

2021 Academic Challenge Sectional Biology Exam

1. Stomata \_\_\_\_\_.
  - a. is where carbon fixation occurs in the leaf
  - b. is where ATP is produced in the chloroplast
  - c. allows ATP to diffuse in the chloroplast
  - d. allows the leaf to transport carbohydrates
  - e. allows carbon dioxide to enter the leaf
  
2. In gel electrophoresis, DNA \_\_\_\_\_.
  - a. separates by the size of the fragments
  - b. moves toward the negative pole
  - c. makes multiple copies of itself
  - d. makes cDNA
  - e. Both a and b are correct.
  
3. The study of the function of body parts is known as \_\_\_\_\_.
  - a. anatomy
  - b. physiology
  - c. microbiology
  - d. pathology
  - e. zoology
  
4. Which of the following **would not** be found in a mature seed?
  - a. radicle
  - b. cotyledon
  - c. polar nuclei
  - d. hypocotyl
  - e. plumule
  
5. Which of the following is a coenzyme for cellular respiration?
  - a. NAD
  - b. NADP
  - c. FAD
  - d. Both a and c are coenzymes for cellular respiration.
  - e. None of the above are coenzymes for cellular respiration.
  
6. Which of the following is the chemical formula for lactose?
  - a.  $C_6H_{12}O_6$
  - b.  $C_6H_{18}O_6$
  - c.  $C_{12}H_{22}O_{11}$
  - d.  $C_{12}H_{24}O_{11}$
  - e.  $C_{12}H_{24}O_{12}$

7. Charles Darwin was considered the father of \_\_\_\_.
- genetics
  - evolution
  - the microscope
  - taxonomy
  - None of the above are correct.
8. Which of the following statements is **false**?
- Water is a polar molecule.
  - Hydrogen bonds allow for surface tension.
  - Water is considered the solute of life.
  - Non-polar molecules are hydrophobic.
  - Frozen water molecules become less dense than liquid water.
9. \_\_\_\_ is a measurement of disorder.
- Kinetic energy
  - Thermal energy
  - Entropy
  - Potential energy
  - Pleiotropy
10. Which of the following is/are part of an animal plasma membrane?
- protein
  - phospholipid
  - cholesterol
  - glycoproteins
  - All the above are correct.
11. A pH of 9 is \_\_\_\_ times more alkaline than a pH of 6.
- 100
  - 10
  - 1000
  - 10,000
  - None of the above are correct.
12. Which of the following is **not** associated with the light independent reactions of photosynthesis?
- stroma
  - carbon dioxide fixation
  - Calvin-Benson cycle
  - photosystems
  - C<sub>3</sub> pathway
13. Which of the following is **true**?

- a. Consumers are autotrophs.
  - b. Plants, fish and rocks would all be part of a community.
  - c. Populations consist of several species.
  - d. Both a and b are true.
  - e. None of the above are true.
14. Which of the following regulates blood sugar?
- a. glucose
  - b. insulin
  - c. aldosterone
  - d. growth hormone
  - e. None of the above are correct.
15. Which of the following is/are **not** associated with protostomes?
- a. snails
  - b. spiral cleavage
  - c. determinant cleavage
  - d. during early cleavage each cell has the potential to develop into an embryo
  - e. None of the above are correct.
16. Under anaerobic conditions, yeast cells produce \_\_\_\_\_.
- a. alcohol
  - b. oxaloacetate
  - c. lactic acid
  - d. carbon dioxide
  - e. None of the above are produced by yeast under anaerobic conditions.
17. The universal blood recipient type is \_\_\_\_\_, and the universal donor is \_\_\_\_\_.
- a. Type A; type O
  - b. Type B; type AB
  - c. Type O; type AB
  - d. Type AB; type O
  - e. Type A; type B
18. \_\_\_\_\_ is a protein that carries oxygen associated with erythrocytes.
- a. Insulin
  - b. Glycogen
  - c. Hemoglobin
  - d. Erythropoietin
  - e. None of the above are correct.
19. Which is **not** a correct association?

- a. *Ascaris* – coelom
  - b. *Lumbricus* – prostomium
  - c. *Schistosoma* – dioecious
  - d. *Fasciola* – monoecious
  - e. *Dipylidium* – scolex
20. The movement of molecules from an area of high concentration to an area of lesser concentration is called \_\_\_\_.
- a. catabolism
  - b. diffusion
  - c. anabolism
  - d. homeostasis
  - e. None of the above are correct.
21. \_\_\_\_ carries nutrients to a plant, while \_\_\_\_ carries water.
- a. Xylem, phloem
  - b. Phloem, xylem
  - c. Bundle sheaths, phloem
  - d. Meristem, xylem
  - e. Phloem, meristem
22. Which of the following is **not** a muscle of the lower limbs in the human body?
- a. Trapezius
  - b. Rectus femoris
  - c. Semimembranosus
  - d. Tibialis anterior
  - e. Vastus medialis
23. Which of the following is **not** a photosynthetic protists?
- a. *Euglena*
  - b. Diatom
  - c. Dinoflagellate
  - d. Water mold
  - e. Algae
24. If Greg has a disorder in which he is **not** producing enough ATP, which of the following organelles would be affected?
- a. ribosomes
  - b. hemocytoblasts
  - c. lysosomes
  - d. mitochondria
  - e. Golgi bodies

25. Match the type of mutation in **Column A**, with their definition in **Column B**.

**Column A**

1. Frame shift
2. Silent
3. Nonsense
4. Missense

**Column B**

- i. Codes for the same amino acid
- ii. Codes for a stop codon
- iii. Codes for one different amino acid
- iv. DNA bases are added or deleted.

**Select the correct matching sequence.**

- a. 1 – iv; 2 – i; 3 – ii; 4 – iii
- 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

26. Gregor Mendel determined the following:

Gene	Height	Seed color	Seed shape
Dominant	T - tall	Y - yellow	R - round
Recessive	t - short	y - green	r - wrinkled

Use the information in the table to answer the following question.

What would be the genotype for the following: a tall pea plant that produces yellow – wrinkled seeds? One the of parent plants was tall, with green, and wrinkled seeds and the other was short, with yellow, and wrinkled seeds.

- a. TtYyRr
- b. TTYyrr
- c. TtYYRr
- d. TtYyrr
- e. None of the above are correct.

27. The process by which the cell changes shape to get rid of or expel materials is called \_\_\_\_\_.

- a. filtration
- b. transcytosis
- c. exocytosis
- d. endocytosis
- e. None of the above are correct.

28. Which of the following is organic?

- a. CO
- b. CO<sub>2</sub>
- c. H<sub>2</sub>O
- d. C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>
- e. Both c and d are correct.

29. \_\_\_\_\_ used X-ray diffraction to reveal the helical shape of DNA.

- a. Barbara McClintock
- b. Rosalind Franklin
- c. Henrietta Lacks
- d. Ian Wilmut
- e. Fred Griffith

30. Which association is **not** correct?

- a. mRNA – transcription
- b. rRNA – brings amino acids
- c. tRNA – anticodon
- d. snRNA – processes pre-mRNA
- e. ribozymes – catalyzes the attachment of amino acids

31. Match the organisms in **Column A**, with the characteristic/classification that best describes the organism in **Column B**.

**Column A**

- 1. yeast
- 2. kelp
- 3. cyanobacterium
- 4. cryptosporidium

**Column B**

- i. Brown algae
- ii. Protista – causes watery diarrhea
- iii. Fungus – oval signal cells
- iv. Prokaryote - photosynthetic

**Select the correct matching sequence.**

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

32. Which genetic disease/disorder is **not** correctly matched?

- a. Turner syndrome – 45 chromosomes
- b. Hemophilia – autosomal recessive, lacks a blood clotting factor
- c. Huntington's disease – autosomal dominant, progressive degeneration of nerve cells
- d. Marfan syndrome – autosomal dominant, affects connective tissue
- e. Edwards syndrome – 47 chromosomes

33. Match the term in **Column A**, with its definition in **Column B**.

**Column A**

1. ecological succession
2. biome
3. r-species
4. saprotroph

**Column B**

- i. An area characterized by climate, soil, and organisms
- ii. Reproduces quickly and produce many offspring
- iii. Gets organic material from decaying matter
- iv. How a biological community changes over time

**Select the correct matching sequence.**

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

34. Which of the following is **not** a correct association?

- a. Bryophyta – *Sphagnum*
- b. Pteridophyta – fern
- c. Horsetail – *Equisetum*
- d. Hornworts – dominant generation sporophyte
- e. Whisk fern – dominant generation sporophyte

35. Match the prezygotic barriers in **Column A**, with its definition in **Column B**.

**Column A**

1. habitat isolation
2. temporal isolation
3. mechanical isolation
4. behavioral isolation

**Column B**

- i. Noncompatible reproductive organs
- ii. Breed in different habitats in the same geographic area
- iii. Different courtship behaviors
- iv. Reproduce at different times

**Select the correct matching sequence.**

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

36. Which is **not** a correct association?

- a. Carl Woese – Archaea
- b. Robert Whittaker – 5 kingdoms
- c. Carl Linnaeus – 2 kingdoms
- d. Ernst Haeckel – 3 kingdoms
- e. All of the above are correct associations.

37. The body's ability to maintain blood calcium within its normal range is an example of \_\_\_\_.

- a. homeostasis
- b. dehydration
- c. hydrolysis
- d. oxidation
- e. None of the above are correct.

38. Which of the following is the most correct sequence of levels of organization?

- a. cellular, organs, tissues, chemical, organ systems
- b. organ systems, chemicals, tissues, organs, cellular
- c. chemicals, tissues, cellular, organs, organ systems
- d. chemicals, cellular, tissues, organs, organ systems
- e. organelles, tissues, cellular, chemicals

39. The Krebs cycle/citric acid cycle yields \_\_\_\_\_ ATP molecules.

- a. 2
- b. 23
- c. 32
- d. 36
- e. 46

40. Match the functional groups in **Column A** with their associated organic molecules in **Column B**.

**Column A**

- 1. amino group
- 2. phosphate group
- 3. hydroxyl group
- 4. carbonyl group

**Column B**

- i. lipids
- ii. monosaccharides
- iii. proteins
- iv. ethanol

**Select the correct matching sequence.**

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

41. RNA polymerase will bind to the \_\_\_\_\_ .

- a. promoter region on DNA
- b. promoter region on the ribosome
- c. operator on DNA
- d. operator on the ribosome
- e. promoter region on tRNA

42. In *Mirabilis jalapa*, when a red flower plant pollinates a white flowered plant, pink flowered plants are produced. This is best explained by \_\_\_\_\_.



- a. codominance
  - b. pleiotrophy
  - c. epistasis
  - d. multiple alleles
  - e. incomplete dominance
43. \_\_\_\_ catalyzes the reaction of the removal of introns from pre-mRNA.
- a. Operator
  - b. Spliceosome
  - c. Aminoacyl-tRNA synthetase
  - d. Polyadenylation
  - e. RNA polymerase
44. The \_\_\_\_ usually consists of an ovary, a stigma, and a style.
- a. corolla
  - b. calyx
  - c. sepal
  - d. perianth
  - e. carpel
45. The \_\_\_\_ cycle lacks a gaseous component.
- a. nitrogen
  - b. hydrologic
  - c. phosphorus
  - d. carbon
  - e. None of the above are correct.
46. Biofilm \_\_\_\_.
- a. may contain many different species of microorganisms
  - b. may be difficult to control
  - c. causes dental plaque
  - d. may grow on both living and nonliving surfaces
  - e. All of the above are correct.
47. Which of the following is **false**?
- a. A proton has the mass equal to one amu.
  - b. A neutron has the mass equal to one dalton.
  - c. An electron has the mass of 1/1800 amu.
  - d. Atomic mass is measured in daltons.
  - e. Isotopes have different masses.
48. Which of the following periods are **not** part of the Paleozoic era?
- a. Cambrian period

- b. Silurian period
- c. Carboniferous
- d. Jurassic period
- e. Permian period

49. Which is **not** correct about karyotyping?

- a. Cells are treated to stop during metaphase.
- b. Cells are placed in a hypotonic solution, so the cells swell.
- c. The chromosomes are stained.
- d. Homologous chromosomes are matched.
- e. All of the above are correct about karyotyping.

50. Temperate phages \_\_\_\_\_.

- a. integrate their nucleic acid into the bacterial DNA
- b. immediately destroy their host
- c. never changes characteristics of their host
- d. are not associated with any bacterial diseases.
- e. None of the above are correct.