

# 2014 Academic Challenge

## BIOLOGY TEST - SECTIONAL

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!**

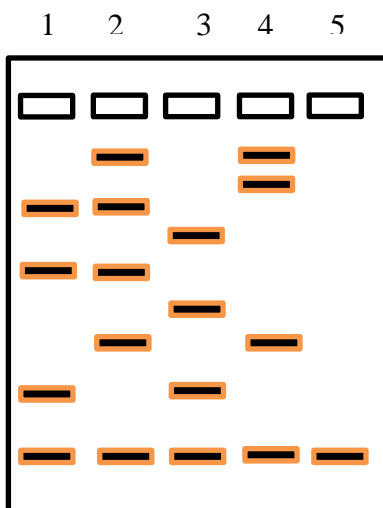
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WYSE – Academic Challenge  
Biology Test (Sectional) – 2014

1. RFLP stands for \_\_\_\_\_.
  - a. Reading Frame Light Program
  - b. Restrictive Fragment Light Program
  - c. Restriction Fragment Length Polymorphism
  - d. Real Fast Light Pigments
  - e. None of the above are correct.
  
2. Which of the following is true?
  - a. Hemoglobin transports oxygen in white blood cells.
  - b. Hemoglobin does not have a stronger affinity for carbon monoxide than oxygen.
  - c. Erythropoietin is secreted by the kidneys in response to a decrease in oxygen levels.
  - d. Hemostasis is not an important process.
  - e. Both b and c are true.
  
3. Which of the following statements is **not** true?
  - a. T cells and B cells are also known as lymphocytes.
  - b. Neutrophils are the most numerous of white blood cells.
  - c. Basophils do not increase in number during allergic reactions.
  - d. Eosinophils decrease in number during allergic reactions.
  - e. Both c and d are not true.
  
4. Which of the following statements is false?
  - a. While using the light microscope, as one increases magnification, then the object will be seen in greater detail.
  - b. If the eyepiece is 10X and the objective lens is 40X, total magnification would be 400 times the specimen's original size.
  - c. When using the microscope, as you increase magnification, the depth of focus increases.
  - d. It is easiest to locate specimens using the lowest magnification of a microscope.
  - e. Both c and d are false.
  
5. The trees, rocks, shrubs, and animals within an area would comprise a/an?
  - a. Community
  - b. Population
  - c. Ecosystem
  - d. Species
  - e. Genus
  
6. Which of the following is laboratory equipment that is used for loading samples into wells for gel electrophoresis?
  - a. Vortex
  - b. Thermocycler
  - c. Eppendorf tubes
  - d. 1XTBE
  - e. Pipet

7. Using the figure of the gel below, determine who the child's father is. Sample one is mom's DNA, sample 2 is the child's DNA, sample 3 is possible father one's DNA, sample 4 is possible father two's DNA, and sample 5 is a dye marker molecule.



- Select the DNA sample that represents the father of the child in this experiment.
- Sample 1
  - Sample 2
  - Sample 3
  - Sample 4
  - Not enough information is provided to answer the question.
8. Cow birds put their eggs into another species nest. The cow birds are larger than the other birds that hatch. This is referred to as \_\_\_\_.
- commensalism
  - predation
  - mutualism
  - social parasitism
  - decomposition
9. Match the events in **Column A** with the osmotic pressures in **Column B**.

**Column A**

- cells shrink
- cells remain the same
- cells swell
- more solute outside the cell than inside
- cell may burst

**Column B**

- isotonic
- hypertonic
- hypotonic

**Select the correct matching sequence.**

- 1-c    2-a,b    3-a    4-c    5-a
- 1-a    2-c    3-c    4-a    5-b
- 1-b    2-a    3-c    4-b    5-c
- 1-c    2-a    3-b    4-b    5-b
- None of the above

10. Match the organelle in **Column A** with the most appropriate processes from **Column B**.

**Column A**

1. Endoplasmic reticulum
2. Mitochondrion
3. Lysosomes
4. Golgi apparatus
5. Nucleus
6. Ribosomes

**Column B**

- a. synthesis
- b. packaging
- c. instructions
- d. transport
- e. recycle

**Select the correct matching sequence.**

- |          |     |     |       |     |     |
|----------|-----|-----|-------|-----|-----|
| a. 1-a,d | 2-a | 3-e | 4-d   | 5-c | 6-a |
| b. 1-b   | 2-c | 3-a | 4-d   | 5-c | 6-e |
| c. 1-a,d | 2-a | 3-a | 4-b   | 5-c | 6-b |
| d. 1-a,d | 2-a | 3-e | 4-b,d | 5-c | 6-a |
| e. 1-a,b | 2-a | 3-a | 4-d   | 5-c | 6-e |

11. A person with Trisomy 21 would have which of the following?
- a. 45 chromosomes
  - b. Down's syndrome
  - c. an extra 21<sup>st</sup> chromosome
  - d. both b and c
  - e. all the above
12. C<sub>4</sub> plants use \_\_\_\_ cell(s) for photosynthesis.
- a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
13. Allele frequencies remain the same if \_\_\_\_.
- a. Hardy-Weinberg conditions are met
  - b. natural selection occurs
  - c. artificial selection occurs
  - d. genetic drift occurs
  - e. All of the above are correct.
14. Wild type fruit flies have red eyes and white eyes are X-linked. If a white eyed female and a white eyed male mated their offspring would have \_\_\_\_.
- a. red and white eyed male offspring
  - b. red and white eyed female offspring
  - c. white eyed male offspring
  - d. All the above choices are correct.
  - e. None of the above choices are correct.

15. RNA polymerase will bind to the \_\_\_\_ region.
- enhance
  - downstream promoter
  - promoter
  - operon
  - intron
16. Which animal is **not** matched to the structure it possesses?
- hydra – nematocysts
  - lamprey – notochord
  - sponges – spicules
  - earthworms – setae
  - sharks – swim bladder
17. Match the descriptions from **Column A** with the most appropriate transport mechanism from **Column B**.

**Column A**

- molecules move with the concentration gradient
- osmosis
- $\text{Na}^+/\text{K}^+$  pump
- molecules move against the concentration gradient

**Column B**

- active
- passive

**Select the correct matching sequence.**

- |                      |     |     |     |
|----------------------|-----|-----|-----|
| a. 1-b               | 2-a | 3-a | 4-b |
| b. 1-b               | 2-b | 3-a | 4-a |
| c. 1-a               | 2-a | 3-b | 4-b |
| d. 1-a               | 2-b | 3-a | 4-b |
| e. None of the above |     |     |     |

18. Carpel is to \_\_\_\_, as stamen is to \_\_\_\_.
- pollen; ovule
  - ovule; pollen
  - sterile; fertile
  - peduncle; petal
  - petal; peduncle
19. Peptide bonds join \_\_\_\_.
- amino acids
  - monosaccharides
  - nucleotides
  - glycerol and fatty acids
  - phosphates and fatty acids
20. Nitrogen has an atomic number of 7. Nitrogen has \_\_\_\_ valence shell electrons.
- 2
  - 3
  - 5
  - 6
  - 7

21. Place the researchers in **Column A** with the appropriate topic of study from **Column B**.

**Column A**

1. Rudolf Virchow
2. Carlolus Linnaeus
3. Robert Whittaker
4. Barbara McClintock
5. Gregor Mendel
6. Thomas Morgan
7. Robert Hooke
8. Schleiden and Schwann

**Column B**

- a. taxonomy
- b. genetics
- c. cells

**Select the correct matching sequence.**

- |    |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|
| a. | 1-c | 2-a | 3-a | 4-b | 5-b | 6-b | 7-c | 8-c |
| b. | 1-b | 2-a | 3-c | 4-a | 5-c | 6-b | 7-a | 8-b |
| c. | 1-a | 2-b | 3-b | 4-c | 5-a | 6-c | 7-b | 8-a |
| d. | 1-a | 2-c | 3-a | 4-c | 5-b | 6-a | 7-c | 8-c |
| e. | 1-c | 2-c | 3-b | 4-b | 5-c | 6-c | 7-a | 8-b |

22. Mushrooms, truffles, and mold have all the following characteristics **except** \_\_\_\_\_.

- a. chitin
- b. reproductive spores
- c. cell walls
- d. hyphae
- e. autotroph

23. Which of the following is **not** produced during glycolysis?

- a. pyruvate
- b. NADH
- c. ATP
- d. CO<sub>2</sub>
- e. All of the above chemicals are produced during glycolysis.

24. Match the animals in **Column A** with the class they belong to in **Column B**.

**Column A**

1. planaria
2. leech
3. squid
4. sea star
5. clam


**Column B**

- a. Cephalopoda
- b. Asteroidea
- c. Bivalvia
- d. Turbellaria
- e. Hirudinea

**Select the correct matching sequence.**

- |    |       |       |       |       |       |
|----|-------|-------|-------|-------|-------|
| a. | 1 – e | 2 – d | 3 – a | 4 – b | 5 – c |
| b. | 1 – d | 2 – e | 3 – c | 4 – b | 5 – a |
| c. | 1 – d | 2 – a | 3 – e | 4 – c | 5 – b |
| d. | 1 – b | 2 – e | 3 – a | 4 – d | 5 – c |
| e. | 1 – d | 2 – e | 3 – a | 4 – b | 5 – c |

25. The \_\_\_\_ layer of the leaf is where most photosynthesis takes place.
- mesophyll
  - epidermis
  - cuticle
  - stomata
  - bundle sheath
26. Which of the following statements is **not** true?
- Depolarization occurs as an action potential travels along a nerve fiber.
  - At rest, a nerve fiber is said to be polarized by the sodium potassium pump.
  - The junction or point at which an impulse travels from one neuron to another is called the synapse.
  - Neurotransmitters are not important at the synaptic cleft and usually have no impact on impulse conduction.
  - A polarized nerve fiber has a negative resting potential.
27. If a female has a karyotype that is missing an X chromosome, she would have?
- Only one X chromosome
  - Turner's syndrome
  - A phenotypic appearance that may include a webbed neck
  - Both a and b
  - All of the above
28. \_\_\_\_ lay eggs inside organisms such as insects. After the eggs hatch, the larva eats its way out of the organism.
- Predators
  - Parasites
  - Decomposers
  - Parasitoids
  - Omnivores
29. Which of the following is **not** a polysaccharide?
- cellulose
  - starch
  - chitin
  - glycogen
  - sucrose
30. Ribulose biphosphate oxidase carboxylase is an enzyme that is important for \_\_\_\_.
- the electron transport chain
  - the Calvin-Benson cycle
  - the light-dependent cycle
  - chemiosmosis
  - the citric acid cycle
31. Which of the following is **not** a correct association?
- mushroom – saprobe
  - Plasmodium* – parasite
  - raccoon – omnivore
  - wolf – carnivore
  - algae – primary consumer

32. If an element has 1 valence shell electron, how many of these atoms would covalently bond with it if the other element has 5 valence shell electrons.
- 1
  - 2
  - 3
  - 4
  - 5
33. The \_\_\_\_ will protect bacteria from phagocytosis.
- flagella
  - pili
  - cell wall
  - endospore
  - capsule
34. The cuticle on the leaf \_\_\_\_.
- will help keep the plant from losing water
  - provides photosynthetic tissue
  - has vascular tissue running throughout
  - allows for gas exchange to take place
  - All the answers above are correct.
35. If a drug disrupts translation, it will affect the \_\_\_\_.
- mitochondrion
  - ribosome
  - lysosome
  - endoplasmic reticulum
  - Golgi apparatus
36.  is a picture of a \_\_\_\_.
- spirilla
  - diplococci
  - diplobacilli
  - bacilli
  - streptococci
37. If there is one base change in DNA and it codes for a stop codon, this is called a \_\_\_\_ mutation.
- frame shift
  - silent
  - missense
  - nonsense
  - codon



38. In snapdragons, red flowers crossed with white flowers produce pink flowers. This is an example of \_\_\_\_.
- epistasis
  - pleiotrophy
  - codominance
  - incomplete dominance
  - polygenetic inheritance

39. Match the animals in **Column A** to the order they belong to in **Column B**.

**Column A**

- rabbits
- mice
- monkey
- dolphin
- duck bill platypus
- elephant

**Column B**

- Primate
- Cetacae
- Monotremata
- Proboscidea
- Lagomorpha
- Rodentia

**Select the correct matching sequence.**

- |          |       |       |       |       |       |
|----------|-------|-------|-------|-------|-------|
| a. 1 – f | 2 – d | 3 – a | 4 – b | 5 – e | 6 – c |
| b. 1 – f | 2 – e | 3 – a | 4 – b | 5 – c | 6 – d |
| c. 1 – e | 2 – f | 3 – a | 4 – b | 5 – c | 6 – d |
| d. 1 – e | 2 – f | 3 – b | 4 – a | 5 – d | 6 – c |
| e. 1 – d | 2 – f | 3 – a | 4 – c | 5 – b | 6 – e |

40. Redwood trees \_\_\_\_.
- produce cones for reproduction
  - produce sori
  - have rhizomes
  - are flowering plants
  - are biennials
41. Chemiosmosis takes place when \_\_\_\_.
- hydrogen ions are pumped through a membrane
  - PEP carboxylase is available
  - carbon dioxide is released
  - lactic acid is produced
  - the sodium – potassium pump is working
42. Which functional group is **not** matched correctly?
- CH<sub>3</sub> – methyl
  - COOH – ketone
  - SH – sulfhydryl
  - OH – alcohol
  - NH<sub>2</sub> – amino
43. Which is **not** found in the human pancreas?
- alpha cells
  - beta cells
  - delta cells
  - parietal cells
  - Islets of Langerhans

44. rRNA, mRNA, and tRNA are all involved in \_\_\_\_.
- transcription
  - translation
  - replication
  - reverse transcription
  - splicing introns
45. Gene linkage changes during \_\_\_\_.
- Prophase I
  - Metaphase I
  - Anaphase II
  - Telophase II
  - Interkinesis
46. Which of the following would represent a test cross?
- TtRr x TtRr
  - TtRr x ttrr
  - TTRR x ttrr
  - TTrr x ttRR
  - Both b and c
47. Which would be a derived trait for Class Aves?
- amniotic egg
  - vertebral column
  - scales
  - feathers
  - All of the above are derived traits.
48. If a pair of frogs survives and starts to repopulate an area, this is referred to as \_\_\_\_.
- founder effect
  - artificial selection
  - bottle neck
  - stabilizing selection
  - All of the above are correct.
49. A \_\_\_\_ is unique because it has one end that is hydrophilic and the other end that is hydrophobic.
- phospholipid
  - starch
  - steroid
  - wax
  - dipeptide
50. The waterproof bands that run around the endodermal cells in plant roots are \_\_\_\_.
- root hairs
  - Casparian strips
  - root caps
  - xylem
  - phloem