



# 2015 Academic Challenge

## BIOLOGY TEST - SECTIONAL

This Test Consists of 50 Questions

### **Biology Test Production Team**

Julie Ellis, Kaskaskia College – Author

Donna Ford, John A. Logan College – Author

Keith A. Krapf, John A. Logan College – Reviewer

Kathryn Torrey, WYSE – Coordinator of Test Production

### 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 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 \*\*\***

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

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WYSE – Academic Challenge  
Biology Test (Sectional) – 2015

1. Which is not a physical method used to fight infection?
  - a. ciliary escalator
  - b. lysozymes
  - c. pH of skin
  - d. lacrimal apparatus
  - e. mucus
  
2. If Zach wants to prepare a solution in the laboratory of a certain pH, he would start with a/an\_\_\_ solution.
  - a. acidic
  - b. basic
  - c. neutral
  - d. buffer
  - e. none of the above.
  
3. Chlorophyll\_\_\_\_\_.
  - a. absorbs light energy
  - b. makes glucose
  - c. makes proteins
  - d. absorbs yellow light
  - e. both a and b
  
4. Cardinals, frogs and rabbits in a given area would be a/an \_\_\_\_\_.
  - a. species
  - b. genus
  - c. population
  - d. community
  - e. ecosystem
  
5. A red blood cell placed in a hypotonic solution would \_\_\_\_\_.
  - a. shrink in size
  - b. remain the same size
  - c. cause plasmolysis
  - d. crenate
  - e. burst
  
6. Using Chi square to analyze results, how many degrees of freedom would be used to analyze the results for a dihybrid cross.
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 16

7. Use the following information

Dominant trait	Recessive trait
P – purple flower	p – white flower
R – round seed	r – wrinkled seed
Y – yellow seed	y – green seed

If a pea plant produced white flowers and round green peas, what possible gamete could it produce?

- Pyr
- pyr
- PYR
- PyR
- pYr

8. DNA replication can be defined as \_\_\_\_\_.

- conservative replication
- semiconservative replication
- discontinuous replication
- dispersive replication
- transcription

9. Match the reproductive structures in **Column A** with the plants in **Column B**.

**Column A**

- sori
- cones
- spores
- flowers

**Column B**

- angiosperm
- moss
- ferns
- gymnosperm

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

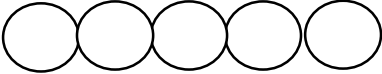
10. The following are derived traits for \_\_\_\_\_. Traits: notochord, dorsal nerve cord, and gill slits of gill pouches.

- Aves
- Urochordata
- Chondrichthyes
- Chordata
- All of the above are derived traits.

11. Which is **not** part of a typical neuron?

- cell body
- dendrites
- axons
- myelin sheath
- intercalated disc

12. Hydrogen bonds form between hydrogen and \_\_\_\_.
- nonpolar covalent bonds
  - oxygen
  - nitrogen
  - polar covalent bonds
  - Answers b, c, and d are all true.
13. Which of the following is not related to RNA?
- thymine
  - ribosome
  - amino acids
  - ribose
  - nucleic acid
14. Etiology can be defined as \_\_\_\_.
- the cause of a disease
  - behaviors of organisms
  - symptoms of a disease
  - the distribution of a disease
  - interactions between organisms in an ecosystem
15. Which of the following is most closely associated with energy?
- ribosomes
  - mitochondria
  - endoplasmic reticulum
  - nucleolus
  - nucleus
16. During gel electrophoresis, the DNA leaves the wells because of the charge of the \_\_\_\_.
- deoxyribose
  - purine bases
  - pyrimidine bases
  - phosphate groups
  - All of the above are correct answers.
17. Which of the following is true?
- Carbohydrates are composed of carbon and other atoms.
  - Saturated fats are examples of liquid plant oils or lipids.
  - DNA is composed of nucleotides which contain a nitrogenous base, 5' carbon sugar, and sulfide group.
  - Both b and c
  - All the above

18. If a mother with curly hair and a father with straight hair has a child with wavy hair, this can best be explained by \_\_\_\_.
- incomplete dominance
  - codominance
  - pleiotropy
  - epistasis
  - polygenetic inheritance
19. Which of the biogeochemical cycles does **not** have an atmospheric component to it?
- hydrolytic cycle
  - carbon cycle
  - nitrogen cycle
  - phosphorous cycle
  - All the above have an atmospheric component to them.
20. Fermentation \_\_\_\_.
- is not as efficient as cellular respiration
  - takes place in human muscle cells when there is an oxygen debt
  - takes place after glycolysis
  - can produce such end products as acids, alcohol, and carbon dioxide
  - All of the above are true.
21. The following can best be described as
- 
- streptobacilli
  - staphylococci
  - streptococci
  - diplococci
  - staphylobacilli
22. In angiosperms, the endosperm is produced by \_\_\_\_.
- the pollen tube in the style
  - union of the ovule and a sperm
  - union of the two polar nuclei and a sperm
  - the pollination of the stigma
  - the anther
23. Which animal has the following characteristics: produces copious amounts of mucus, dorsal nerve cord, jawless, and tentacles?
- jellyfish
  - lamprey
  - hydra
  - hagfish
  - lancelet

24. If a bicyclist is stationary at the top of the hill, he could be said to be demonstrating \_\_\_\_\_ energy.
- mechanical
  - potential
  - light
  - kinetic
  - none of the above
25. Which is an incorrect association?
- Methanogens - Archaea
  - Viroid – naked RNA
  - Peptidoglycan - Bacteria
  - Cilia - *Paramecium*
  - Nucleoid - Protista
26. Plants store carbohydrates as starch. After a leaf is decolorized, which reagent would be used to test for the areas in the leaf where photosynthesis takes place?
- Benedict's solution
  - Methylene blue
  - Biuret solution
  - Sudan solution
  - Iodine potassium iodide
27. How many grams of glucose ( $C_6H_{12}O_6$ ), are needed to make a 1 molar glucose solution?

Symbol	Atomic number	Atomic mass
H	1	1
C	6	12
O	8	16

- 24 grams
  - 48 grams
  - 96 grams
  - 180 grams
  - There is not enough information to determine how many grams are needed to make a one molar glucose solution.
28. During cellular respiration, the most ATP is produced during \_\_\_\_\_.
- glycolysis
  - the transition stage
  - chemiosmosis
  - the light dependent reaction
  - the citric acid cycle

29. Flukes have complex life cycles. The fluke's egg hatches into a \_\_\_\_.
- cercariae
  - miracidia
  - rediae
  - metacercariae
  - sporocyte

30. Given the following information, determine the genotypes for each parent.

Dominant trait	Recessive trait
$X^N$ – normal color vision	$X^n$ – color blind
A – normal skin pigmentation	a – albinism

A colorblind, normal skin pigmentation man and a normal color vision, normal skin pigmentation woman have a son who has normal skin pigmentation, but is color blind and their daughter is an albino, but has normal color vision.

- Man –  $X^N X^n Aa$                       Female –  $X^N X^N Aa$
- Man –  $X^n Y Aa$                           Female –  $X^N X^n Aa$
- Man –  $X^N Y AA$                          Female –  $X^n X^n AA$
- Man –  $X^n Y aa$                          Female –  $X^N X^n aa$
- There is not enough information to determine the parents' genotypes.

31. Given the following DNA sequence, determine the correct order for the amino acids it is coding.

TAC TTT AAA GAC

Codon	Amino Acid
AAA	Lysine
AUG	Methionine
CUG	Leucine
UUU	Phenylalanine

- Lysine                      Phenylalanine                      Methionine                      Leucine
- Methionine                      Leucine                      Phenylalanine                      Lysine
- Methionine                      Lysine                      Phenylalanine                      Leucine
- Lysine                      Phenylalanine                      Leucine                      Methionine
- Phenylalanine                      Methionine                      Lysine                      Leucine

32. Saprobies \_\_\_\_.

- eat plants and animals
- are decomposers
- are scavengers
- are mainly animals
- are parasites



33. Which association is **incorrect**?

- a. Earthworm – clitellum
- b. Spider – chelicerae
- c. Grasshopper – Malpighian tubules
- d. Planarian – flame cells
- e. Clam – radula

34. Which is **not** an example of a prezygotic reproductive barrier which affects interbreeding between species?

- a. temporal isolation
- b. hybrid inviability
- c. behavioral isolation
- d. gametic isolation
- e. mechanical isolation

35. Plants usually have \_\_\_\_.

- a. chloroplasts
- b. large central vacuole
- c. cell walls made up of chitin
- d. All of the above are correct.
- e. Both a and b are correct answers.

36. PCR \_\_\_\_.

- a. is used to amplify small segments of a chromosome
- b. stands for polymerase chain reaction
- c. uses Taq polymerase
- d. Both a and b are true.
- e. All the answers are correct.

37 Which is **not** a greenhouse gas?

- a. N<sub>2</sub>
- b. CO<sub>2</sub>
- c. H<sub>2</sub>O vapor
- d. Ozone
- e. CH<sub>4</sub>

38. Which is **not** a type of meristem?

- a. apical meristem
- b. vascular cambium
- c. cork cambium
- d. intercalary meristem
- e. All of the above are types of meristem.

39. Yeast \_\_\_\_.
- usually reproduce by budding
  - is in Domain Archaea
  - have cell walls composed of cellulose
  - are strict anaerobes
  - All of the above are correct.
40. A metabolic pathway can be described as \_\_\_\_.
- an enzyme-substrate complex
  - a series of chemical reactions that follow each other
  - homeostasis
  - hydrolysis
  - biosynthesis
41. Isomers would have \_\_\_\_.
- the same molecular formula
  - the same structural formula
  - a different molecular weight
  - a different number of neutrons
  - Both a and b are correct.
42. If viral DNA becomes integrated into a bacterial chromosome, it is called a/an \_\_\_\_.
- lytic phage
  - bacteriophage
  - prophage
  - viroid
  - prion
43. During the sodium-potassium pump, \_\_\_\_ is pumped out of the cell and \_\_\_\_ is pumped into the cell using a carrier \_\_\_\_ and \_\_\_\_ as the energy source.
- |    |           |           |         |        |
|----|-----------|-----------|---------|--------|
| a. | potassium | protein   | ATP     | sodium |
| b. | potassium | lipid     | ATP     | sodium |
| c. | sodium    | potassium | lipid   | ATP    |
| d. | sodium    | potassium | protein | ATP    |
| e. | potassium | sodium    | protein | ATP    |
44. Which is **not** a correct association?
- human wisdom teeth – vestigial structure
  - bat's wings and whale flipper – homologous structures
  - spines and thorns in different plants – homologous structures
  - hind limb bones in a python – vestigial structure
  - All are correct associations

45. During \_\_\_\_\_, crossing-over takes place.
- Prophase I
  - Prophase II
  - Metaphase I
  - Metaphase II
  - Crossing-over can take place in all of the above.
46. Which of the following is **not** a fruit?
- walnut
  - wheat
  - avocado
  - broccoli
  - All of the above are fruits.
47. Which cell part packages and modifies proteins?
- Golgi apparatus
  - mitochondrion
  - endoplasmic reticulum
  - ribosome
  - lysosome
48. Which is **not** an accessory organ of the digestive system?
- liver
  - gall bladder
  - salivary gland
  - duodenum
  - pancreas
49. Which of the following is true?
- Cytosol is the fluid of the cell outside the nucleus.
  - Cyclic and non-cyclic photosynthetic pathways occur in the ribosome.
  - Cell walls of a bacterial cell are composed of peptidoglycan and phospholipids which are important proteins in the plasma membrane.
  - Both a and b are correct.
  - Both a and c are correct.
50. Which of the following is true?
- Bacilli, spirillum, and cocci are major shapes of prokaryotes.
  - Prokaryotic cells do not have flagellar propulsion.
  - Bacteria or all eukaryotic cells have a cell wall.
  - Both a and b are correct.
  - All of the above.