



2005 Academic Challenge

BIOLOGY TEST - SECTIONAL





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. Some Academic Challenge test sites may use answer sheets that require you to fill in the letter of the answer you choose on the blank line after each question number. Others 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 as  ,  ,  , etc.

Test Question - 1. Which of the following was formed by the New Madrid Earthquakes of 1811-1812?

- a. Lake of the Ozarks (MO)
- b. Little Grassy Lake (IL)
- c. Kentucky Lake (KY)
- d. Reelfoot Lake (TN)
- e. Crater Lake (OR)

Answer Sheet - 1. A B C E

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 are too difficult for you. Go on to the other questions and come back to the difficult ones later if you can.

***** 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) – 2005

1. Concentric rings, Haversian canals, canaliculi, and lacunae are all characteristic of which type of tissue?
 - a. bone
 - b. cartilage
 - c. muscle
 - d. blood
 - e. adipose
2. Which is correct?
 - a. DNA’s two sugar phosphate backbones run in opposite directions.
 - b. DNA is double stranded and helical in shape.
 - c. The bases of DNA are adenine, guanine, thymine, and cytosine.
 - d. Both b and c are correct.
 - e. All of the above are correct.
3. Match the temperature regulation mechanisms from **Column A** with the correct organisms in **Column B**.

Column A

1. ectotherms
2. endotherms

Column B

- i. lizards
- ii. mammals
- iii. snakes
- iv. birds
- v. turtles

Select the most appropriate matching sequence :

- a. 1 – ii, iii, v; 2 – i, iv, v
 - b. 1 – i, iii, v; 2 – ii, iv
 - c. 1 – iii, iv; 2 – i, ii, v
 - d. 1 – iv, v; 2 – i, ii, iii
 - e. 1 – ii, iv, v; 2 – i, iii
4. ____ primarily move with the aid of tiny hair like projections called cilia, where as ____ primarily propel themselves with the aid of long whip like flagella.
 - a. Pseudopods; *Euglena*
 - b. *Paramecium*; *Euglena*
 - c. *Euglena*; *Paramecium*
 - d. *Euglena*; Pseudopods
 - e. *Amoeba*; *Paramecium*

5. The tibia is to the fibula, as the radius is to the ____.
- tarsal
 - femur
 - patella
 - ulna
 - humerus
6. A/an ____ includes all the organisms and their environment, both living and nonliving, within which they naturally occur.
- ecosystem
 - population
 - biotic hemisphere
 - community
 - species
7. Which would **not** be considered an antipredator defense?
- Batsian mimicry
 - concealment or camouflage
 - warning coloration
 - stalking
 - keeping in groups or flocks
8. Match the term in **Column A** with the most correct description in **Column B**.

Column A**Column B**

- | | |
|--------------|------------------------------|
| 1. anion | i. loss of an electron |
| 2. reduction | ii. gain of an electron |
| 3. cation | iii. positively charged atom |
| 4. oxidation | iv. negatively charged atom |

Select the most appropriate matching sequence:

- 1 – i; 2 – iii; 3 – ii; 4 – iv
 - 1 – iv; 2 – ii; 3 – iii; 4 – i
 - 1 – ii; 2 – iii; 3 – iv; 4 – i
 - 1 – iii; 2 – iv; 3 – i; 4 – ii
 - 1 – i; 2 – ii; 3 – iii; 4 – iv
9. A common exit chamber for the digestive, urinary, and reproductive systems of birds is called the ____.
- amniotic egg
 - gizzard
 - cloaca
 - crop
 - gut

10. A carbon atom has 6 protons, and a radioactive isotope of carbon has 8 neutrons. For this radioactive form of carbon, its atomic number is ____ and its atomic mass is ____.

- a. 8; 14
- b. 6; 14
- c. 14; 8
- d. 2; 8
- e. 6; 12

11. Which statement is true concerning the fall overturn of lakes?

- a. The fall overturn continues until the temperature is uniform throughout the lake.
- b. The fall overturn occurs because the epilimnion cools, becoming colder than the hypolimnion.
- c. The fall overturn occurs allowing the nutrients and oxygen to mix throughout the lake.
- d. Wind is important for the fall overturn.
- e. All of the above are true statements concerning the fall overturn of lakes.

12. Match the classes of mollusks in **Column A** with organism examples from **Column B**.

Column A

- 1. bivalves
- 2. gastropods
- 3. cephalopods

Column B

- i. squid
- ii. oysters
- iii. octopods
- iv. clams and scallops
- v. snails and slugs

Select the correct answer:

- a. 1 – v; 2 – ii, iii; 3 – i, iv
- b. 1 – i, iv; 2 – iii; 3 – ii, v
- c. 1 – ii, iv; 2 – v; 3 – i, iii
- d. 1 – v; 2 – i, iii; 3 – ii, iv
- e. 1 – i, iii; 2 – iv; 3 – ii, v

13. While considering pH, ____ donate hydrogen ions, ____ accept hydrogen ions, and ____ have the ability to do both of the previously mentioned activities.

- a. buffers; bases; acids
- b. acids; buffers; bases
- c. acids; bases; buffers
- d. bases; acids; buffers
- e. bases; buffers; acids

14. Match the classes of flatworms in **Column A** with their correct association in **Column B**.

Column A

1. trematoda
2. cestoda
3. turbellaria

Column B

- i. free living flatworms
- ii. flukes
- iii. tapeworms

Select the most appropriate matching sequence:

- a. 1 – iii; 2 – ii; 3 – i
 - b. 1 – i; 2 – ii; 3 – iii
 - c. 1 – ii; 2 – iii; 3 – i
 - d. 1 – i; 2 – iii; 3 – ii
 - e. 1 – iii; 2 – i; 3 – ii
15. Which of the following is **not** a characteristic or descriptive property of water?
- a. Molecules of H₂O spread out and crystallize upon freezing.
 - b. The liquid form of water is less dense than the frozen form.
 - c. Water can exist as liquid, gas, or solid.
 - d. Water is the solvent of life.
 - e. Water does not readily change from one form to another.
16. In building the larger organic molecules of life, _____ are to amino acids, as _____ are to nitrogenous bases of DNA.
- a. covalent bonds; ionic bonds
 - b. ionic bonds; nonpolar covalent bonds
 - c. hydrogen bonds; ionic bonds
 - d. covalent bonds; peptide bonds
 - e. peptide bonds; hydrogen bonds
17. In guinea pigs, H is dominant for straight hair and h is recessive for curly hair. What would be the genotypes of a straight haired guinea pig and curly haired guinea pig that produced curly haired offspring?
- a. Hh X hh
 - b. Hh X Hh
 - c. HH X hh
 - d. HH X Hh
 - e. There is not enough information provided to answer the question.
18. What would be the formula of a monosaccharide that has three oxygen atoms?
- a. O₃
 - b. H₃O₃
 - c. CO₃
 - d. C₆H₃O₃
 - e. C₃H₆O₃

19. Condensation or dehydration synthesis joins one glucose molecule and one galactose molecule to form ____.
- maltose
 - lactose
 - sucrose
 - fructose
 - starch
20. A deficiency in the trace element, ____, may prevent the normal functioning of the thyroid gland. Excess or too little of this particular element may result in an abnormal enlargement called a goiter. This particular element has also been added to table salt, which has helped reduce the incidence of goiter development from a diet deficient of this element.
- selenium
 - zinc
 - phosphorus
 - magnesium
 - iodine
21. Which structure is **not** found in both fungi and plants?
- nucleus
 - vacuole
 - centriole
 - cell wall
 - cytoskeleton
22. Which is **not** a characteristic or anatomical structure of a crayfish?
- closed circulatory system
 - cheliped and maxilliped
 - carapace
 - stalked eyes
 - both b and c
23. Which is true of cellular respiration?
- Most ATP is produced during the Krebs cycle or citric acid cycle.
 - Carbon dioxide is generated during both the Krebs cycle or citric acid cycle and the formation of Acetyl CoA.
 - NAD⁺ and FAD⁺ are important coenzymes of cellular respiration.
 - Both b and c are true.
 - None of the above statements are true.
24. To which domain do *Homo sapiens* belong?
- Archaea
 - Animalia
 - Bacteria
 - Eukarya
 - none of the above

25. Suzy planted three different types of flowers. The first flower (A) will come back and bloom again next season. The second flower (B) will die off and not return. The third flower (C) will not bloom until its second season. Which of the following statements is most likely true?
- Her first flower (A) is an annual, second flower (B) is a perennial, and the third flower (C) is a biennial.
 - Her first flower (A) is a perennial, second flower (B) is an annual, and the third flower (C) is a biennial.
 - Her first flower (A) is a biennial, second flower (B) is a perennial, and the third flower (C) is an annual.
 - All Suzy's flowers are most likely biennial.
 - All Suzy's flowers are most likely annuals.
26. Which scientist made contributions to the study of inheritance?
- Thomas Hunt Morgan
 - Gregor Mendel
 - Walter Sutton
 - both a and b
 - all of the above
27. In most organisms the ____ pattern is produced directly from the ____.
- tRNA; DNA
 - DNA; mRNA
 - mRNA; DNA
 - mRNA; tRNA
 - DNA; tRNA
28. Special proteins called ____ wind or pack DNA into small spools or bundles called nucleosomes.
- polymerases
 - ligases
 - histones
 - cyclins
 - none of the above
29. Jellyfish have ____ and earthworms have ____.
- bilateral symmetry; radial symmetry
 - radial symmetry; asymmetry
 - bilateral symmetry; biradial symmetry
 - radial symmetry; bilateral symmetry
 - asymmetry; biradial symmetry
30. CAM plants release ____ to the Calvin cycle during the ____.
- carbon dioxide; night
 - oxygen; night
 - oxygen; day
 - carbon dioxide; day
 - water; day

31. What normally occurs during double fertilization in flowering plants?
- a. one sperm fertilizes the egg and the other joins with the polar nuclei
 - b. two sperm fertilize two eggs simultaneously
 - c. one sperm fertilizes the stigma and the other fertilizes the ovules
 - d. one sperm forms the pollen tube and the other fertilizes the egg
 - e. one sperm fertilizes the fruit and the other joins with the polar nuclei
32. In plants the diploid generation is called the _____.
- a. sporophyte
 - b. gametophyte
 - c. pollen
 - d. microspore
 - e. ovules
33. _____ photosynthesize like plants.
- a. Archaea
 - b. Ciliates
 - c. Cyanobacteria
 - d. Protozoans
 - e. Prions
34. Under normal circumstances, which of the following does **not** occur during meiosis I?
- a. homologous chromosomes separate
 - b. four haploid cells are produced
 - c. crossing-over
 - d. chromatids separate and migrate to opposite poles
 - e. both b and d
35. Which is **not** a product of genetic engineering?
- a. penicillin
 - b. human insulin
 - c. human growth hormone
 - d. interferon
 - e. Factor VIII

36. An exoskeleton and jointed limbs are characteristic of ____.

- a. arthropods
- b. nematodes
- c. polychaetes
- d. mollusks
- e. ctenophores

37. Match the cell organelles in **Column A** with their functions in **Column B**.

Column A

- 1. ribosomes
- 2. mitochondria
- 3. chloroplasts
- 4. lysosomes
- 5. vesicles

Column B

- i. photosynthesis
- ii. storage of materials
- iii. protein synthesis
- iv. cellular respiration
- v. intracellular digestion

Select the most appropriate matching sequence:

- a. 1 – i; 2 – ii; 3 – iii; 4 – iv; 5 – v
- b. 1 – iii; 2 – iv; 3 – i; 4 – ii; 5 – v
- c. 1 – iv; 2 – iii; 3 – i; 4 – v; 5 – ii
- d. 1 – iii; 2 – v; 3 – i; 4 – iv; 5 – ii
- e. 1 – iii; 2 – iv; 3 – i; 4 – v; 5 – ii

38. Mitosis is to ____ cells, as meiosis is to ____.

- a. germ; somatic
- b. gametes; somatic
- c. somatic; triploid
- d. somatic; gametes
- e. haploid; germ

39. In eukaryotes, the Krebs cycle or citric acid cycle occurs in the ____.

- a. cristae of the mitochondrion
- b. matrix of the mitochondrion
- c. intermembrane space of the mitochondrion
- d. cytoplasmic membranes
- e. plasma membrane

40. Use the information below in order to determine the phenotypes that would be coded for in the Punnett square, as indicated by the numbers **1**, **2**, and **3**.

R – round seeds
G – yellow seeds

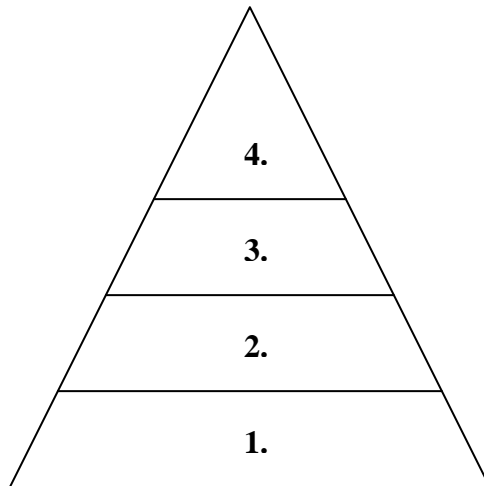
r – wrinkled seeds
g – green seeds

	RG	Rg	rG	rg
RG				
Rg		1.		
rG			2.	
rg				3.

Select the most appropriate answer:

- a. 1 – round and green; 2 – wrinkled and green; 3 – wrinkled and yellow
 b. 1 – round and green; 2 – wrinkled and yellow; 3 – wrinkled and green
 c. 1 – wrinkled and green; 2 – round and yellow; 3 – round and green
 d. 1 – round and yellow; 2 – wrinkled and green; 3 – round and green
 e. 1 – wrinkled and green; 2 – round and yellow; 3 – wrinkled and yellow
41. Hindlimb bones in pythons, human wisdom teeth, the human appendix, and pig's toes that do not touch the ground are considered ____.
- a. convergent evolutionary structures
 b. divergent evolutionary structures
 c. vestigial structures
 d. homoplastic features
 e. homologous features
42. What possible gametes would normally be produced if an individual has the genotype, **TtRrYY**?
- a. Tt; Rr; YY
 b. TR; Tr; RY; rY
 c. TRY; TrY; tRY; trY
 d. TRY; TRY; Try; Try; tRY; try
 e. TrY; TtY; TRY; TRr

43. Place the terms where they belong in the ecological pyramid.



Select the correct answer:

- a. 1 – Herbivores; 2 – Primary consumers; 3 – Carnivores; 4 – Top carnivores
- b. 1 – Herbivores; 2 – Producers; 3 – Carnivores; 4 – Top carnivores
- c. 1 – Producers; 2 – Herbivores; 3 – Carnivores; 4 – Top carnivores
- d. 1 – Herbivores; 2 – Primary consumers; 3 – Top carnivores; 4 – Carnivores
- e. 1 – Producers; 2 – Secondary consumers; 3 – Carnivores; 4 – Top carnivores

44. The study of insects is called _____.

- a. entomology
- b. herpetology
- c. ornithology
- d. ichthyology
- e. none of the above

45. Which statement is correct?

- a. Apoptosis is programmed cell death.
- b. Mitosis is most similar to the first division in meiosis.
- c. Meiosis produces four haploid cells.
- d. Both a and c are correct.
- e. All of the above are correct.

46. The oxygen released by plants during photosynthesis comes from _____.

- a. H_2O
- b. CO
- c. CO_2
- d. $C_6H_{12}O_6$
- e. $NADPH_2$

47. Using the following information, determine the genotypes of normal parents that produce a child with PKU.

A – normal; **a** – PKU

The genotypes of the mother and father would be _____ and _____.

- a. mother AA; father Aa
- b. mother Aa; father aa
- c. mother Aa; father AA
- d. mother Aa; father Aa
- e. mother aa; father aa

48. Which statement is true?

- a. Cytokinesis is completed during anaphase.
- b. Chromosomes line up on the equator in metaphase.
- c. Cleavage furrows are associated with animal cells.
- d. DNA synthesis takes place during anaphase.
- e. Both statements b and c are correct.

49. What would the correct mRNA sequence be for the DNA sequence, **ATCAGCTAC**?

- a. TAGTCGATG
- b. ATGACGTAC
- c. UAGUCGAUG
- d. AUCAGCUAC
- e. UACUGCAUC

50. Which of the following dihybrid crosses would produce a 1:1:1:1 phenotypic ratio?

- a. RrSs X RRSS
- b. RrSs X RrSs
- c. RRSS X rrss
- d. RrSs X rrss
- e. none of the above