2018 Academic Challenge

BIOLOGY TEST – SECTIONAL

– This Test Consists of 50 Questions –

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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!

WYSE – Academic Challenge
Biology Test (Sectional) – 2018

1. Under anaerobic conditions, yeast cells produce ____.
   a. CO_2
   b. alcohol
   c. lactic acid
   d. Both a and b are correct.
   e. Both a and c are correct.

2. Enzymatic reactions that result in larger products being produced from smaller molecules can be described as ____.
   a. anabolic
   b. catabolic
   c. hydrolysis
   d. condensation
   e. Both a and d are correct.

3. Given the following information, determine the weight of a mole of glucose - $C_6H_{12}O_6$.

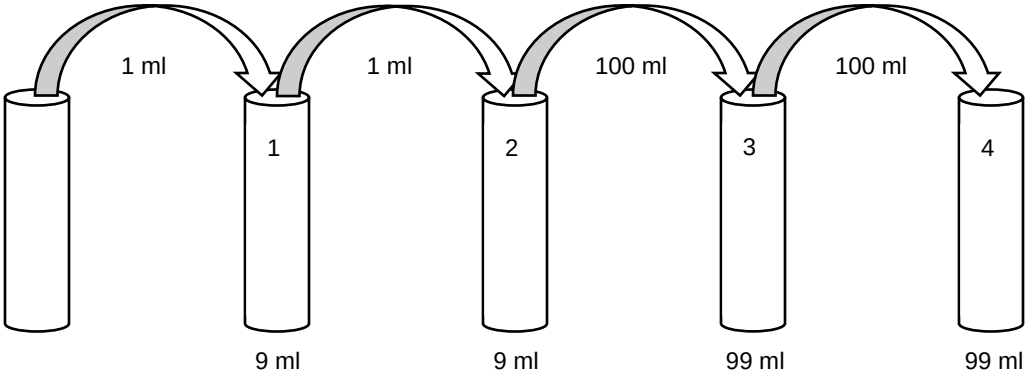
Element	Oxygen	Carbon	Hydrogen
Atomic weight	16	12	1

   a. 29 amu
   b. 29 grams
   c. 100 grams
   d. 180 grams
   e. 180 amu

4. Which of the following is **not** correct?
   a. The levels of organization in order from smallest to most complex include, chemical, cellular, tissues, organs and organ systems.
   b. The taxonomic categories in order from broadest to most specific are, domain, kingdom, family, order, genus and species.
   c. NAD and FAD become reduced, are coenzymes and carry electrons during cellular respiration reactions.
   d. NADP is the coenzyme utilized during photosynthesis in plants.
   e. H_2O is the most abundant inorganic compound in the human body, and the solvent of life.

5. Which best describes a blue jay, blue spruce, dog and ants living in one area?
   a. population
   b. community
   c. ecosystem
   d. biome
   e. None of the above are correct.

6. Determine the dilution for test tube #3.



   a. 10^{2}
   b. 10^{-1}
   c. 10^{-2}
   d. 10^{-3}
   e. 10^{-4}

7. Match the plant structures in **Column A** with their function in **Column B**.

Column A	**Column B**
1. phloem	a. photosynthesis
2. stomata	b. transports carbohydrates
3. leaf mesophyll	c. growth
4. meristematic region	d. gas exchange

Select the correct matching sequence:

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

8. Which is the correct association?
   a. Transposons and jumping genes – Barbara McClintock
   b. Human genome project – Ian Wilmut
   c. Cloning of 1st adult mammal – Francis Collins
   d. Both a and b are correct.
   e. All of the above, are correct.

9. If the carbon atom has an atomic number of 6 and an atomic mass of 12, the isotope carbon 14 would have ____ neutrons.
   a. 4
   b. 6
   c. 8
   d. 10
   e. 12

10. Which of the following is an organic compound?
    a. $C_6H_{12}O_6$
    b. H_2O
    c. CO_2
    d. Both a and b are organic compounds.
    e. All of the above, are organic compounds.

11. Which of the following is true?
    a. Stomata are surrounded by guard cells.
    b. C4 plants thrive in warmer temperatures than C3 plants.
    c. CAM plants fix carbon dioxide at night.
    d. Both a and b are correct.
    e. All of the above, are correct

12. Match the organelle in **Column A** with the correct function in **Column B**.

Column A	**Column B**
1. Chloroplast	a. digestive enzyme
2. Mitochondria	b. cellular respiration
3. Ribosomes	c. protein synthesis
4. Lysosomes	d. photosynthesis

Select the correct matching sequence:

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

13. ____ and glucose are the monosaccharides that make up lactose.
    a. Glucose
    b. Galactose
    c. Maltose
    d. Fructose
    e. None of the above are correct.

14. Which of the following is correct?
    a. Pyruvate gains a carbon dioxide to form acetyl Coenzyme A.
    b. ATP is produced in the citric acid cycle by photophosphorylation.
    c. Rubisco is a carboxylase and an oxidase.
    d. The light – dependent reactions produce ATP by substrate – level phosphorylation.
    e. All of the above, are correct.

15. Which of the following is **not** correct?
    a. DNA ligase seals sticky ends of DNA cut with restriction enzymes in recombinant DNA research.
    b. Plasmids are sometimes found in bacterial cells and can serve as vectors.
    c. PCR amplifies DNA.
    d. Both b and c are correct.
    e. All of the above, are correct.

16. Hydra are found in the kingdom ____.
    a. Plantae
    b. Animalia
    c. Protista
    d. Bacteria
    e. Fungi

17. ____ can be described as water being forced through openings in leaves.
    a. Evaporation
    b. Condensation
    c. Dehydration
    d. Guttation
    e. Precipitation

18. Some trees have modified leaves that form spines and some other plants have modified stems that form thorns. Spines and thorns are ____structures.
    a. homologous
    b. vestigial
    c. homoplastic
    d. heterogeneous
    e. adaptive

19. Which is **not** matched correctly to the cause of the genetic disorder?
    a. Sickle cell anemia – mutation
    b. Phenylketonuria – defective enzyme
    c. Cystic fibrosis – defective transport protein
    d. Huntington's disease – repeating nucleotides
    e. Tay-Sachs – defective transport protein

20. Using the following information determine the amino acid sequence for the following DNA strand.

    TAC AAG CAT TGG CCT

Codon	GUA	UUC	AUG	GGA	ACC
Amino Acid	Val	Phe	Met	Gly	Thr

    a. Val – Thr – Phe – Met – Gly
    b. Met – Phe – Val – Thr – Gly
    c. Met – Gly – Thr – Val – Phe
    d. Phe – Met – Val – Thr – Gly
    e. Gly – Thr – Val – Phe – Met

21. Which is the correct sequence of flower parts from the outside of the bloom to the inside?
    a. petal, sepal, carpal, stamen
    b. sepal, carpal, stamen, petal
    c. petal, stamen, carpal, sepal
    d. sepal, petal, stamen, carpal
    e. stamen, carpal, sepal, petal

22. Which disease is caused by a virus?
    a. lyme disease
    b. anthrax
    c. cholera
    d. rabies
    e. botulism

23. Animals that lay eggs externally are ____.
    a. viviparous
    b. ovoviviparous
    c. oviparous
    d. placental
    e. marsupials

24. Barr bodies are found in ____.
    a. the nuclei of all mammalian males
    b. hemizygous cells
    c. the nuclei of most mammalian females
    d. homozygous genotypes
    e. heterozygous phenotypes

25. Which of the following is **not** a density-independent factor?
    a. a forest fire
    b. a tornado
    c. a flood
    d. killing frost
    e. All of the above, are density-independent factors.

26. The largest and most complex algae are the ____.
    a. brown algae
    b. red algae
    c. green algae
    d. golden algae
    e. diatoms

27. Molecules moving from an area of lower concentration to an area of higher concentration occurs during ____.
    a. diffusion
    b. active transport
    c. passive transport
    d. Both a and c are correct.
    e. None of the above, are correct.

28. When blood sugar levels decrease between meals, ____.
    a. the pancreas will secrete insulin
    b. glucagon will be released
    c. the human body will utilize glycogen reserves from the liver.
    d. Both b and c are correct.
    e. All of the above, are correct.

29. 3D images of human cells can be seen with ____ microscopes.
    a. scanning electron
    b. light
    c. dissecting
    d. transmission electron
    e. None of the above, are correct.

30. (E) is dominant for free earlobes, (e) is recessive for attached earlobes, (R) is dominant for roller and (r) is recessive for non-roller. What will be the genotype of a man that has attached earlobes and can't roll his tongue and a woman that has free earlobes and can roll her tongue, if they have a child that has attached earlobes that can't roll their tongue?
    a. Man = EeRr; Woman = eerr
    b. Man = eeRr; Woman = eeRr
    c. Man = EERe; Woman = Eerr
    d. Man = eerr, Woman = EeRr
    e. None of the above, are correct.

31. ____ is the strongest or hardest substance in the human body.
    a. Collagen
    b. Melanin
    c. Enamel
    d. Bone
    e. Keratin

32. Match the atom combinations in **Column A** with the correct product that could be produced from **Column B**.

Column A	**Column B**
1. Na and Cl	a. sugar
2. C, H, and O	b. water
3. H and O	c. acetone
4. C and O	d. dry ice
	e. alcohol
	f. table salt

Select the correct matching sequence:

a. 1 – d, e	2 – f, a	3 – b	4 – c
b. 1 – e	2 – d, c	3 – f	4 – a, b
c. 1 – f	2 – a, c, e	3 – b	4 – d
d. 1 – f	2 – a, d	3 – b, e	4 – c
e. 1 – d, f	2 – a	3 – b, e	4 – c

33. Which of the following is **not** correct?
    a. DNA contains a 5-carbon sugar called deoxyribose and is helical in shape.
    b. RNA contains nitrogenous bases, guanine, cytosine, and thymine.
    c. Rosalind Franklin discovered the helical shape of RNA with x-ray diffraction techniques.
    d. Both a and b are correct.
    e. Both b and c are correct.

34. Which of the following is **not** true?
    a. *Paramecium* have both micronuclei and macronuclei.
    b. *Volvox* are colonial organisms that may contain multiple daughter colonies.
    c. Fresh water *Amoeba* can enter human nostrils and cause death.
    d. *Euglena* have flagella and chloroplasts.
    e. All of the above, are true.

35. Which of the following is **not** matched correctly?
    a. metaphase – chromatids lined up at the equator of the cell.
    b. light-dependent reactions – thylakoid
    c. meiosis I – reduction division
    d. anaphase II – sister chromatids separate
    e. prophase II – crossing-over occurs

36. Which animal is **not** correctly matched to its phylum?
    a. sponges – Porifera
    b. insects – Arthropoda
    c. snail – Mollusca
    d. sea Cucumber – Cnidaria
    e. sea Squirt – Chordata

37. *Aedes aegypti* is a vector for ____.
    a. West Nile disease
    b. Yellow fever
    c. Zika virus
    d. Dengue fever
    e. All of the above, except a, are correct.

38. Which of the following is correct?
    a. Entropy is a measure of disorder.
    b. During energy transformations, some energy, is released as heat.
    c. An educated guess that can be tested is called a theory.
    d. Both a and b are correct.
    e. Both b and c are correct.

39. Which of the following is the least common element in the human body?
    a. carbon
    b. potassium
    c. nitrogen
    d. oxygen
    e. hydrogen

40. Many hyphae tangled together are called a/an____.
    a. lichen
    b. archegonia
    c. mycorrhizae
    d. antheridium
    e. mycelium

41. The bubbles produced when opening a can of soda are a result of _____ escaping from the liquid.
    a. oxygen
    b. carbon dioxide
    c. H_2O
    d. Both a and c are correct.
    e. None of the above, are correct.

42. Which of the following is correct?
    a. DNA is electronegative and will migrate toward the positive end of a gel.
    b. Larger fragments of DNA will travel the farther than smaller DNA fragments during gel electrophoresis.
    c. Gel electrophoresis separates molecules according to both size and charge.
    d. Both a and c are correct.
    e. All of the above, are correct.

43. Viruses ____.
    a. have a capsid
    b. have both DNA and RNA
    c. require a cell in order to reproduce
    d. Both a and b are correct.
    e. Both a and c are correct.

44. Which of the following is **not** a cell signaling process?
    a. reception
    b. signal transmission
    c. signal transduction
    d. adhering junction
    e. response

45. Which of the following is correct?
    a. Humans have a buffer in their blood that helps maintain its pH between 7.35 and 7.45.
    b. Buffers can only release hydrogen ions in response to changing pH.
    c. A solution with a pH of 7 is 30 times more alkaline that a solution with a pH of 4.
    d. Both a and c are correct.
    e. All of the above, are correct

46. What is a difference between Domain Bacteria and Domain Archaea?
    a. Domain Bacteria have ester linkage in their plasma membrane and Domain Archaea have ether linkage in their plasma membrane.
    b. Domain Bacteria are all single celled and Domain Archaea can be single or multicellular.
    c. Domain Bacteria have cell walls and Domain Archaea do not have cell walls.
    d. Domain Bacteria are prokaryotes and Domain Archaea are eukaryotes.
    e. Domain Bacteria may have a plasmid and Domain Archaea do not possess plasmids.

47. The gametangia in plants that produce sperm cells is the ____.
    a. ovary
    b. antheridia
    c. archegonia
    d. protonema
    e. None of the above, are correct.

48. In Mendel's experiments the P generation were ____.
    a. true breeding
    b. homozygous for their characteristics
    c. the parents of the first filial generation
    d. the parents of the F1 generation
    e. All of the above, are correct.

49. Using the Hardy – Weinberg Principle, determine the value of p, if the frequency of aa – is 0.09
    a. 0.91
    b. 0.81
    c. 0.7
    d. 0.49
    e. 0.42

50. Meiosis occurs in ____.
    a. the anther of flowering plants
    b. the testes of males
    c. human ovaries
    d. Both a and c are correct.
    e. All of the above, are correct.