



**ENGINEERING
AT ILLINOIS**

2018 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) – 2018

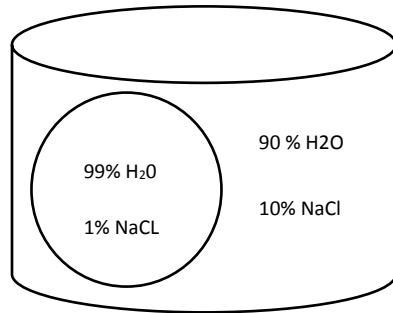
1. Acidity is to _____, as, alkalinity is to _____.
 - a. H⁺; OH⁻
 - b. OH⁻; H⁺
 - c. C¹⁴; C¹²
 - d. Both a and c are correct.
 - e. All of the above, are correct.
2. Which of the following is **not** a protein?
 - a. ATP
 - b. hemoglobin
 - c. albumin
 - d. Both a and c are correct.
 - e. All the above, are proteins.
3. Which flower part is **not** correctly matched to its function?
 - a. stigma – pollination
 - b. anther – produces pollen
 - c. ovary – produces ovule
 - d. sepal – bud
 - e. peduncle – attaches anther
4. Prokaryotic cells have _____.
 - a. ribosomes
 - b. DNA
 - c. a plasma membrane
 - d. cytoplasm
 - e. All of the above answers, are correct.
5. In pea plants, round seeds (R) are dominant to wrinkled seeds (r). What is the expected phenotype ratio for a cross between two heterozygous round seed plants?
 - a. 1 : 1 : 1 : 1
 - b. 1 : 2 : 1
 - c. 9 : 3 : 3 : 1
 - d. 3 : 1
 - e. None of the above, are correct.

6. Which animal is **not** matched to the structure that is usually used for gas exchange?
- crayfish – gills
 - spiders – gills
 - frogs – lungs
 - clams – gills
 - earthworms – skin
7. Which is **not** a vestigial structure?
- wisdom teeth
 - python's hind limb bones
 - bat's wings
 - appendix
 - human coccyx bone
8. Carnivore is to _____, as omnivore is to _____.
- animals; plants and animals
 - plants; animals
 - plants; plants and animals
 - plants and animals; plants
 - plants and animals; animals
9. Which is **not** a characteristic of all living organisms?
- made up of cells
 - respond to stimuli
 - growth and development
 - made up of tissues
 - reproduction
10. During _____, doubled chromosomes are pulled apart and migrate toward opposite poles.
- metaphase
 - anaphase
 - telophase
 - prophase
 - interphase
11. Obligate aerobes _____.
- require oxygen to grow
 - can grow with or without oxygen
 - cannot grow in the presence of oxygen
 - are all pathogens
 - are all photosynthetic

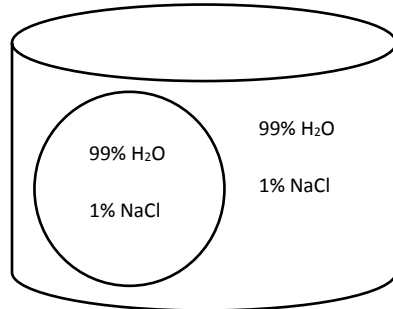
12. Match the diagrams in **Column A** with the solution type represented in **Column B**.

Column A

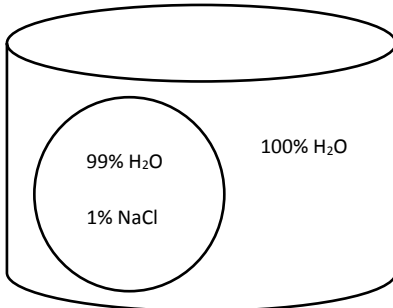
1.



2.



3.



Column B

a. hypotonic

b. isotonic

c. hypertonic

Select the correct matching sequence:

a. 1 – c

2 – a

3 – b

b. 1 – b

2 – a

3 – c

c. 1 – c

2 – b

3 – a

d. 1 – a

2 – b

3 – c

e. 1 – b

2 – c

3 – a

13. During Metaphase I, _____.

- a. homologous chromosomes exchange genetic material
- b. homologous chromosome pairs attach to the same spindle
- c. homologous chromosomes move to opposite poles
- d. the nuclear envelope starts to break apart
- e. the cytoplasm begins to split

14. Microtubules are ____.
- found in cilia
 - the same size as intermediate filaments
 - also known as actin
 - composed of nucleotides
 - None of the above are correct.
15. Oxygen has an atomic number of 8. How many valence shell electrons does oxygen have?
- 2
 - 4
 - 6
 - 8
 - 16
16. Which of the following is **not** associated with enzymes?
- Many enzyme's names end in –ase.
 - Enzymes speed up chemical reactions.
 - Most enzymes are proteins.
 - Most enzymes catalyze many different chemical reactions.
 - Enzymes lower the activation energy of chemical reactions.
17. Glycolysis produces ____.
- ATP
 - pyruvate
 - NADH
 - Only a and b are produced during glycolysis.
 - All of the above, are produced during glycolysis.
18. Match the scientists in **Column A** with their discoveries in **Column B**.

Column A

- Watson and Crick
- Alexander Fleming
- Louis Pasteur
- Rachel Carson

Column B

- penicillin
- rabies vaccine
- environmentalist
- DNA structure

Select the correct matching sequence:

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

19. Which is **not** a correct association?
- anticodon – tRNA
 - ribosome – rRNA
 - codon – mRNA
 - DNA polymerase – adds nucleotides to DNA
 - DNA ligase – unwinds DNA during DNA replication
20. Which of the following genetic disorders is caused by a dominant allele?
- cystic fibrous
 - Huntington’s disease
 - Tay-Sachs disease
 - sickle-cell anemia
 - phenylketonuria
21. Which of the following is associated with *Paramecia*?
- micronucleus
 - macronucleus
 - contractile vacuole
 - Both a and b are correct.
 - All of the above, are correct.
22. Spiders, ticks, millipedes, and crayfish _____.
- are all poisonous
 - are all arthropods
 - are all predators
 - have the same mouth parts
 - All of the above answers, are correct.
23. Match the organelle in **Column A** with the correct function in **Column B**.

Column A

- Ribosome
- Lysosome
- Golgi apparatus
- Mitochondria

Column B

- digestive enzymes
- proteins
- cellular respiration
- sorts and packages

Select the correct matching sequence:

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

24. The Krebs cycle/citric acid cycle is part of ____.
- a. photosynthesis
 - b. cellular respiration
 - c. protein synthesis
 - d. Both a and b are correct.
 - e. Both a and c are correct.
25. Lipid synthesis is most closely associated with the ____.
- a. ribosomes
 - b. smooth endoplasmic reticulum
 - c. Golgi bodies
 - d. lysosomes
 - e. None of the above, are correct.
26. When molecules move through a membrane against the concentration gradient, it is called ____.
- a. active transport
 - b. facilitated diffusion
 - c. passive transport
 - d. filtration
 - e. None of the above are correct.
27. Aves refers to ____.
- a. fish
 - b. reptiles
 - c. amphibians
 - d. birds
 - e. myxini
28. Which of the following, is **not** one of the four major organic molecule groups found in living organisms?
- a. carbohydrates
 - b. lipids
 - c. proteins
 - d. minerals
 - e. Both a and d, are **not** one of the four major organic molecule groups in living organisms.

29. If (R) is dominant for the ability to roll one's tongue and (r) is recessive for not having the ability of rolling one's tongue, what will be the genotype ratio of a cross between a heterozygous roller and non-roller?
- 1:1
 - 3:1
 - 1:2:1
 - 9:3:3:1
 - None of the above are correct.
30. Which of the following is true?
- Meiosis in human males results in four haploid cells that contain 23 chromosomes.
 - Mitosis is asexual reproduction that helps repair injured or damaged tissues.
 - Mitosis is asexual reproduction for growth of tissues.
 - Only a and c are correct.
 - All of the above, are correct.
31. Which taxonomic category is between Phylum and Order?
- Family
 - Domain
 - Genus
 - Class
 - Species
32. Which is **not** necessary for photosynthesis?
- H₂O
 - NAD
 - ATP
 - photosystems
 - visible light
33. Osteo refers to _____.
- blood
 - cartilage
 - bone
 - lipids
 - None of the above are correct.
34. Which is **not** associated with DNA?
- adenine
 - guanine
 - uracil
 - deoxyribose
 - double helix

35. Which is **not** part of a leaf?
- mesophyll
 - epidermis
 - xylem
 - pith
 - phloem
36. Which is **not** a freshwater ecosystem?
- pond
 - stream
 - mangrove swamps
 - rivers
 - lakes
37. The structural formula for a molecule of oxygen is ____.
- $O = O$
 - $O - O$
 - O_2
 - O
 - All of the above, are correct.
38. Which of the following statements is **not** true?
- DNA replication is semiconservative.
 - DNA is composed of nucleotides.
 - DNA is found in the mitochondria.
 - DNA's strands are held together by hydrogen bonds.
 - All of the above, are correct.
39. Determine the total magnification for a microscope with an ocular power of 10X, while using the 45X objective lens.
- 55 X
 - 100 X
 - 450 X
 - 2025 X
 - There is not enough information provided to determine the total magnification.
40. A tuber is ____.
- an underground stem
 - a root
 - the same as a bulb
 - an adventitious root
 - a runner

41. Using the following reaction, name the reactants $\text{HCl} + \text{NaOH} \rightleftharpoons \text{NaCl} + \text{H}_2\text{O}$.
- HCl
 - NaCl
 - NaOH
 - Both a and b are reactants.
 - Both a and c are reactants.
42. Which of the following is an example of a mutualistic relationship?
- tapeworm in a dog's intestine
 - a bird's nest in a tree
 - mosquito carrying a virus
 - bacteria in the large intestine producing vitamins
 - a snake eating a mouse
43. Which molecule is **not** correctly matched?
- chitin – carbohydrate
 - triglyceride - lipid
 - RNA – nucleic acid
 - glucose – carbohydrate
 - steroids – protein
44. Which of the following is **not** found in *Euglena*?
- an eyespot
 - chloroplasts
 - flagella
 - mitochondria
 - Euglena* have all of the above.
45. During DNA replication, _____ pairs with _____.
- adenine; thymine
 - guanine; uracil
 - adenine; cytosine
 - adenine; uracil
 - cytosine; thymine
46. In pea plants, tall plants (T) are dominant to dwarf (t) and yellow seeds (Y) are dominant to green seeds (y). Which of the following genotypes will produce a dwarf yellow seed pea plant?
- TTYy
 - TtYy
 - ttYy
 - ttyy
 - Both c and d are correct.

47. Which of the following is correct, if an atom has 7 protons and 8 neutrons?
- a. The atom's atomic number is 7.
 - b. The atom's atomic weight is 15.
 - c. The atom will have 2 electrons in the first shell.
 - d. The atom will have 5 electrons in the second shell.
 - e. All of the above answers, are correct.
48. Annelids _____.
- a. are segmented worms
 - b. are all terrestrial
 - c. are pseudocoelomates
 - d. have radial symmetry
 - e. Both a and c are correct.
49. Which plants produce seeds?
- a. pine trees
 - b. ferns
 - c. grass
 - d. Only a and c produce seeds.
 - e. All of the above produce seeds.
50. Viruses have _____.
- a. a protein coat
 - b. a nucleic acid core
 - c. a plasma membrane
 - d. Both a and b are correct.
 - e. All of the above answers, are correct.