2012 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. 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!

WYSE – Academic Challenge
Biology Test (Regional) – 2012

1. Match the organism in **Column A** with the means of reproduction from Column **B**.

Column A	**Column B**
1. Frogs	i. Internal fertilization
2. Humans	ii. External fertilization
3. Bacteria	iii. Double fertilization
4. Plants	iv. Binary Fission

Select the correct matching sequence.

a.	1-iv	2-ii	3-iii	4-i
b.	1-iii	2-i	3-iv	4-ii
c.	1-ii	2-i	3-iii	4-iv
d.	1-ii	2-i	3-iv	4-iii
e.	1-i	2-iv	3-iii	4-ii

2. How many autosomes would a normal human gamete contain?

a. 20 b. 21 c. 22 d. 23 e. 45

3. Match the events in **Column A** with the proper stage in **Column B**.

Column A	**Column B**
1. DNA synthesis and replication	i. metaphase
2. Chromatids move to opposite poles	ii. telophase
3. Chromosomes line up on equator	iii. interphase
4. Cytokinesis completes	iv. anaphase

Select the correct matching sequence.

a.	1-iv	2-ii	3-iii	4-i
b.	1-iii	2-i	3-iv	4-ii
c.	1-ii	2-i	3-iii	4-iv
d.	1-ii	2-i	3-iv	4-iii
e.	None of the above			

4. Which of the following is **not** a sex linked trait or X-linked trait?

a. Hemophilia
b. albinism
c. Trisomy 21
d. Duchenne muscular dystrophy
e. Both b and c

5. Which of the following is a monosaccharide?

a. lactose b. maltose c. fructose d. glucose e. both c and d

6. CO_2, ATP, and H_2O are all products of ____.

   a. transpiration
   b. cellular respiration
   c. fermentation
   d. photosynthesis
   e. none of the above

7. Match the definition in **Column A** with the proper substance in **Column B**.

Column A	**Column B**
1. most abundant monosaccharide in the human body	i. collagen
2. strong structural protein of bone	ii. chitin
3. waterproofing protein	iii. glucose
4. exoskeleton of insects	iv. keratin

   Select the correct matching sequence.

   a. 1-iv 2-ii 3-iii 4-i
   b. 1-iii 2-i 3-iv 4-ii
   c. 1-ii 2-i 3-iii 4-iv
   d. 1-ii 2-i 3-iv 4-iii
   e. none of the above

8. Which is **not** a step in the process of cellular respiration?

   a. cyclic pathway
   b. Krebs cycle or citric acid cycle
   c. Calvin Benson cycle
   d. oxidative phosphorylation
   e. both a and c

9. Which of the following statements is true?

   a. C_3 plants are adapted to dry arid climates.
   b. CAM plants fix CO_2 only during the day.
   c. Cacti are C_4 plants.
   d. Corn is neither a C_3 nor CAM plant.
   e. Plants are the only organisms that can perform photosynthesis.

10. Bird beaks are different. The differences depend on what the bird eats. The beaks are considered to be a/an ____.

    a. adaption
    b. homeostasis
    c. response to stimuli
    d. pinocytosis
    e. ornithologist

11. ____ is the ultimate source of energy for living organisms and ____ is the cellular form of energy produced by cellular respiration.

    a. Sun; $FADH_2$
    b. ATP; NAPH
    c. Sun; NADH
    d. ATP; cyclic AMP
    e. None of the above

12. Which of the following is true?

    a. Phospholipids are hydrophobic on one end and hydrophilic on the other end.
    b. Polar molecules are hydrophilic.
    c. Hydrogen bonds form between water molecules.
    d. Both a and c are true.
    e. All of the above are true.

13. Maintaining a relatively stable internal environment is defined as ____, and may be accomplished through ____.

    a. metabolism; cellular respiration
    b. homeostasis; negative feedback mechanisms
    c. homeostasis; negative and positive feedback mechanisms
    d. positive feedback mechanisms; homeostasis
    e. hemostasis; negative feedback mechanisms

14. In the human heart, the superior vena cava empties blood low in oxygen into the ____.

    a. right atrium
    b. left atrium
    c. right ventricle
    d. left ventricle
    e. aorta

15. If a phenotype expresses more than one type of allele, such as in AB blood type, this is best described as ____.

    a. epistasis
    b. pleiotropy
    c. codominance
    d. incomplete dominance
    e. complete dominance

16. According to Mendel's genetics, the F1 generation offspring are ____.

    a. 100% homozygous
    b. 100% heterozygous
    c. 75% heterozygous and 25% homozygous
    d. 25% heterozygous and 75% homozygous
    e. none of the above

17. The backbone of DNA is composed of ____ and ____.

    a. deoxyribose and nitrogenous base
    b. nitrogenous base and phosphate
    c. adenine and thymine
    d. phosphate and deoxyribose
    e. guanine and cytosine

18. Carbon has six protons and six neutrons in its nucleus. Which of the following statements is correct?

    a. Carbon would have six valence shell electrons.
    b. Carbon has an atomic number of six.
    c. Carbon has an atomic number of twelve.
    d. Carbon only forms single bonds with other carbon atoms.
    e. Both a and b are correct.

19. Which of the following is **not** a characteristic of all living things?

    a. All organisms are made up of cells.
    b. All organisms must be able to reproduce.
    c. All organisms respond to stimuli.
    d. All organisms have a nucleus.
    e. All organisms need an energy source.

20. Match the products in **Column A** with the organism that would produce it in **Column B**.

Column A	**Column B**
1. silk	i. seed of the cacao tree
2. honey	ii. pine trees
3. resin	iii. bees
4. chocolate	iv. silkworms

    Select the correct matching sequence.

a.	1-iv	2-iii	3-ii	4-i
b.	1-iii	2-i	3-iv	4-ii
c.	1-ii	2-i	3-iii	4-iv
d.	1-iv	2-i	3-ii	4-iii
e.	1-iii	2-iv	3-i	4-ii

21. Which organism is **not** in Domain Eukarya?

    a. mold
    b. oak tree
    c. *Staphylococcus aureus*
    d. *Amoeba*
    e. wolf

22. Which cell part is **not** correctly matched with its function?

    a. mitochondria – make ATP
    b. lysosome – make spindles
    c. ribosome – protein synthesis
    d. chloroplast – photosynthesis
    e. cytoskeleton – shape and movement of the cell

23. mRNA is transcribed ____.

    a. at the ribosome
    b. in the nucleus
    c. at the endoplasmic reticulum
    d. in the lysosome
    e. at the Golgi complex

24. Which of the following animals is a Primate?

    a. dog
    b. bear
    c. human
    d. chimpanzee
    e. both c and d

25. Which of the following is the scientist closely associated with the first cloning of an adult mammal?

    a. Alfred Wallace
    b. Ian Wilmut
    c. Thomas Morgan
    d. Francis Crick
    e. Francis Collins

26. An omnivore would ____.

    a. eat plants
    b. eat both plants and animals
    c. break down leaf litter
    d. recycle nitrogen in the soil
    e. live inside the gut of a termite

27. An automobile manufacturing company is going to test different brands of motor oil and record their effects on the longevity of engines. Which of the following is true?

    a. The different brands of oil would be the independent variable.
    b. The experimental variable would be the different brands of oil.
    c. The dependent variable would be the effects on engine longevity.
    d. both a and c
    e. all of the above

28. In Giant City Park, the soil, trees, and animals are all part of a/an ____.

    a. ecosystem
    b. population
    c. community
    d. species
    e. none of the above

29. If Joe was going to ride his bicycle up a large hill and then coast down the other side, which of the following is true?

    a. His climb to the top would be analogous to activation energy.
    b. When he arrives to the top, his potential energy can be converted to kinetic energy on the way down.
    c. Depending on the energy required to get to the top of the hill, his muscles may produce lactic acid as oxygen debt may occur.
    d. b and c
    e. all of the above

30. Which of the following is true?

    a. According to research, a single base pair change is responsible for the difference between normal hemoglobin and sickle cell disease.
    b. Bioluminescent algae glows and would be found in the Kingdom Protista.
    c. Some algae, bacteria, and plants are able to photosynthesize.
    d. both b and c
    e. all of the above

31. Which is **not** true?

    a. PCR and RFLP are useful in DNA research or forensics.
    b. Recombinant DNA has been changed and contains DNA from only one species.
    c. Plasmids can be used in DNA research as a vector and are sometimes found in bacterial cells.
    d. DNA ligase seals the sticky ends of DNA, while restriction enzymes cleave DNA.
    e. *E. coli* have been genetically engineered to produce human insulin, which is useful for individuals with diabetes.

32. Ferns ____.

    a. are vascular plants
    b. produce seeds
    c. dominant generation is the gametophyte generation
    d. both a and b
    e. all of the above

33. All of the following animals are in Phylum ____: hydra, jelly fish, sea anemones, and coral.

    a. Platyhelminthes
    b. Ctenophora
    c. Cnidaria
    d. Hydrozoa
    e. Poriferia

34. A different form of an element is a/an ____.

    a. isomer
    b. ion
    c. amphipathic
    d. isotope
    e. molecule

35. In plants, the meristematic tissue is ____.

    a. responsible for water movement
    b. responsible for plant growth
    c. responsible for gas exchange in the leaf
    d. needed for support
    e. responsible for getting minerals to the leaves

36. DNA and RNA are examples of ____.

    a. proteins
    b. amino acids
    c. nucleic acids
    d. lipids
    e. carbohydrates

37. Which of the following would have the highest hydrogen ion concentration?

    a. pH 2 b. pH 5 c. pH 7 d. pH 8 e. pH 14

38. Which characteristic is **not** matched with the Phylum in which it is associated?

    a. Nematocyst – Cnidarians
    b. Ostia – Porifera
    c. Notochord – Chordata
    d. Water vascular system – Echniodermata
    e. Tegument – Annelida

39. Grapes, tomatoes, and avocados are all examples of ____.

    a. hesperidiums
    b. legumes
    c. drupes
    d. berries
    e. pomes

40. What would be the total magnification of a microscope if the ocular has a magnification of 15x and the objective lens has the magnification of 10x?

    a. 25x b. 100x c. 150x d. 225x e. 625x

41. The nephron is the functional unit of the ____.

    a. kidney
    b. brain
    c. intestine
    d. pancreas
    e. muscle

42. The first shell can hold ____ electrons and the second shell can hold ____ electrons.

    a. 16 and 32
    b. 8 and 16
    c. 8 and 2
    d. 2 and 8
    e. 2 and 4

43. If a blood cell was placed in an isotonic solution, it would ____.

    a. shrink
    b. burst
    c. cause greater turgor pressure
    d. remain the same size
    e. There is not enough information to determine what would happen.

44. Natural selection ____.

    a. is a mechanism for evolution
    b. is the process that breeders use to get larger farm animals
    c. is the same as genetic drift
    d. only relies on mutations
    e. both a and b are correct

45. Bacteria are very important for the ____.

    a. phosphorous cycle
    b. nitrogen cycle
    c. hydrologic cycle
    d. carbon dioxide cycle
    e. none of these

46. Plants need ____ for photosynthesis.

    a. cell walls
    b. ribosomes
    c. chlorophyll
    d. lignin
    e. cellulose

47. Which is **not** a characteristic of sharks?

    a. placoid scales
    b. gill slits
    c. operculum
    d. fins
    e. All are characteristics of sharks.

48. PCR is a way to ____.

    a. purify and refresh water
    b. amplify DNA
    c. take wastes out of blood
    d. separate DNA by size and charge
    e. add nutrients to soil

49. In pea plants, round seeds (R) are dominant to wrinkled seeds (r). If a heterozygote is crossed with a wrinkled seed plant the offspring could produce ____.

    a. only round seed
    b. only wrinkled seed
    c. both round seeds and wrinkled seeds
    d. seeds that are half round and half wrinkled
    e. Not enough information to determine the type of seeds produced.

50. Which of the following is a name of an enzyme?

    a. lipase
    b. sucrose
    c. sterol
    d. amylose
    e. albumin