



**ENGINEERING  
AT ILLINOIS**

## 2017 Academic Challenge

### BIOLOGY TEST – REGIONAL

– 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. 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 (Regional) – 2017

1. Which of the following statements is **not** true?
  - a. mRNA stays in the nucleus.
  - b. tRNA molecules carry amino acids.
  - c. The diploid number of chromosomes in the human body is 46.
  - d. Transcription is followed by translation during the production of proteins.
  - e. Albumin, hemoglobin and keratin are proteins.
2. The indicator for starch is \_\_\_\_\_.
  - a. Benedicts solution
  - b. Iodine potassium iodide
  - c. Phenol red
  - d. Litmus paper
  - e. Biuret reagent
3. Which of the following statements is/are correct?
  - a. A solution with a pH of 3 is 100 times more acidic than a solution with a pH of 5.
  - b. Enantiomers are isomers that are mirror images of each other.
  - c. Polar molecules do not have slight charges and are hydrophobic.
  - d. Both a and b are correct.
  - e. Both a and c are correct.
4. Which of the following statements is/are true?
  - a. During condensation reactions, bonds are formed between two or more smaller molecules and water is released.
  - b. Temperature and pH may denature enzymes.
  - c. Acidic solutions are associated with high levels of hydrogen ions.
  - d. Both b and c are true.
  - e. All of the above are true.
5. Which of the following is/are **not** a correct association?
  - a. Lipid – nucleotide
  - b. Carbohydrate – cellulose
  - c. Protein – albumin
  - d. Both a and b are correct.
  - e. All the above are correct.

6. Which is **not** correctly matched?
- Euglena* – Kingdom Protista
  - Yeast – Kingdom Fungi
  - E. coli* – Viral species
  - Streptococcus* – Domain Bacteria
  - Influenza A – Virus
7. If B is for brown eyes, b for blue eyes, R for tongue roller, and r for non tongue roller, what would the genotypes of two parents that can roll their tongues with blue eyes that produce a blue eyed male child that cannot roll his tongue be?
- RrBb X RrBb
  - RRBb X RRBb
  - Rrbb X rrBb
  - rrbb X Rrbb
  - None of the above are correct.
8. A homozygous red flowered plant and a homozygous white flowered plant produce pink offspring. This is known as \_\_\_\_.
- incomplete dominance
  - pleiotrophy
  - codominance
  - epistasis
  - None of the above are correct.
9. \_\_\_\_ is used by plants to transport water.
- Xylem
  - Phloem
  - Cork cambium
  - Bark
  - Stomata
10. When chromosomes fail to separate properly during cell division, it is referred to as \_\_\_\_.
- nondisjunction
  - binary fission
  - linkage grouping
  - kinetochore attachment
  - None of the above are correct.
11. Which is **not** a component of cellular respiration?
- chemiosmosis
  - citric acid cycle
  - non cyclic pathway
  - electron transport chain
  - glycolysis

12. The structure responsible for maintaining shape in the basic unit of life is the \_\_\_\_.
- a. mitochondria
  - b. centriole
  - c. cell wall
  - d. cytoskeleton
  - e. None of the above are correct.
13. In the structure of flowering plants, petals are surrounded by \_\_\_\_.
- a. stamens
  - b. the anther
  - c. sepals
  - d. a carpel
  - e. None of the above are correct.
14. Which of the following is **not** a coenzyme?
- a. NAD
  - b. ATPase
  - c. FAD
  - d. NADP
  - e. All the above are coenzymes.
15. The lower jaw bone is called the \_\_\_\_.
- a. maxilla
  - b. mandible
  - c. manubrium
  - d. mental foramen
  - e. None of the above are correct.
16. Which of the following is a double membrane bound organelle?
- a. chloroplast
  - b. bacteria
  - c. mitochondria
  - d. Both a and b are correct.
  - e. Both a and c are correct.
17. Lipid synthesis occurs in the \_\_\_\_.
- a. ribosome
  - b. smooth endoplasmic reticulum
  - c. lysosome
  - d. nucleolus
  - e. None of the above are correct.

18. The division of cytoplasm completes during \_\_\_\_.
- a. anaphase
  - b. metaphase
  - c. prophase
  - d. interphase
  - e. None of the above are correct.
19. The natural death of a cell is called \_\_\_\_.
- a. denaturation
  - b. apoptosis
  - c. cytokinase
  - d. telomere isolation
  - e. None of the above are correct.
20. Who of the following is considered a pioneer in microscope work?
- a. Ian Wilmut
  - b. Francis Collins
  - c. Rosalind Franklin
  - d. Antonie Van Leeuwenhoek
  - e. Friedrich Miescher
21. Which of the following organisms uses cilia for locomotion?
- a. *Amoeba*
  - b. *Euglena*
  - c. *Paramecium*
  - d. Both b and c utilize cilia.
  - e. None of the above use cilia for locomotion.
22. The final acceptor of electrons in cellular respiration is \_\_\_\_.
- a. glucose
  - b. NAD<sup>+</sup>
  - c. FAD<sup>+</sup>
  - d. oxygen
  - e. Both b and c are correct.
23. Which of the following is **not** used in classifying organisms?
- a. fossil records
  - b. molecular comparisons
  - c. comparative anatomy
  - d. biogeography
  - e. All of the above are used in classifying organism.

24. Transpiration, precipitation, and condensation are important for the \_\_\_\_\_.  
 a. nitrogen cycle  
 b. phosphorous cycle  
 c. hydrological cycle  
 d. carbon cycle  
 e. All of the above are true.
25. Carbon has an atomic number of six. Carbon has \_\_\_\_\_ valence shell electrons.  
 a. 1  
 b. 2  
 c. 3  
 d. 4  
 e. 5
26. Which is **not** a correct flower association?  
 a. anther – pollen  
 b. ovary – ovule  
 c. peduncle – stem  
 d. corolla – petals  
 e. sepal – part of the flower where the petals attach

27. Match the characteristics in **Column A** with their Phylum in **Column B**.

**Column A**

1. Pores, choanocytes
2. Acoelomates, flame cells
3. Segmented body, setae
4. Pseudocoelomate, cuticle

**Column B**

- a. Annelida
- b. Porifera
- c. Nematoda
- d. Platyhelminthes

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

28. Which of the following does **not** apply to DNA?  
 a. double helix  
 b. adenine, guanine, cytosine, and thymine  
 c. deoxyribose  
 d. positively charged  
 e. antiparallel

29. The plasma membrane is best described as \_\_\_\_\_.
- a lipid layer followed by a protein layer
  - a bi-carbohydrate layer with proteins scattered throughout
  - a bi-lipid layer with carbohydrates scattered throughout
  - a bi-protein layer with lipids scattered throughout
  - a bi-lipid layer with proteins scattered throughout
30. Color blindness is an X-linked trait. Neither Bob nor Jill has color blindness. If their first son is colorblind, what are the chances that their second son will also be colorblind?
- 100%
  - 25%
  - 50%
  - 75%
  - Not enough information is provided to answer the question.
31. The number of chromosomes in a female with Turner's syndrome would be?
- 22
  - 23
  - 45
  - 46
  - 47
32. Louis Pasteur had many discoveries. Which of the following is **not** a discovery associated with Louis Pasteur?
- rabies vaccine
  - pasteurization
  - aseptic surgery
  - helped disprove spontaneous generation
  - showed microbes caused fermentation
33. Which of the following vectors is **not** correctly matched to the disease it spreads?
- Tick – Lyme Disease
  - Tick – Malaria
  - Mosquito – West Nile Disease
  - Tsetse fly – Sleeping Sickness
  - Mosquito – Yellow Fever
34. Which of the following statements is/are false?
- Peptidoglycan makes up the cell wall of most prokaryotes.
  - Cellulose is known as fiber in a human's diet.
  - Pipettes are used to measure liquids.
  - Restriction enzymes seal sticky ends of DNA back together in recombinant DNA research.
  - Chitin is found in both fungi and arthropods.



35. Estuaries can be described as \_\_\_\_\_.  
 a. productive grass lands  
 b. wetlands where fresh water and salt water meet  
 c. an area formed when a permafrost layer starts to melt  
 d. an area where a grassland and forest interact  
 e. a fresh water marsh
36. Which functional group is **not** correctly matched?  
 a. Methyl – CH<sub>3</sub>  
 b. Amino – NH<sub>2</sub>  
 c. Carboxyl – COOH  
 d. Phosphate – PO<sub>4</sub><sup>-2</sup>  
 e. Alcohol – R – O – R
37. The plant organelle that stores water and helps maintain the cell shape is the \_\_\_\_\_.  
 a. central vacuole  
 b. Golgi apparatus  
 c. chloroplast  
 d. cell wall  
 e. endoplasmic reticulum
38. Match the descriptions from **Column A** with the most appropriate term in **Column B**.

**Column A**

1. separation according to size and charge
2. map of 46 chromosomes
3. amplification of DNA
4. spinning of samples

**Column B**

- a. PCR
- b. centrifugation
- c. Human Genome Project
- d. Gel electrophoresis

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

39. Photosynthesis may occur in which of the following?  
 a. bacteria  
 b. protists  
 c. plants  
 d. Both a and c are correct.  
 e. All the above are correct.

40. The highest rain forest layer is called the \_\_\_\_.
- a. emergent
  - b. understory
  - c. canopy
  - d. lower story
  - e. shrub layer
41. Which organic molecule is **not** correctly matched?
- a. proteins – amino acids
  - b. carbohydrates – fructose
  - c. nucleic acids – RNA
  - d. salts – acetic acid
  - e. lipids – glycerol and fatty acids
42. Which of the following is **not** true about earthworms?
- a. 5 aortic arches
  - b. separate sexes
  - c. dorsal blood vessel
  - d. crop
  - e. intestines
43. Active transport \_\_\_\_.
- a. uses energy
  - b. goes against the concentration gradient
  - c. pumps sodium outside the cell and brings potassium inside the cell
  - d. needs ATP
  - e. All of the above are true.
44. Which of the following is **not** associated with Domain Bacteria?
- a. prokaryote
  - b. cell wall
  - c. mitochondria
  - d. ribosomes
  - e. plasmid
45. Which is **not** a correct association?
- a. Moss – vascular plant
  - b. Fern – vascular plant
  - c. Gymnosperm – seed plant
  - d. Angiosperm – flowering plant
  - e. Dicot – tap root

46. Given the following DNA strand, choose the DNA strand that has the correct complementary base pairs.

**TAC ATC GAG CAT**

- a. **AUG UAG CUC GUA**
  - b. **ATG TAG CTC GTA**
  - c. **TAC ATC GAG CAT**
  - d. **UAC AUC GAG CAU**
  - e. **GCA CGA TCT TCG**
47. Natural selection \_\_\_\_.
- a. explains why populations are in genetic equilibrium
  - b. explains why organisms best adapted for their ecosystem produce more offspring
  - c. occurs only in animal species
  - d. occurs when breeders decide which animals will mate
  - e. explains why traits acquired through an animal's life time are passed on to the next generation
48. Which of the following is **not** a typical part of a leaf?
- a. lenticels
  - b. mesophyll
  - c. vein
  - d. stoma
  - e. cuticle
49. If Suzy has an abnormally low number of red blood cells or hemoglobin, she may be?
- a. suffering from hypertension
  - b. experiencing angina
  - c. anemic
  - d. iron deficient
  - e. Both c and d are correct.
50. Which of the following is true?
- a. Viruses have a protein coat and a nucleic acid core.
  - b. Viruses contain DNA or RNA.
  - c. Glycoprotein spikes aid in the entry of viral material into its host.
  - d. Some viruses have an envelope.
  - e. All the above are correct.