

2021 Academic Challenge Regional Biology Exam

1. Which of the following is found between the right atrium and right ventricle?
  - a. pulmonary valve
  - b. tricuspid valve
  - c. cardiac valve
  - d. mitral valve
  - e. aortic valve
  
2. Which of the following has a two chambered heart?
  - a. frog
  - b. birds
  - c. reptiles
  - d. fish
  - e. Both a and c are correct.
  
3. In a neutral atom, how many electrons would be in the valence shell, if there are 11 protons and 12 neutrons in the nucleus?
  - a. 1
  - b. 2
  - c. 8
  - d. 12
  - e. 23
  
4. Stomata are usually found \_\_\_\_\_.
  - a. on tree bark
  - b. on root hairs
  - c. in the apical meristem
  - d. on petals
  - e. on leaves
  
5. If researchers were measuring the life span of a vehicle in relationship to different brands of motor oil, which of the following would be true?
  - a. The independent variable in the experiment would be the different brands of oil.
  - b. The life span of the engine would be the independent variable.
  - c. Neither the automobile nor the oil is the dependent variable of the experiment.
  - d. Both a and b are correct.
  - e. None of the above are correct.
  
6. Which of the following **is true**?
  - a. rRNA, mRNA and tRNA are three types of RNA molecules.
  - b. Ribosomes contain digestive enzymes and help remove harmful substances from cells.
  - c. Lipid synthesis occurs along the Golgi apparatus.
  - d. Centrioles are typically found in plant cells.
  - e. All of the above are correct.

7. Which of the following **is true**?
- Chitin is a protein found in shellfish.
  - Collagen is a polysaccharide.
  - Enzymes lower activation energy.
  - Insulin helps regulate blood glucose levels and is secreted by the thyroid.
  - Cellulose is found in the exoskeleton of arthropods.
8. Which of the following **is true**?
- The DNA bases are guanine, adenine, cytosine, and thymine.
  - Amino acids are the building blocks of DNA.
  - Peptide bonds are found between the bases of RNA.
  - Covalent bonds hold the DNA strands together.
  - All the above are true.
9. Which of the following **is not** a producer?
- moss
  - mushroom
  - grass
  - corn
  - wheat
10. Which of the following **is not** in Domain Eukarya?
- E. coli*
  - sponge
  - rose
  - yeast
  - Amoeba*
11. Carbon – 12 has 6 neutrons while Carbon – 14 has \_\_\_\_\_ neutrons.
- 2
  - 4
  - 8
  - 12
  - 14
12. Which association **is not** correct?
- mitochondrion – cellular respiration
  - endoplasmic reticulum – spindle fibers
  - ribosome – protein synthesis
  - cytoskeleton – cell shape
  - chloroplast – photosynthesis
13. In garden peas, round seed shape (R) is dominant to wrinkled seed shape (r). What would be the genotype ratio for the following cross Rr x Rr?
- 4 : 0

- b. 3 : 1
- c. 1 : 2 : 1
- d. 1 : 1 : 1 : 1
- e. 9 : 3 : 3 : 1

14. Match the scientists in **Column A** with their discoveries in **Column B**.

**Column A**

- 1. Robert Hooke
- 2. Alexander Fleming
- 3. Louis Pasteur
- 4. Rachel Carson

**Column B**

- i. Pasteurization
- ii. Showed DDT was harmful to the environment
- iii. Discovered penicillin
- iv. Named cells

**Select the correct matching sequence.**

- a. 1 – iv; 2 – i; 3 – iii; 4 – ii
  - b. 1 – iii; 2 – iv; 3 – i; 4 – ii
  - c. 1 – iv; 2 – iii; 3 – i; 4 – ii
  - d. 1 – i; 2 – iii; 3 – ii; 4 – iv
  - e. 1 – ii; 2 – i; 3 – iv; 4 – iii
15. What molecule is produced from transcription?
- a. DNA
  - b. rRNA
  - c. tRNA
  - d. mRNA
  - e. cDNA
16. Kidneys, ureters and the urethra would all be studied and examined closely by a/an \_\_\_\_\_.
- a. pediatrician
  - b. urologist
  - c. orthopedic surgeon
  - d. oncologist
  - e. cardiologist
17. Which **is not** a correct association?
- a. Golgi apparatus – packages
  - b. lysosome – digests worn out cell parts
  - c. neurons – nervous tissue
  - d. myocytes – muscle cells
  - e. centriole – holds sister chromatids together
18. Dicot plants would have \_\_\_\_\_.
- a. broad leaves
  - b. tap root system

- c. flower parts in multiples of 4 and 5
  - d. vascular bundles in rings
  - e. Dicot plants would have all the above.
19. Viruses would have a \_\_\_\_.
- a. ribosome
  - b. plasma membrane
  - c. cell wall
  - d. protein coat
  - e. Viruses would have all of the above.
20. Which of the following **is not** a type of wetland?
- a. swamp
  - b. marsh
  - c. bogs
  - d. ecotone
  - e. All the above are types of wetlands.
21. Which of the following **does not** apply to water?
- a. polar covalent
  - b. organic
  - c. cohesive
  - d. adhesive
  - e. capillary action
22. \_\_\_\_ are used by insects for excretion.
- a. Malpighian tubules
  - b. Kidneys
  - c. Nephridia
  - d. Flame cells
  - e. Parapodia
23. ATP is produced during the \_\_\_\_.
- a. citric acid cycle
  - b. glycolysis
  - c. photophosphorylation
  - d. chemiosmosis
  - e. ATP is produced in all of the above.
24. Which of the following are all the gamete possibilities for the following genotype: AaBb?
- a. Aa and Bb

- b. AB and ab
  - c. A, a, B, b
  - d. AB, Ab, aB, and ab
  - e. None of the above are the gamete possibilities.
25. Which of the following plant **is not** a C3 plant?
- a. corn
  - b. wheat
  - c. sunflower
  - d. oak tree
  - e. spinach
26. The hydrological cycle consists of all the following **except** \_\_\_\_\_.
- a. rain
  - b. evaporation
  - c. condensation
  - d. transpiration
  - e. assimilation
27. Bacteria usually have all, but \_\_\_\_\_.
- a. ribosomes
  - b. a chromosome
  - c. nucleus
  - d. plasma membrane
  - e. cell wall
28. Which **is not** a possible offspring for the following cross: AaBb x AAbb?
- a. AABB
  - b. Aabb
  - c. AABb
  - d. Aabb
  - e. All of the above are possible offspring for the cross.
29. DNA \_\_\_\_\_.
- a. is double stranded
  - b. is antiparallel
  - c. has complementary base pairs
  - d. is a polymer
  - e. All of the above are true.
30. Phylum Platyhelminthes \_\_\_\_\_.
- a. contain flatworms
  - b. have only one parasitic Class

- c. are segmented
  - d. are pseudocoelomates
  - e. All of the above are true.
31. Which **does not** apply to mushrooms?
- a. Domain Eukarya
  - b. Phylum Fungi
  - c. produce spores
  - d. produce roots
  - e. produce hyphae
32. Magnesium usually has 12 protons and 12 neutrons. Which statement **is not** correct?
- a. Magnesium would have 2 valence shell electrons.
  - b. Magnesium would form a +2 ion.
  - c. In a neutral atom of magnesium, 3 electron orbitals are required.
  - d. Magnesium would have an atomic weight of 24.
  - e. Magnesium would have an atomic number of 24.
33. Which of the following **is not** a correct association?
- a. COVID-19 – virus
  - b. MRSA – bacteria
  - c. Yeast infection – fungi
  - d. HIV – virus
  - e. Malaria – bacteria
34. \_\_\_\_\_ is the process of seed sprouting.
- a. Pollination
  - b. Germination
  - c. Fertilization
  - d. Imbibition
  - e. Scarification
35. An exponential growth curve is best described as \_\_\_\_\_.
- a. J – shaped curve
  - b. bell – shaped curve
  - c. linear growth
  - d. S – shaped curve
  - e. bimodal curve
36. Which of the following **is not** an inorganic molecule?
- a.  $\text{CO}_2$
  - b.  $\text{C}_6\text{H}_{12}\text{O}_6$

- c. H<sub>2</sub>O
- d. CF<sub>4</sub>
- e. H<sub>2</sub>O<sub>2</sub>

37. Some enzymes \_\_\_\_.
- a. require both a protein part and a cofactor
  - b. work well in very hot conditions
  - c. catalyze at a very low pH
  - d. have names that end in -zyme.
  - e. All of the above are true.

38. Match the microscope parts in **Column A**, to their functions in **Column B**.

<b>Column A</b>	<b>Column B</b>
1. Objectives	i. Adjusts the light
2. Coarse adjustment	ii. Magnifies
3. Iris diaphragm	iii. Where the slide is placed
4. Stage	iv. Moves the stage up and down

**Select the correct matching sequence.**

- a. 1 – iv; 2 – i; 3 – iii; 4 – ii
  - b. 1 – ii; 2 – iv; 3 – iii; 4 – i
  - c. 1 – iv; 2 – iii; 3 – i; 4 – ii
  - d. 1 – i; 2 – iii; 3 – ii; 4 – iv
  - e. 1 – ii; 2 – iv; 3 – i; 4 – iii
39. Pine trees, hemlock, and ginkgo are examples of \_\_\_\_.
- a. dicots
  - b. monocots
  - c. angiosperm
  - d. gymnosperms
  - e. fern allies
40. A/An \_\_\_\_ is a picture of the chromosome pairs.
- a. karyotype
  - b. pedigree
  - c. amniocentesis
  - d. preimplantation genetic diagnosis
  - e. chorionic villus sampling

41. DNA replication \_\_\_\_.
- a. occurs during the S phase of Interphase
  - b. uses many enzymes

- c. uses complementary base pair rules
  - d. has a leading and a lagging strand
  - e. All of the above are correct.
42. Hardy-Weinberg equilibrium is reached if a population \_\_\_\_\_.  
a. is not evolving.  
b. is mutating  
c. has the same birth rate and death rate  
d. has a small population size  
e. has a very diverse clade
43. Excess glucose can be stored in the liver as, \_\_\_\_\_.  
a. lipase  
b. amylase  
c. glycogen  
d. insulin  
e. bile
44. Which of the following is **not** true?  
a. ATP stands for adenosine triphosphate.  
b. CAM plants thrive in cooler temperatures.  
c. C4 plants do well in warmer temperatures,  
d. NAD and FAD are both coenzymes for cellular respiration.  
e. Kinetic energy is not resting energy.
45. At the terminal end of the electron transport chain, \_\_\_\_\_ is the final acceptor of electrons.  
a. hydrogen  
b. carbon  
c. oxygen  
d. Both a and b are correct.  
e. All of the above are correct in certain environments.
46. Which of the following best describes the events during translation?  
a. produces mRNA from a DNA template  
b. tRNA is produced from a DNA template  
c. amino acids bind together forming polypeptides  
d. tRNA transports amino acids to the ribosomes  
e. Both c and d are correct.
47. Which is the correct sequence of cellular division stages?  
a. metaphase, prophase, telophase, anaphase  
b. prophase, metaphase, anaphase, telophase



- c. anaphase, telophase, metaphase, prophase
- d. anaphase, prophase, telophase, metaphase
- e. prophase, anaphase, metaphase, telophase

48. Which of the following is an active transport mechanism?

- a. osmosis
- b. diffusion
- c. sodium/potassium pump
- d. Both a and b are correct.
- e. All of the above are correct.

49. Hemophilia is a/an \_\_\_\_\_.

- a. X-linked/sex-linked trait
- b. autosomal dominant trait
- c. autosomal recessive inherited trait
- d. Both a and c are correct.
- e. None of the above are correct.

50. During glycolysis of cellular respiration, each glucose molecule produces \_\_\_\_\_ pyruvate molecules.

- a. 2
- b. 4
- c. 6
- d. 32
- e. 36