

Academic Challenge



EASTERN ILLINOIS UNIVERSITY

2019 Academic Challenge BIOLOGY TEST – REGIONAL

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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Academic Challenge

Biology Test (Regional) – 2019

- Duplicated chromosomes are held together by ____
 - centrosomes
 - centrioles
 - centromeres
 - kinetochore fibers
 - None of the above are correct.
- Which of the following **is true**?
 - Humans have 44 autosomes and 2 sex chromosomes.
 - Frogs and birds have the same number of chromosomes.
 - DNA components are the same within different species.
 - Both a and c are correct.
 - All the above are correct
- In the hierarchy of living organisms, which level is between cells and organs?
 - chemicals
 - organ systems
 - organisms
 - organelles
 - tissues
- Which is an **incorrect** association?
 - mRNA – transcription
 - tRNA – translation
 - rRNA – ribosomes
 - fatty acids – cell walls
 - amino acids – proteins
- Segments, seta, coelom, and triploblastic are all characteristics of Phylum _____.
 - Cnidaria
 - Ctenophora
 - Nematoda
 - Platyhelminthes
 - Annelida

6. Which of the following cell parts are found in many plant cells?

- i. chloroplasts ii mitochondria iii. lysosomes
iv. central vacuole v. endoplasmic reticulum

- a. i; ii; iii; iv; v
b. i; ii; iv; v
c. i; iii; iv; v
d. i; iv; v
e. i; iii; iv

7. Isotopes have _____.

- a. the same atomic weights
b. the same number of neutrons
c. a different number of protons
d. a different atomic number
e. a different number of neutrons

8. Which scientist is **not** correctly matched to a discovery or theory?

- a. Lynn Margulis – endosymbiosis theory
b. Louis Pasteur – rabies vaccine
c. Alexander Fleming – penicillin
d. Gregor Mendel – meiosis
e. Charles Darwin – natural selection

9. Match the vectors in **Column A** with a disease it transmits in **Column B**.

Column A

1. *Anopheles* mosquito
2. *Culex* mosquito
3. deer tick
4. tsetse fly

Column B

- i. Sleeping sickness
ii. Lymes disease
iii. West Nile
iv. Malaria

Select the correct matching sequence.

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

10. Photosynthesis requires all of the following **except** ____.
- light
 - chlorophyll
 - glucose
 - carbon dioxide
 - water
11. Which of the following is **not** associated with DNA?
- semiconservative replication
 - double helix
 - deoxyribose
 - peptide bond
 - nucleic acid
12. In the human skull, the bottom jaw bone is called the ____.
- parietal
 - maxilla
 - mandible
 - sphenoid
 - lacrimal
13. Fibrous roots are found in ____.
- monocots
 - gymnosperms
 - dicots
 - All of the above are correct.
 - None of the above are correct.
14. Which of the following statements is **correct**?
- Coenzyme A is used in both aerobic respiration and fermentation.
 - Fermentation nets a total of 2 ATP.
 - Aerobic respiration uses an organic final electron acceptor.
 - Fermentation uses an inorganic final electron acceptor.
 - Aerobic respiration and anaerobic respiration produce the same number of ATP.
15. Which of the following is **not** a correct association?
- Tundra – short growing season
 - Taiga – many gymnosperms
 - Savannah – many trees that shade out grass
 - Prairie – many grass species
 - Tropical rain forest – lots of rain

16. Allele frequencies of a population may change because of ____.
- natural selection
 - mutation
 - genetic drift
 - founder effect
 - All of the above are correct.
17. Which of the following is **not true** about ionic bonds?
- Electrons are transferred.
 - The anion is named first, followed by the cation.
 - The valence shell electrons are used.
 - Ionic bonds form crystal lattices.
 - Ionic bonds disassociate in water.
18. In Guinea pigs, black fur (B) is dominant to brown fur (b). What would be the expected phenotype ratio from a cross between a brown fur Guinea pig and a black fur Guinea pig that is heterozygous for black fur?
- 1 : 1
 - 3 : 1
 - 1 : 2 : 1
 - 1 : 1 : 1 : 1
 - 9 : 3 : 3 : 1
19. ATP production, cristae, ribosomes, and DNA are associated with the ____.
- mitochondrion
 - endoplasmic reticulum
 - lysosome
 - centriole
 - peroxisome
20. Which of the following does **not** refer to homeostasis?
- maintaining a relatively stable internal environment
 - positive feedback regulation
 - negative feedback regulation
 - Both a and b are correct.
 - All of the above refer to homeostasis.
21. Which of the following is **not** matched to the Kingdom in which it belongs?
- Mold – Fungi
 - Moss – Plantae
 - Plasmodium* – Archaea
 - Amoeba* – Protista
 - E. coli* – Bacteria

22. Which of the following muscles would **not** be found in a human leg?
- gastrocnemius
 - triceps
 - sartorius
 - quadriceps femoris
 - soleus
23. Which of the following is **not** a fruit?
- tomato
 - avocado
 - cucumber
 - carrot
 - None of the above are fruit.
24. Determine the base sequence for mRNA, using the following DNA sequence.
- TACCCATCGCATGAG**
- AUCCCUACGCUAGUG**
 - TACCCATCGCATGAG**
 - UACCCAUCGCAUGAG**
 - AUGGGUAGCGUACUC**
 - ATGGGTAGCGTACTC**
25. Red green colorblindness is an X-linked trait. If a daughter has colorblindness then, _____.
- her father is colorblind
 - her mother must be colorblind
 - all her brother's would be colorblind
 - All of the above are correct.
 - None of the above are correct.
26. Protein synthesis occurs in the _____.
- ribosome
 - chloroplast
 - mitochondrion
 - nucleolus
 - None of the above are correct.
27. Photosynthetic pigments may be found in _____.
- plants
 - bacteria
 - algae
 - Both a and c are correct.
 - All of the above are correct.

28. Which of the following is closely associated with iodine metabolism and metabolic rates?
- spleen
 - thyroid
 - hypothalamus
 - thymus
 - thalamus
29. Which of the following is **not** a function of proteins?
- transport
 - reception
 - channel
 - junctions
 - All of the above are functions of proteins
30. Which of the following is **not** a property of water?
- polar covalent bonds
 - adhesive forces
 - solvent of life
 - rapid changes in temperature
 - surface tension
31. Which of the following is an **incorrect** statement?
- Glucose, glycogen, and starch are examples of carbohydrates.
 - Lipids are nonpolar molecules and are hydrophobic.
 - The nucleus of an atom does not have a charge.
 - Organic compounds must contain carbon.
 - Nucleic acids are made up of nucleotides.
32. If alleles of a genotype are the same it is described as ____.
- phenotype
 - dominant
 - recessive
 - homozygous
 - heterozygous
33. If one parent has blood type A and the other parent has blood type B, what blood types could their children have?
- A, B
 - A, B, O
 - A, AB, B, O
 - AB
 - AB, O

34. Which of the following is smallest in size?
- E. coli*
 - Algae
 - Yeast
 - Zika
 - Amoeba*
35. Which of the following is the correct order of mitotic stages?
- metaphase, anaphase, telophase, prophase
 - anaphase, prophase, metaphase, telophase
 - prophase, telophase, anaphase, metaphase
 - telophase, metaphase, anaphase, prophase
 - None of the above are correct.
36. CAM plants are unique because they ____.
- survive cool weather environments
 - perform carbon dioxide fixation during the night time
 - are adapted to use animal materials such as live house flies for food
 - perform carbon dioxide fixation only during the day
 - Both a and d are correct.
37. Rabbits, oak trees and earthworms in Clinton County are all part of a/an ____.
- ecosystem
 - population
 - community
 - Both a and b are correct.
 - Both a and c are correct.
38. Which of the following is **not** an evergreen?
- fir
 - white pine
 - pear
 - weeping willow
 - Both c and d are not an evergreen.
39. Which of the following organelles is considered the command center of the cell?
- mitochondria
 - nucleus
 - ribosome
 - nucleolus
 - None of the above are correct.

40. As a golf ball rolls toward the pin, it is demonstrating ____ energy.
- thermal
 - potential
 - kinetic
 - Both a and b are correct.
 - All the above are correct.
41. Which enzyme is **not** associated with DNA replication?
- DNA ligase
 - Helicase
 - Primase
 - Ribozyme
 - DNA polymerase
42. In peas tall (T) is dominant to short (t) and yellow (Y) seeds are dominant to green (y). What would be the gamete possibilities for a pea plant with the following genotype: Ttyy?
- Tt and yy
 - Only Ty
 - Only ty
 - Ttyy
 - Ty and ty
43. Which is **not** associated with meiosis?
- crossing over
 - $2n \rightarrow 2n$
 - haploid cells
 - homologous chromosomes line up on the same spindle
 - 2 cell divisions
44. ____ is the science of naming organisms.
- Ecology
 - Genetics
 - Taxonomy
 - Evolution
 - Mycology
45. Which is **not** matched to the Domain in which it belongs?
- Thermophile – Bacteria
 - Paramecium* – Eukarya
 - Staphylococcus aureus* – Bacteria
 - Methanogen – Archaea
 - Mold – Eukarya

46. Which of the following is an example of a Lewis structure?

- a. H – H
- b. H : H
- c. H₂
- d. All of the above are examples of a Lewis structure.
- e. None of the above is an example of a Lewis structure

47. A hypothesis should be written so it _____.

- a. can be falsified
- b. can be proven correct
- c. includes the independent variable
- d. includes the dependent variable
- e. All of the above are correct.

48. Which of the following is **not** a producer?

- a. moss
- b. kelp
- c. grass
- d. mold
- e. fern

49. All of the following are parts of a root **except** _____.

- a. meristem
- b. root cap
- c. root hair
- d. elongation
- e. stomata

50. The _____ strand of DNA is replicated in segments called _____.

- a. lagging; Okazaki fragments
- b. leading; Okazaki fragments
- c. lagging; Watson fragments
- d. leading; RNA primers
- e. leading; Watson fragments

