not require many nutrients
- c. require a large amount of oxygen
- d. are photoheterotrophs
- e. Both a and b are correct.

26. Which of the following diseases is **not** spread by a mosquito vector?
- Dengue fever
 - tularemia
 - Malaria
 - Yellow fever
 - St. Louis Encephalitis
27. Which of the following can inhibit protein production?
- miRNA
 - snRNA
 - dsRNA
 - SRPRNA
 - lncRNA
28. Which of the following genetic disorders is **not** an example of pleiotropy?
- Marfan syndrome
 - Sickle cell anemia
 - Phenylketonuria
 - Cystic fibrosis
 - All of the above are examples of pleiotropy.
29. Which association is **incorrect**?
- seta - moss sporophyte
 - capsule - moss sporophyte
 - foot - moss gametophyte
 - thallus - liverwort gametophyte
 - prothallus - fern gametophyte
30. Atomic force microscopy and scanning tunneling microscopy are ____ microscopes.
- electron
 - two photon
 - scan probe
 - scanning acoustic
 - darkfield
31. When a triglyceride is produced ____.
- three water molecules are added
 - three water molecules are removed
 - three fatty acids are added.
 - Both a and b are correct.
 - Both b and c are correct.
32. Pili and fimbriae are composed of ____.
- microfilament
 - flagellin
 - pilin
 - peptidoglycan
 - microtubule

33. In humans, the gallbladder is in the _____.
a. right lower quadrant
b. right upper quadrant
c. left lower quadrant.
d. left upper quadrant
e. left medial bursa
34. In the electron transport chain, the first carrier molecule is/are _____.
a. ubiquinones
b. coenzyme Q
c. cytochrome a
d. cytochrome b
e. flavoproteins
35. Gram negative bacteria cell walls contain all of the following, **except** _____.
a. teichoic acid
b. lipopolysaccharide
c. peptidoglycan
d. periplasm
e. porin
36. Which statement is **incorrect**?
a. A buffering system includes a weak acid or a weak base.
b. Cohesion is a property of water that is important for water's surface tension.
c. Water's adhesive property helps explain how water makes surfaces wet.
d. Water has a low specific heat.
e. Liquid water has greater density than ice.
37. Which of the following could **not** be a possible gamete for the following genotype:
AaBbCCDd
a. ABCD
b. AbCd
c. aBcD
d. abCD
e. aBC
38. Which of the following is found in a prokaryotic gene and **not** a eukaryotic gene?
a. Promoter region
b. Operator region
c. Repressor gene
d. Enhancer region
e. All of the above are found in both eukaryotic and prokaryotic genes.
39. Which of the following is **not** a macromolecule?
a. sucrose
b. mRNA
c. chitin
d. glycogen
e. albumin

40. Which animal is **not** matched to the subphyla in which they are found?
- Beetles - Hexapoda
 - Millipede - Myriapods
 - Barnacle - Crustacea
 - Horseshoe crab - Crustacea
 - Mites - Chelicerate
41. Some leaves have ____ which are leaflike found at the base of the petiole.
- stomata
 - stipules
 - nodes
 - leaflets
 - stalks
42. In guinea pigs, black fur (B) color is dominant to brown (b) fur color and short fur (S) is dominant to long fur (s). If a guinea pig with black short fur was crossed with a guinea pig with black long fur, and their offspring consisted of guinea pigs with black long fur, black short fur, brown long fur, and brown short fur. The genotypes of parents would be ____.
- BBSS and BbSs
 - BbSs and BbSs
 - BbSs and Bbss
 - BbSs and BBss
 - BBSs and Bbss

43. Match the stages of meiosis in **Column A** with their descriptions in **Column B**.

Column A

Column B

- Prophase I
- Metaphase I
- Anaphase II
- Telophase II

- Four haploid nuclei
- Non - sister chromatids exchange genetic material
- Homologous chromosomes line up on the same spindle
- Sister chromatids separate

- 1 - ii; 2 - iv; 3 - iii; 4 - i
- 1 - ii; 2 - iii; 3 - iv; 4 - i
- 1 - iv; 2 - i; 3 - ii; 4 - iii
- 1 - iii; 2 - ii; 3 - iv; 4 - i
- 1 - i; 2 - iii; 3 - iv; 4 - ii

44. cDNA is made by using ____.
- mRNA and removing exons using reverse transcriptase
 - pre-mRNA and adding reverse transcriptase
 - mature mRNA and adding reverse transcriptase
 - tRNA and adding ribozymes
 - rRNA and adding ribozymes

45. The atomic number for sulfur is 16. What would be its charge if it was an ion?
- +1
 - +2
 - +3
 - 1
 - 2
46. When triglycerides are digested, the fatty acids enter ____.
- glycolysis
 - the Krebs cycle
 - electron transport chain
 - the pentose - phosphate pathway
 - Embden— Meyerhof pathway
47. In a population of 1000, 160 individuals express the recessive trait. Using the Hardy-Weinberg principle, determine the expected number of heterozygote individuals in the population.
- 160
 - 360
 - 400
 - 480
 - 600
48. Match the linkage types in **Column A** with the type of organic molecule in **Column B** which it is found.

Column A

- phosphodiester linkage
- ester linkage
- peptide bond
- glycosidic linkage

Column B

- proteins
- carbohydrate
- triglyceride
- nucleic acid

- 1 – ii; 2 – i; 3 – iv; 4 – iii
 - 1 – i; 2 – iii; 3 – iv; 4 – ii
 - 1 – iii; 2 – ii; 3 – iv; 4 – i
 - 1 – iv; 2 – iii; 3 – i; 4 – ii
 - 1 – iv; 2 – iii; 3 – ii; 4 – i
49. Which of the following is **not** a correct association?
- linked genes – found on the same chromosome
 - BBdd – homozygous genotype
 - AbbDe – gamete possibility
 - X^rX^r – homozygous female
 - XXY – Klinefelter's syndrome
50. Western blots are used for ____ after they are separated by gel electrophoresis.
- polypeptides/proteins
 - carbohydrates
 - RNA
 - DNA
 - All of the above are correct.