



# 2012 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) – 2012

1. Chitin \_\_\_\_\_.
  - a. is found in the cell walls of fungi
  - b. is found in the exoskeletons of Phylum Arthropoda
  - c. is a carbohydrate
  - d. has nitrogen in its chemical formula
  - e. all the above
  
2. The \_\_\_\_ portion of the plasma membrane serves as receptors, channels, and junctions, whereas the \_\_\_\_ component provides a barrier.
  - a. protein; lipid
  - b. lipid; carbohydrates
  - c. carbohydrates; protein
  - d. nucleic acid; lipid
  - e. lipid; protein
  
3. If a person's red blood cells hemolyze, it would most likely be as a result of degradation to \_\_\_\_\_.
  - a. transport vesicles
  - b. antibodies
  - c. the mitochondria
  - d. lysosomes
  - e. the plasma membrane
  
4. The Na<sup>+</sup>/K<sup>+</sup> pump is a form of \_\_\_\_, performed by the \_\_\_\_ component of the cell membrane.
  - a. facilitated diffusion; lipid
  - b. osmosis; protein
  - c. active transport; protein
  - d. diffusion; lipid
  - e. none of the above
  
5. \_\_\_\_ are to plants as \_\_\_\_ are to animals.
  - a. Tight junctions; adhering junctions
  - b. Desmosome; tight junctions
  - c. Gap junctions; desmosomes
  - d. Plasmodesmata; gap junctions
  - e. Adhering junctions; plasmodesmata
  
6. If a child has type O blood, which of the following could **not** be the child's parent's blood types?
  - a. type O and type B
  - b. type O and type A
  - c. type AB and type O
  - d. type A and type B
  - e. none of the above

7. Which of the following statements is true?
- Amylase and water are needed for the digestion of starch.
  - Membrane changes that result in the engulfment of liquid into a cell are referred to as pinocytosis.
  - Active transport mechanisms require receptor proteins on the plasma membrane.
  - Both a and b are correct.
  - All the above are correct.
8. Which is **not** a correct association?
- plasmid – DNA vector
  - DNA probe – single stranded DNA labeled with a radioactive element
  - restriction enzymes – cut DNA at specific nucleotide sequences
  - cDNA – DNA with exons only
  - All the above answers are correct.
9. Operons \_\_\_\_.
- are found in prokaryotes and eukaryotes
  - are nucleotides in DNA, that DNA polymerase binds
  - are genes that are transcribed together on one mRNA strand
  - are translated in the nucleus of eukaryotes
  - All the above answers are correct.
10. Which of the following is **not** correct?
- NAD is reduced to NADPH and the electrons are replaced by photolysis of water during photosynthesis.
  - For each glucose molecule about 36 ATPs can be produced.
  - FAD is reduced to FADH<sub>2</sub> during cellular respiration.
  - Phosphorylation of ADP results in ATP.
  - Following the electron transport chain, oxygen is the final electron acceptor.
11. In meiosis, variant chromosome combinations are a result of \_\_\_\_, and cells become haploid in \_\_\_\_.
- Telophase I; Anaphase II
  - Prophase I; Telophase I
  - Anaphase I; Telophase II
  - Metaphase I; Prophase II
  - Metaphase II; Telophase
12. Which of the following is true?
- DNA polymerase is important in complimentary base pairing.
  - Phagocytosis and pinocytosis are both types of exocytosis.
  - Uracil is found in DNA and not RNA.
  - Microtubules are to the cytoskeleton as microfilaments are to the nucleus.
  - Both a and d are true.

13. In fruit flies, eye color is an X-linked trait. Red eyes ( $X^R$ ), are dominant to white eyes ( $X^r$ ). The wild type color (B) is dominant to ebony (b). If a white – eyed female who is heterozygous for the wild type body color, is mated with a red – eyed male who is heterozygous for the wild type body color, the possible offspring could **not** be \_\_\_\_.
- red – eyed males with wild type body
  - white – eyed males with ebony body
  - red – eyed females with wild type body
  - red – eyed females with ebony body
  - All of the answers could be possible offspring.
14. A disease kills most of the wrens on an island. The wrens that survive start to repopulate the island. This is an example of \_\_\_\_.
- artificial selection
  - immigration
  - founder effect
  - directional selection
  - genetic bottle neck
15. Dictyosomes are found in plants. They are also known as \_\_\_\_.
- plasmodesmata
  - chloroplast
  - Golgi complex
  - tonoplast
  - vacuole
16. Which of the following statements are true?
- Hydrophobic molecules repel water.
  - Turgor pressure increases as plant vacuoles gain water.
  - Special organelles called contractile vacuoles help maintain water balance in some protists.
  - Both a and b are correct.
  - All of the above answers are correct.
17. Which of the following is true?
- Chromosomes line up independently of each other in prophase I of meiosis.
  - In  $G_2$  the amount of DNA is doubled compared to  $G_1$ .
  - Meiosis II is also known as a reduction division.
  - Crossing over occurs during anaphase II of meiosis.
  - Mitosis consists of interphase, prophase, metaphase, anaphase, and telophase.
18. A perfect flower consists of \_\_\_\_.
- stamen and carpals
  - petals and sepals
  - peduncle and receptacles
  - stigma and style
  - filaments and anther

19. Match the metabolic processes in **Column A** with the place in the cell where they occur from **Column B**.

**Column A**

1. light dependent reaction
2. glycolysis
3. citric acid cycle
4. light independent reaction
5. electron transport and chemiosmosis – respiration

**Column B**

- a. cristae
- b. thylakoid
- c. stroma
- d. cytosol
- e. matrix

**Select the correct matching sequence.**

- |           |        |        |        |       |
|-----------|--------|--------|--------|-------|
| a. 1 – c; | 2 – d; | 3 – a; | 4 – b; | 5 – e |
| b. 1 – b; | 2 – d; | 3 – e; | 4 – c; | 5 – a |
| c. 1 – c; | 2 – a; | 3 – e; | 4 – b; | 5 – d |
| d. 1 – e; | 2 – c; | 3 – a; | 4 – b; | 5 – d |
| e. 1 – b; | 2 – e; | 3 – d; | 4 – c; | 5 – a |

20. Which is **not** related to connective tissue?
- a. elastin
  - b. mast cells
  - c. fibroblasts
  - d. collagen
  - e. lacks blood supply
21. If the tRNA sequence is UCG, which of the following would be the correct codon?
- a. AGC
  - b. TCG
  - c. TGC
  - d. UGC
  - e. UCG
22. Which of the following is **not** a formed element in blood?
- a. platelets
  - b. lymphocytes
  - c. macrophages
  - d. plasma
  - e. both b and d
23. Which of the following is **not** correct?
- a. Polyploidy is common among plants.
  - b. Diploid organisms may reproduce asexually through meiosis and sexually through mitosis.
  - c. CO<sub>2</sub>, ATP, and H<sub>2</sub>O are products of cellular respiration.
  - d. For each glucose molecule, 36 NADs are produced.
  - e. Both b and d.

24. Which of the following is an incorrect association?
- polar covalent bonds – hydrophilic
  - nonpolar covalent bonds – oil, hydrophobic
  - hydrogen bonds – help stabilize the structure of DNA
  - peptide bonds – connect amino acids of proteins
  - All of the above are correct.
25. In DNA, the \_\_\_\_ relate to its rungs.
- nitrogenous bases
  - phosphate and deoxyribose
  - deoxyribose and hydrogen bonds
  - hydrogen bonds
  - both a and d
26. Which of the following is **not** correct?
- Oxidation reactions result in the gain of electrons.
  - A solution of pH 7 is 1000 times more alkaline than a pH of 4.
  - Condensation reactions are catabolic.
  - Activation energy is lowered with the presence of an enzyme.
  - both a and c
27. Mycologist study \_\_\_\_.
- mucus
  - viruses
  - the immune system
  - fungi
  - protozoans
28. Some female mice will release a chemical in their urine to slow down maturation of young females if conditions are very crowded. This is an example of \_\_\_\_.
- a density – independent factor
  - a density – dependent factor
  - natural selection
  - bottle neck
  - none of the above
29. Which organism is **not** matched with the Domain it is in?
- polio virus – Bacteria
  - E. coli* – Bacteria
  - red wood tree – Eukarya
  - mold – Eukarya
  - Halobacterium* - Archaea
30. Which of the following is a three dimensional alpha helix, beta sheet structure/system made up of more than one polypeptide?
- primary
  - secondary
  - tertiary
  - quaternary
  - both a and b

31. Match the tissues in **Column A** with the components or cell types in **Column B**.

**Column A**

1. connective
2. epithelial
3. muscle
4. nervous

**Column B**

- a. dendrite
- b. smooth
- c. blood
- d. adipose
- e. squamous
- f. cardiac
- g. axon

**Select the correct matching sequence**

- |              |           |           |          |
|--------------|-----------|-----------|----------|
| a. 1 – c, d; | 2 – a, e; | 3 – b, f; | 4 – g    |
| b. 1 – e, g; | 2 – c, d; | 3 – b, f; | 4 – a    |
| c. 1 – c, d; | 2 – e;    | 3 – b, f; | 4 – a, g |
| d. 1 – c;    | 2 – d, e; | 3 – a, b; | 4 – f, g |
| e. 1 – c, d; | 2 – b, e; | 3 – f;    | 4 – a, g |

32. Which is **not** a reservoir animal for the following diseases?

- a. Leprosy – armadillo
- b. Lymes Disease – deer
- c. Hanta virus – mice
- d. Plague – prairie dogs
- e. Giardiasis – fish

33. Match the ECG wave in **Column A** with the correct definition in **Column B**.

**Column A**

1. P wave
2. QRS wave
3. T wave

**Column B**

- i. repolarization of ventricles
- ii. depolarization of ventricles
- iii. depolarization of atria

**Select the correct matching sequence.**

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

34. Which of the following animals have an open circulatory system?

- a. perch
- b. lancet
- c. crayfish
- d. hagfish
- e. shark

35. Homeotherm refers to \_\_\_\_\_, while poikilotherm refers to \_\_\_\_\_.

- a. body temperature from the environment; body temperature remaining the same
- b. body temperature remaining the same; body temperature maintained from metabolism
- c. body temperature maintained from metabolism; body temperature remaining the same
- d. body temperature remaining the same; body temperature depending on the environment
- e. body temperature from the environment; body temperature maintained from metabolism

36. Which vaccine type does **not** match with the organism it helps protect against?
- live, attenuated vaccine – mumps
  - toxoid – tetanus
  - conjugated vaccine – *Haemophilus influenza* type B
  - subunit vaccine – hepatitis B
  - DNA vaccine – diphtheria
37. The gametophyte generation of ferns is called the \_\_\_\_\_.
- gemmae
  - fronds
  - prothallus
  - protoneum
  - rhizoid
38. Mutualism is an important relationship between many organisms. Which of the following is **not** a mutualistic relationship?
- mycorrhize – roots and fungi
  - lichen – fungi and algae
  - termite and *Trichonympha*
  - cow gut and methanogen
  - cow birds putting their eggs into another bird's nest
39. Which of the following statements is **not** true?
- The total magnification of a microscope using an ocular with a 10X lens and an objective of 45X would be 450X.
  - If a scientist was using an electron microscope, the organism would need to be living.
  - As the power of the microscope increases, the need for light also increases.
  - While using the 100X objective, the oil added stops the light from refracting as the power increases.
  - The rheostat knob is used to control light.
40. If a molecule has a molecular formula of  $C_2H_2$ , there will be a \_\_\_\_\_.
- single bond between the carbon atoms
  - double bond between the carbon atoms
  - double bond between the carbon and hydrogen atoms
  - triple bond between the carbon atoms
  - None of the above answers are correct.
41. \_\_\_\_\_ is the wall of a ripen ovary.
- Seed coat
  - Pericarp
  - Peduncle
  - Receptacle
  - Lenticel
42. If an organism's genotype is  $X^rYAa$ , which of the following could **not** be a possible gamete.
- $X^rA$
  - Ya
  - YA
  - $X^R a$
  - $X^r a$



43. Which of the following would **not** be considered a derived characteristic of Phylum Chordata?
- endostyle or thyroid
  - notochord
  - dorsal nerve tubular cord
  - gill slits or gill pouches
  - deuterostome
44. Which is **not** a correct association?
- chitin – N-acetylglucosamine
  - cellulose – alpha – glucose and beta – glucose
  - starch – alpha – glucose
  - glycogen – beta – glucose
  - pectin – pectic acid and pectinic acid
45. Many factors affect population size. \_\_\_\_\_ factors have a greater affect when the population size is large.
- Biotic
  - Abiotic
  - Density – independent
  - Climate
  - none of the above
46. Match the microbes in **Column A** with their description in **Column B**.

**Column A**

- prions
- viruses
- viroids
- bacteria
- protozoan

**Column B**

- short pieces of RNA
- cell walls
- infectious protein
- heterotroph, nucleus
- has a protein coat and nucleic acid core

**Select the correct matching sequence.**

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

47. Which is **not** a correct association?
- operculum – bony fish
  - carapace – crayfish
  - placoid scales – turtle
  - hollow bones – birds
  - tunic – sea squirt
48. DNA \_\_\_\_\_.
- has the code for proteins
  - replicates during the S phase of interphase
  - strands run antiparallel
  - is transcribed forming mRNA
  - All of the answers are correct.

49. Chlorophyll is a pigment that \_\_\_\_.
- a. emits 2 electrons when excited by light
  - b. absorbs green light
  - c. is found only in plants
  - d. is used during the light-independent reaction
  - e. has iron in the center of the molecule
50. The expected genotype ratio for a dihybrid test cross is \_\_\_\_.
- a. 9 : 3 : 3 : 1
  - b. 1 : 2 : 1
  - c. 3 : 1
  - d. 1 : 1 : 1 : 1
  - e. 1 : 1