



# 2013 Academic Challenge

## BIOLOGY TEST - STATE FINAL

This Test Consists of 50 Questions

### **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. Only one oval should be marked to answer each question. Multiple ovals will automatically be graded as incorrect answers.

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 \*\*\***

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

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WYSE – Academic Challenge  
Biology Test (State Final) – 2013

1. Match the terms in **Column A** with the most appropriate information in **Column B**.

**Column A**

1. Pleiotrophy
2. Polygenic Inheritance
3. Epistasis
4. Incomplete Dominance

**Column B**

- i. height and eye color
- ii. reason there are three colors of retrievers
- iii. bell-shaped curve
- iv. multiple effects from a single gene pair
- v. red flower x white flower → pink flowers

**Select the correct matching sequence.**

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

2. While observing plant cells under a microscope, a scientist adds a dilute solution of salt water to the slide. Which of the following statements is true?
- a. The cell wall of the plant will shrink.
  - b. The central vacuole will expand.
  - c. The chloroplasts will burst.
  - d. The contents within the cells will clump in the middle.
  - e. The speed of cytoplasmic streaming will increase.
3. Which best describes the independent variable of an experiment?
- a. control group
  - b. the change or treatment of the experiment
  - c. data being recorded
  - d. the similarities of the groups
  - e. both b and d
4. Which is a correct sequence from simple to more complex levels of organization?
- a. cellular, organ, tissue, organ system
  - b. chemical, tissue, cellular, organs
  - c. chemical, cellular, tissue, organs
  - d. organelle, chemical, cellular, organ
  - e. chemical, organ, organelle, cellular
5. \_\_\_\_ is the most important photosynthetic pigment.
- a. Chlorophyll a
  - b. Chlorophyll b
  - c. Chlorophyll c
  - d. Beta carotene
  - e. All of the above are equally important.

6. Which association is **not** correct?
- yogurt – bacteria
  - soy sauce – bacteria
  - penicillin – fungi
  - Roquefort cheese – bacteria
  - truffles – fungi
7. Desmotubules \_\_\_\_.
- hold adjacent animal cells together
  - secrete oil out of plant cells
  - allow organelles to pass from one cell to another
  - produce spindles
  - connect the smooth endoplasmic reticulum between two adjacent plant cells
8. Which term is **not** associated with transcription?
- ribozyme
  - operator
  - exon
  - promoter
  - RNA polymerase
9. A karyotype is used to \_\_\_\_.
- study family generations
  - look for a trisomy
  - determine proteins produced by a fetus
  - detect spina bifida
  - detect Tay – Sachs disease
10. K selection can be described as organisms that \_\_\_\_.
- do not produce lots of offspring
  - have long life spans
  - mature later on in life
  - have large body size
  - All the answers describe K selection.
11. \_\_\_\_ can be used to detect radioactive decay.
- X-ray
  - Autoradiography
  - MRI
  - Sonogram
  - CAT Scan
12. Which of the following is **not** part of the endomembrane system?
- endoplasmic reticulum
  - Golgi complex
  - mitochondria
  - lysosomes
  - vesicles

13. Which organism is **not** correctly matched to its Phylum or Class?
- sea star – Class Asteroidea
  - Toxoplasma* – Phylum Apicomplexa
  - Portuguese man-of-war – Class Hydrozoa
  - lilies – Class Eudicotledones
  - yeast – Phylum Ascomycota
14. Chlorine has an atomic number of 17. The electron configuration for chlorine is \_\_\_\_.
- 1s – 2;      2s – 2;      2p – 6;      3s – 2;      3p – 5
  - 1s – 2;      2s – 2;      2p – 8;      3s – 2;      3p – 3
  - 1s – 2;      1p – 6;      2s – 2;      2p – 6;      3s – 1
  - 1s – 2;      2s – 2;      2p – 6;      2d – 7
  - 1s – 2;      2s – 2;      2p – 6;      3s – 2;      3d – 5
15. \_\_\_\_ nerves send impulses to the central nervous system.
- Afferent
  - Efferent
  - Sensory
  - Motor
  - Both a and c are correct.
16. Which of the following is **not** true?
- Physiology is the study of function and anatomy is the study of structure.
  - Systematics is the study of organ systems.
  - A zoologist would study animals.
  - Botanists would study plants.
  - Ecologists would be concerned with environmental effects on our rain forests.
17. Which of the following is **not** a biennial?
- foxtail
  - carrots
  - cabbage
  - Queen Anne's lace
  - marigold
18. Achondroplasia is \_\_\_\_.
- an autosomal recessive trait
  - an autosomal dominant trait
  - an X-linked trait
  - a Y-linked trait
  - an example of incomplete dominance
19. Which functional group is **not** correctly matched with the organic molecule?
- NH<sub>2</sub> – amino acid
  - PO<sub>4</sub><sup>-2</sup> – DNA
  - OH – carbohydrates
  - CH<sub>3</sub> – sucrose
  - SH – proteins

20. Match the animals in **Column A** with their class in **Column B**.

**Column A**

1. tuna
2. sand dollar
3. shark
4. eagle
5. planarian

**Column B**

- i. Aves
- ii. Turbellaria
- iii. Actinopterygii
- iv. Echinoidea
- v. Chondrichthyes

**Select the correct matching sequence.**

- a. 1 – iii;      2 – iv;      3 – v;      4 – i;      5 – ii
  - b. 1 – v;      2 – iv;      3 – i;      4 – ii;      5 – iii
  - c. 1 – iv;      2 – iii;      3 – v;      4 – i;      5 – ii
  - d. 1 – v;      2 – iv;      3 – iii;      4 – i;      5 – ii
  - e. 1 – iii;      2 – ii;      3 – i;      4 – v;      5 – iv
21. Tracheal mites can live in the trachea of honey bees making it difficult for the honey bees to get oxygen. Which statement or statements accurately describes the relationship between the tracheal mites and honey bees?
- a. Tracheal mites are ectoparasites.
  - b. Tracheal mites are parasites and honey bees are their host.
  - c. There is a symbiotic relationship between the tracheal mites and honey bees.
  - d. All of the above statements are correct.
  - e. Both statements b and c are correct.
22. The wrist is \_\_\_\_\_ to the elbow.
- a. lateral
  - b. distal
  - c. proximal
  - d. inferior
  - e. medial
23. Which of the following is **not** true?
- a. In hydrolysis reactions, water is removed.
  - b. In catabolic reactions, larger molecules are broken down into smaller molecules.
  - c. Anabolism is to catabolism, as hydrolysis is to dehydration.
  - d. Oxidation is to reduction, as cation is to anion.
  - e. Anabolism is to dehydration, as catabolism is to hydrolysis.
24. Which of the following dihybrid phenotype ratios would result from a test cross with a plant that is heterozygous for both traits?
- a. 1 : 1
  - b. 3 : 1
  - c. 1 : 1 : 1 : 1
  - d. 9 : 3 : 3 : 1
  - e. none of the above

25. Communication between the left and right cerebral hemispheres of the human brain occurs through the \_\_\_\_.
- corpus callosum
  - diencephalon
  - hypothalamus
  - brain stem
  - cerebellum
26. The anticodon – AAA – is complementary to the codon \_\_\_\_.
- TTT
  - CCC
  - UUU
  - GGG
  - Both answers a and c are correct.
27. Guard cells are different from most epidermal cells because they usually have \_\_\_\_.
- xylem
  - phloem
  - trichomes
  - chloroplasts
  - Both answers a and b are correct.
28. Which of the following is **not** true?
- A pH of 7 is considered neutral.
  - The normal pH of human blood ranges from 7.0 to 7.3.
  - A solution with a pH of 5 is 100 times more acidic than a pH of 7.
  - Buffers help maintain pH by either releasing or picking up hydrogen ions.
  - Alkalosis and acidosis refer to abnormal changes in human blood pH.
29. The schooling of fish is an example of \_\_\_\_.
- random dispersion
  - territory behavior
  - clump dispersion
  - uniform dispersion
  - homogeneous pattern
30. Exons are \_\_\_\_.
- spliced out of the mRNA
  - expressed sequences of tRNA
  - found only in prokaryotic cells
  - found in mature mRNA
  - arranged the same in all tissue type

31. Which of the following is true?
- If two heterozygous tall plants were crossed, the genotype of the offspring would be  $\frac{3}{4}$  tall and  $\frac{1}{4}$  short.
  - When a test cross is complete with a dominant purple flowered plant and the offspring are white, this indicates to researchers that the purple flowered plant is most likely heterozygous.
  - When pink flowers result from a cross between a dominant red and a recessive white, this would be an example of codominance.
  - Both a and c are true.
  - All of the above are true.

32. Match the theories or findings in **Column A** with the scientist/s in **Column B** who is most closely associated.

**Column A**

- Endosymbiotic theory
- Cell Theory
- Theory of evolution
- Genetics
- DNA structure

**Column B**

- Schleiden, Schwann, and Virchow
- Gregor Mendel
- Watson and Crick
- Charles Darwin
- Lynn Margulis

**Select the correct matching sequence**

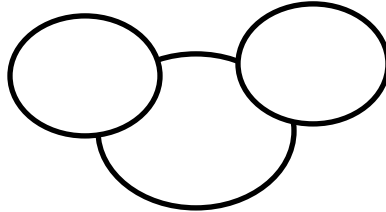
- |            |          |         |          |         |
|------------|----------|---------|----------|---------|
| a. 1 – ii; | 2 – iii; | 3 – v;  | 4 – i;   | 5 – iv  |
| b. 1 – v;  | 2 – i;   | 3 – ii; | 4 – iii; | 5 – iv  |
| c. 1 – iv; | 2 – ii;  | 3 – i;  | 4 – v;   | 5 – iii |
| d. 1 – v;  |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

33. The cell part that is very important in apoptosis is the \_\_\_\_.
- ribosome
  - peroxisome
  - mitochondrion
  - smooth endoplasmic reticulum
  - glyoxysome
34. The \_\_\_\_ structure of a protein gives the protein its \_\_\_\_ shape.
- tertiary; 3-D
  - 3-D; tertiary
  - secondary; 3-D
  - alpha helix; secondary
  - secondary; primary
35. In a population the phenotypic ratio for the recessive trait is 0.49. Using the Hardy-Weinberg Principle, determine the allele frequencies for the dominant allele – A and the recessive allele a.
- A – 0.5 and a – 0.5
  - A – 0.7 and a – 0.3
  - A – 0.4 and a – 0.6
  - A – 0.2 and a – 0.8
  - A – 0.3 and a – 0.7

36. Which is **not** an example of Phylum Pteridophyta?
- horsetails
  - wisk ferns
  - mosses
  - Boston ferns
  - maidenhair fern
37. Which of the following associations would **not** be considered a shared derived character for the taxa?
- Class Aves – feathers
  - Class Amphibia – notochord
  - Class Reptilia – amniotic egg
  - Phylum Anthophyta – flowers
  - Domain Bacteria – peptidoglycan
38. Many of the “tools” for biotechnology are \_\_\_\_.
- man-made products
  - obtained from animals
  - from bacteria and viruses
  - produced by fungi
  - large machines
39. Which of the following is **not** a deuterostome?
- sea urchin
  - acorn worm
  - lancelet
  - tunicate
  - ribbon worm
40. Catalase has the ability to \_\_\_\_.
- break down hydrogen peroxide
  - be used as a defense mechanism for some insects like the bombardier beetle
  - carry hydrogen atoms to another organic molecule
  - Both a and b are correct.
  - Both a and c are correct.
41. Bacteria have very diverse ways of gaining energy. Which of the following is **not** correct?
- saprotroph – get their carbon from organisms they infect harming the host organism
  - chemoheterotroph – need organic molecules for their carbon and energy source
  - photoheterotroph – get their carbon from organisms, but their energy source from sunlight
  - photoautotroph – get carbon from carbon dioxide, but their energy source from the sunlight
  - chemoautotroph – get carbon from carbon dioxide, but their energy source is from oxidizing inorganic chemical like hydrogen sulfide



42. In DNA, if a base is substituted for another base and the product results in a different amino acid coded for, this is referred to as a \_\_\_\_.
- a. nonsense mutation
  - b. missense mutation
  - c. silent mutation
  - d. frameshift mutation
  - e. transposon
43. The following represents pine \_\_\_\_.



- a. ovule
  - b. microspore
  - c. pollen
  - d. embryo
  - e. zygote
44. \_\_\_\_ are protective caps that allow DNA to replicate many times before genetic information is lost.
- a. Telomeres
  - b. Kinetochores
  - c. 7-Methylguanosine caps
  - d. RNA primers
  - e. Okazaki fragments
45. The plasma membrane has proteins scattered throughout with different functions. Ion channel-linked, G protein-linked, and enzyme-linked are examples of \_\_\_\_.
- a. recognition proteins
  - b. receptor proteins
  - c. carrier proteins
  - d. anchoring proteins
  - e. active transport proteins
46. Water has properties such as: cohesive forces, adhesive forces, high specific heat, and high heat of vaporization. These properties are all because of \_\_\_\_.
- a. ionic bonds
  - b. nonpolar covalent bonds
  - c. van der Waals forces
  - d. hydrogen bonds
  - e. hydrophobic interactions

47. Which of the following term is **not** correctly matched to their concept?
- altruism – individual acts in a way to help the group
  - pheromones – chemical signals
  - home range – an area in which an individual can be found, but does not defend
  - cohort – a group of individuals of the same age
  - semelparous – species reproduce several times during their lifetime
48. Carotenoids are molecules that are pigments. The movement of \_\_\_\_\_ allows the colors to be produced.
- protons
  - neutrons
  - electrons
  - positrons
  - transposons
49. Which of the following cell parts would only be found in eukaryotic cells?
- ribosomes
  - plasma membrane
  - cell wall
  - cytoskeleton
  - flagella
50. Many types of organic molecules may be used to produce ATP during cellular respiration. When fatty acids are broken down, this process is called \_\_\_\_\_.
- fermentation
  - beta oxidation
  - deamination
  - anaerobic respiration
  - anabolism