



ACADEMIC CHALLENGE FOR  
**ACES**  
ENGINEERING AND SCIENCE



EASTERN ILLINOIS UNIVERSITY

## 2022 Academic Challenge

# REGIONAL BIOLOGY EXAM

### Biology Test Production Team

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### GENERAL DIRECTIONS

Please read the following instructions carefully. This is a timed test; any instructions from the test supervisor should be followed promptly.

The test supervisor will give instructions for filling in any necessary information on the answer sheet. Most Academic Challenge sites will ask you to indicate your answer to each question by marking an oval that corresponds to the correct answer for that question. One oval should be marked to answer each question. Multiple ovals will automatically be graded as an incorrect answer.

Be sure ovals are marked as  , not  ,  ,  , etc.

If you wish to change an answer, erase your first mark completely before marking your new choice.

You are advised to use your time effectively and to work as rapidly as you can without losing accuracy. Do not waste your time on questions that seem too difficult for you. Go on to the other questions, and then come back to the difficult ones later if time remains.

**Time: 40 Minutes**

**Number of Questions: 50**

**DO NOT OPEN TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO!**

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1. The lower jaw bone is called the \_\_\_\_\_.
  - a. zygomatic
  - b. maxilla
  - c. vomer
  - d. mandible
  - e. frontal
  
2. In the metric system, 2.5 cm would be equal to \_\_\_\_m.
  - a. 0.025
  - b. 0.0025
  - c. 25
  - d. 250
  - e. None of the above are correct.
  
3. Placing a sample of human red blood cells in a hypotonic solution would \_\_\_\_\_.
  - a. cause the cells to shrink
  - b. cause the cells to swell
  - c. cause the cells to take up chloride ions
  - d. have no effect on the cells
  - e. Not enough information is provided to answer the question.
  
4. Using the following DNA template, **ATCGTA**, select the correct tRNA anticodon.
  - a. UAGCAU
  - b. AAGCAA
  - c. TAGCAT
  - d. UACGUA
  - e. AUCGUA
  
5. Which taxonomic category would be found between phylum and order?
  - a. Kingdom
  - b. Species
  - c. Class
  - d. Family
  - e. Genus
  
6. PCR \_\_\_\_\_.
  - a. cuts DNA as specific sites
  - b. amplifies DNA
  - c. seals sticky ends of plasmids back together
  - d. stands for peptide coding region
  - e. is similar to gel electrophoresis

7. Yeast and mold belong to the kingdom \_\_\_\_.
- Bacteria
  - Archaea
  - Fungi
  - Plantae
  - Protista
8. Who discovered the helical shape of DNA utilizing XRAY diffraction techniques?
- Rosalind Franklin
  - Rachel Carson
  - Nora Roberts
  - Barbara McKlinton
  - None of the above are correct.
9. Which of the following is **not** a result of non-disjunction?
- Kleinfelters
  - Acondroplasia
  - Turner syndrome
  - Both a and b are correct.
  - All of the above are correct.
10. Which of the following is **not** correct.
- Gametes are haploid.
  - Zygotes are diploid.
  - Polyploidy is common in humans.
  - Aneuploidy does not occur in humans.
  - Both a and b are not correct.
11. Homologous chromosomes line up on the equator during \_\_\_\_.
- Anaphase I
  - Prophase I
  - Metaphase I
  - Telophase II
  - None of the above
12. Which of the following is true, if Suzie's pool has a pH of 9?
- Her pool is 100 times more acidic than a neutral pH.
  - Her pool pH is neutral.
  - Her pool would have 100 times more OH<sup>-</sup> than it would if it were neutral.
  - Her pool is neither, acidic or alkaline.
  - Both b and d are correct.
13. Dehydration reactions join together glucose and \_\_\_\_, to make \_\_\_\_.
- fructose; sucrose
  - glucose; maltose
  - galactose; lactose
  - Both a and c are correct.
  - All of the above are correct.

14. Amino acids are \_\_\_\_.
- building blocks of nucleic acids
  - building blocks of proteins
  - all polar molecules
  - Both a and c are correct.
  - Both b and c are correct.
15. Cacti would best be described as \_\_\_\_ plants.
- C<sub>3</sub>
  - C<sub>4</sub>
  - CAM
  - Both a and b are correct.
  - All of the above are correct.
16. Which is **not** a property of living organisms?
- cellular
  - responsive
  - adaptive
  - Both a and c are correct.
  - All the above are properties of living organisms.
17. Maintaining a stable internal balance despite external fluctuations is best defined as \_\_\_\_.
- exothermic reactions
  - endothermic reactions
  - metabolism
  - homeostasis
  - None of the above are correct.
18. Which of the following will **not** affect enzyme activity?
- shape
  - temperature
  - pH
  - denaturation
  - All of the above have an effect on enzyme activity.
19. Which of the following abbreviated organizations would be involved with wildlife conservation?
- CDC
  - FDA
  - WHO
  - IRS
  - DNR

20. Which of the following would specialize in diseases of the kidneys?
- Urologist
  - Nephrologist
  - Gynecologist
  - Oncologist
  - Pulmonologist
21. Which of the following make up the backbone or uprights of DNA?
- 5 carbon sugar and phosphate groups
  - Nitrogenous bases and hydrogen bonds
  - Deoxyribose and phosphate groups
  - Both a and c are correct.
  - None of the above are correct.
22. Ferns, bald cyprus trees, mallard ducks, bluegill and rocks at Little Grassy Lake are all part of a/an \_\_\_\_\_.
- population
  - species
  - ecosystem
  - community
  - None of the above are correct.
23. In humans, the temporal bone would be \_\_\_\_\_ to the nasal bone.
- medial
  - inferior
  - distal
  - lateral
  - anterior
24. Many leaves have a waxy \_\_\_\_\_ to help prevent water loss.
- xylem
  - phloem
  - cuticle
  - stomata
  - mesophyll
25. Calcium has an atomic number of 20. How many valence shell electrons does calcium have?
- 2
  - 6
  - 8
  - 10
  - 20

26. Which of the following is true?
- ATP stands for adenosine triphosphate.
  - ATP has a nucleotide structure.
  - ATP is the cellular form of energy synthesized in the ribosomes.
  - Both a and b are correct.
  - All of the above are correct.
27. Which of the following is an **incorrect** association?
- Cellular respiration – mitochondria
  - Photosynthesis – chloroplast
  - Lysosome – protein synthesis
  - Microtubules – cytoskeleton
  - All the above are correct associations
28. Total magnification while using a light microscope can be determined \_\_\_\_.
- if the magnification of the eyepiece and objective lens are known
  - if the condenser lens enhances the image
  - by adjusting both the fine and coarse knobs
  - only if the make and model of the microscope is known
  - while using the oil immersion lens
29. Phospholipids, steroids, and triglycerides \_\_\_\_.
- do not dissolve in water
  - are lipids
  - all have fatty acid tails
  - Both a and b are correct.
  - All of the above are correct.
30. Water vascular system, tube feet, and an endoskeleton are characteristics of Phylum \_\_\_\_.
- Echinodermata
  - Cnidaria
  - Ctenophora
  - Rotifera
  - Porifera
31. Artificial selection \_\_\_\_.
- has produced dog breeds
  - is used in agriculture
  - is a technique that began recently
  - Both a and b are correct.
  - All the above are correct.

32. Match the Mitotic stages in **Column A** with the description that best describes the stage in **Column B**.

**Column A**

1. Metaphase
2. Prophase
3. Telophase
4. Anaphase

**Column B**

- i. Chromatids are pulled apart
- ii. Daughter nuclei form
- iii. Doubled chromosomes line up on the spindles at the equator
- iv. Chromatin material starts to condense

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

33. Which of the following is a correct association?

- a. Aa – heterozygous phenotype
- b. aa – homozygous genotype
- c. tall plants – phenotype
- d. Both a and b are correct.
- e. Both b and c are correct.

34. Which of the following does **not** apply to DNA?

- a. antiparallel
- b. sides held together by hydrogen bonds
- c. adenine, guanine, cytosine, thymine
- d. deoxyribose
- e. All of the above apply to DNA.

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

- a. Earthworm – hermaphrodite
- b. Leech – segmented
- c. Rotifer – cilia
- d. Hydra – eyes
- e. Spiders – book lungs

36. Which plant is **not** a dicot?

- a. rose
- b. corn
- c. sunflower
- d. bean
- e. carrot



37. Which of the following does **not** produce ATP?
- Glycolysis
  - Calvin cycle
  - Citric acid cycle
  - Chemiosmosis
  - All of the above produce ATP.
38. When naming an ionic compound, the \_\_\_\_\_ is first in the name.
- cation
  - anion
  - salt
  - chemical with the lowest atomic number
  - None of the above are correct.
39. The part of the lake closest to the shore is called \_\_\_\_\_.
- limnetic
  - profundal zone
  - benthic
  - thermocline
  - littoral
40. Which of the following is **not** in Domain Eukarya?
- paramecia
  - slime mold
  - algae
  - streptococcus
  - truffles
41. \_\_\_\_\_ transports \_\_\_\_\_ from the leaves to other parts of the plant.
- Xylem; water
  - Phloem; water
  - Xylem; sugar
  - Phloem; sugar
  - Phloem; minerals
42. If round (R) pea seeds are dominant to wrinkled (r) pea seeds, what would be the phenotype ratio from a cross between two pea plants that are heterozygous for round seeds?
- All round seeded plants
  - 3 : 1
  - 1 : 2 : 1
  - 9 : 3 : 3 : 1
  - 1 : 1 : 1 : 1

43. \_\_\_\_ are small extra circular pieces of DNA sometimes found in prokaryotes.
- Cilia
  - Plasmids
  - Flagella
  - Villi
  - None of the above are correct.
44.  $C_6H_{12}O_6$  is the chemical formula for \_\_\_\_.
- glucose
  - fructose
  - sucrose
  - Both a and b are correct.
  - All of the above are correct.
45. Which of the following is **not** true?
- X-linked traits were discovered in *Drosophila melanogaster*.
  - Thomas Morgan studied X-linked traits.
  - Males are typically carriers of X-linked traits without having the phenotype expressed.
  - X-linked traits are less common in human females, than males.
  - X-linked traits are not carried on the autosomes.
46. The plant tissue responsible for growth is \_\_\_\_.
- pith
  - vascular
  - mesophyll
  - stomata
  - meristem
47. Isotopes differ in \_\_\_\_.
- the number of protons
  - the number of neutrons
  - the number of electrons
  - atomic number
  - All of the above are correct.
48. During photosynthesis, oxygen is released from the \_\_\_\_.
- splitting of water
  - splitting of glucose
  - Calvin cycle
  - stroma
  - inner membrane of the chloroplast

49. All viruses have a/an \_\_\_\_.
- a. protein coat
  - b. nucleic acid core
  - c. envelope
  - d. Both a and b are correct.
  - e. All of the above are correct.
50. Which is **not** a correct association?
- a. Cellular respiration – Electron transport chain
  - b. Photosynthesis – Electron transport chain
  - c. Fermentation – glycolysis
  - d. Cell cycle – Interphase
  - e. Mitosis – Interkinesis