TAMS TOURNAMENT 2013 BIOLOGY BEASTS

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_School:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Score: \_\_\_\_\_\_\_\_\_\_\_\_/50 Tiebreak? Y / N Place:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

INSTRUCTIONS

* You have 50 minutes to answer the 50 multiple choice questions and 1 bonus free response questions in this test.
* Only correct answers will be counted; there is no partial credit on multiple choice questions
* There is no penalty for guessing
* The bonus question will only be used in the event of a tiebreak
* This is your cover sheet and answer sheet. The back of this sheet has the bonus question. Detach this sheet and place the cover sheet and test booklet in separate piles when you are done with the test.
* You may write on the test.
* Good luck!

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Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_School:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

BONUS (used in the event of a tiebreak):

1. Draw a phylogenetic tree of the animal phyla, labeling major developments at each branch point. After you are done, continue by drawing a phylogenetic tree of the vertebrate classes (also with labels of developments).

TAMS Tournament 2013 Biology Beasts

1. Which of the following is/are true about pH?
2. Acids have a pH of less than 7
3. As pH increases, hydronium concentration increases
4. Generally, cells operate at a pH of around 7
5. A and B
6. A and C
7. Which of the following is NOT a disaccharide?
8. Maltose
9. Lactose
10. Sucrose
11. Galactose
12. All of the following are disaccharides
13. What would case a protein to denature?
14. Very high temperatures
15. Extreme pH
16. Exposure to hydrocarbons
17. A and B
18. A, B, and C
19. What is a prion?
20. A misfolded protein that may cause disease
21. A “prior” version of an activated complex
22. A polysaccharide found in shrimp cells
23. A lipid that prevents blood from freezing in arctic mammals
24. A string of nucleic acids that is a precursor for rRNA
25. Which of the following is true of enzymes?
26. Enzymes provide energy for a reaction
27. Enzymes are degraded during a reaction
28. Enzymes are large carbohydrates
29. Enzymes end with the suffix –ise
30. The induced fit model has replaced the lock and key model of enzyme binding
31. Which of the following does not contain any membrane-bound organelles?
32. Human
33. *Plasmodium vivax*
34. *Escherichia coli*
35. Tuna fish
36. Giant Sequoia
37. What is the function of the endoplasmic reticulum?
38. Synthesize proteins
39. Synthesize lipids
40. Detoxify cell
41. Glycogen metabolism
42. All of the above
43. Which of the following has/have more than one membrane?
44. Smooth Endoplasmic Reticulum
45. Chloroplasts
46. Mitochondria
47. Rough Endoplasmic Reticulum
48. B and C
49. Which of the following is/are true about centrioles and centrosomes?
50. All eukaryotic cells have centrioles and centrosomes
51. 2 centrioles make up one centrosome
52. 2 centrosomes make up one centriole
53. A and B
54. A and C
55. Which of the following is the most effective way for the cell to rapidly intake specific substances?
56. Phagocytosis
57. Receptor-mediated endocytosis
58. Pinocytosis
59. Cotransport
60. Diffusion through channel proteins
61. If tall plants are dominant over short plants, and you cross two tall plants to produce 100 offspring, which of the following is/are LEAST likely to be a combination of offspring?
62. 100 tall offspring, 0 short offspring
63. 75 tall offspring, 25 short offspring
64. 50 tall offspring, 50 short offspring
65. A and B
66. B and C
67. Are most autosomal genetic disorders dominant or recessive? Why?
68. Dominant, because dominant traits are passed on to all offspring
69. Dominant, because the law of independent assortment favors dominant traits
70. Recessive, because parents are able to be unaffected while passing on traits to their children
71. Recessive, because those with recessive traits tend to be physically weaker
72. Neither, they are equally likely due to incomplete dominance
73. Which pair of parents can have offspring with type O blood?
74. Kanye (Type A) and Kim (Type O)
75. Jay-Z (Type B) and Beyonce (Type A)
76. Barack (Type AB) and Michelle (Type O)
77. Answers A and B
78. All of the above
79. What is the purpose of telomeres?
80. Allow certain sections of DNA to translocate from one point to another
81. Protect important chromosomal DNA from being lost due to repeated replication
82. Create disulfide bridges between the two halves of ribosomes
83. Enclose mRNA to protect it on its trip out of the nucleus
84. Serve as binding sites for tRNA
85. Which of the following is true about DNA replication?
86. Okazaki fragments are created on the lagging strand
87. DNA synthesis occurs from the 3’ end to the 5’ end
88. Replication forks only occur at the lagging end of a replication bubble
89. Topoisomerase increases rotational tension on DNA strands in order to create the helical shape
90. DNA polymerase I adds nucleotides to the RNA primer
91. Where does photosynthesis occur?
92. In the chloroplast
93. In the cytosol
94. In the mitochondria
95. A and B
96. B and C
97. Which of the following is true about fermentation?
98. It must occur in mitochondria
99. Fermentation regenerates NAD+ from NADH
100. Glycolysis and fermentation are synonymous
101. Lactic acid fermentation is used by baker’s yeast
102. Fermentation generates PGAL
103. Why are most plants green?
104. Because cellulose tints cell walls green
105. Because a buildup of photosynthesis byproducts in the central vacuoles colors plant cells green
106. Because chlorophyll absorbs green light
107. All of the above
108. None of the above

19. Which electron carrier in **respiration** provides the most energy? Why?

1. NADP, since it releases its electrons earlier in the ETC
2. NADP, since it carries a high-energy phosphate group
3. NAD, since it releases its electrons earlier in the ETC
4. NAD, since it bypasses the first inefficient protein complex of the ETC
5. FAD, since it can bind to 2 hydrogen atoms as opposed to 1

20. Which of the following is true of C4 plants?

1. They use crassulacean acid as a temporary storage for carbon
2. They open their stomata during the night and close their stomata during the day
3. In C4 plants, the Calvin cycle occurs in **mesophyll** cells
4. C4 plants are less susceptible to photorespiration
5. C and D

21. What is the basic unit of life?

1. Molecule
2. Organelle
3. Cell
4. Tissue
5. Organ

22. What is the cell wall of fungi composed of?

1. Peptido-glycan
2. Cellulose
3. Chitin
4. Phospholipids
5. Fungi have no cell wall

23. What is a difference between Domain Archaea and Domain Bacteria?

1. Archaea are eukaryotes while bacteria are prokaryotes
2. Archaea have introns, whereas bacteria do not
3. Archaea evolved from heterotrophs, whereas bacteria evolved from autotrophs
4. All of the above are differences
5. None of the above are differences

24. What is correct order of events in the life cycle of *Rhizopus stolonifer* (a zygomycete)?

1. Plasmogamy-Karyogamy-Meiosis
2. Karyogamy-Plasmogamy-Meiosis
3. Zygomycetes only reproduce asexually and do not undergo meiosis
4. Plasmogamy and Karyogamy occur simultaneously in zygomycetes
5. Plasmogamy and Karyogamy do not occur in zygomycetes

25. Which of the following exhibit *embryonic* radial symmetry?

1. Sponges
2. Jellyfish
3. Flatworms
4. Mollusks
5. Starfish

26. If you put a plant next to a window, over several weeks, the plant will begin to:

1. Grow towards the window
2. Grow away from the window
3. Evolve methods to more efficiently capture indoor sunlight
4. Release ascospores
5. None of the above

27. Which of the following evolved most recently?

1. Mosses
2. Ferns
3. Evergreens
4. Oaks
5. Everything evolved at the same time

28. Which of the following is NOT a characteristic of dicots?

1. Netlike venation
2. Floral parts in multiples of 4 or 5
3. Scattered vascular bundles in the stem
4. Taproots
5. All of the following are characteristics of dicots

29. Exposure of fruits to ethylene gas will result in:

1. A positive feedback loop that promotes fruit ripening
2. A negative feedback loop that promotes fruit ripening
3. A positive feedback loop that inhibits fruit ripening
4. A negative feedback loop that inhibits fruit ripening
5. Immediate asphyxiation of the fruit cells

30. What does double fertilization refer to?

1. The fact that flowers can be fertilized up to twice a year
2. The fact that one sperm will fertilize the egg and the other will fertilize the polar bodies
3. The fact that two sperm are needed to fertilize the egg since the first dies on contact with the cell membrane
4. The fact that two sperm will fertilize the egg in order to produce a triploid endosperm
5. The fact that every ovule contains two eggs that need to be fertilized simultaneously

31. How many chambers does the human heart have?

1. 1
2. 2
3. 3
4. 4
5. 5

32. Which is the only vein that carries oxygenated blood?

1. Superior vena cava
2. Pulmonary vein
3. Pulmonary artery
4. Coronary vein
5. Coronary artery

33. What is the fundamental unit of gas exchange in the lungs?

1. Bronchi
2. Bronchiole
3. Alveoli
4. Trachea
5. Aquaporin

34. What is most responsible for carrying carbon dioxide in the blood?

1. Hemoglobin
2. Myoglobin
3. Erythrocytes
4. Carbonic acid-bicarbonate buffers
5. Carbon nanotubes

35. What does the “spike” on an ECG represent?

1. Generation of signal by the sinoatrial node
2. Delay of signal by the atrioventricular node
3. Signals traveling along bundle branches
4. Signals traveling to the heart apex
5. Signals diffusing through purkinje fibers

36. Where does digestion start?

1. Mouth
2. Esophagus
3. Stomach
4. Intestines
5. Liver

37. What does the pancreas do when blood sugar drops?

1. It secretes insulin
2. It secretes glucose
3. It secretes glucagon
4. It secretes glycogen
5. It secretes ghrelin

38. What is the gland that connects the endocrine and nervous systems?

1. Hypothalamus
2. Anterior pituitary
3. Posterior pituitary
4. Gonad
5. Pineal gland

39. Why can one hormone have different effects on different cells?

1. Cells can have different receptors
2. Cells can have different intracellular proteins
3. Cells can have different transduction pathways
4. All of the above
5. None of the above

40. Which of the following vitamins is/are hydrophilic (mark all that apply)?

1. Vitamin A
2. Vitamin B
3. Vitamin C
4. Vitamin D
5. Vitamin E

41. In humans, what produces the female gamete?

1. Ovaries
2. Testes
3. Antheridia
4. Archegonia
5. Uterus

42. Which of the following represents a specific immune response?

1. Lysozymes
2. Macrophages
3. Neutrophils
4. Helper T cells
5. Natural killer cells

43. Which nitrogenous waste product is most energetically expensive to secrete?

1. Ammonia
2. Urea
3. Uric Acid
4. Urine
5. All of the above are equally costly in terms of energy required

44. Which of the following is NOT a neurotransmitter?

1. Acetylcholine
2. GABA
3. Serotonin
4. Nitric Oxide
5. All of the above can function as neurotransmitters

45. Which of the following is responsible for the myelination of neurons in the brain?

1. Oligodendrocytes
2. Schwann Cells
3. Astrocytes
4. Microglia
5. Nodes of Ranvier

46. What is the largest reservoir of freshwater in in the biosphere?

1. Oceans
2. Lakes
3. Groundwater
4. Ice
5. Clouds

47. Suppose that brown eyes exhibit simple dominance over green eyes. If 8,000 people in a 50,000 person city have green eyes, how many people are heterozygous for brown eyes?

1. 16,000
2. 18,000
3. 24,000
4. 25,000
5. 36,000

48. If 10,000 calories are stored in the biomass of plants, how many calories are stored in the biomass of snakes (A secondary consumer)?

1. 10,000
2. 1,000
3. 100
4. 10
5. 1

49. What is true of R-strategists?

1. They are more likely to exhibit type III survivorship curves
2. They invest heavily into producing a few offspring
3. They are living at population levels close to carrying capacity
4. They thrive in relatively constant environments
5. B, C, and D are all true

50. Which of the following species would be most likely to exhibit aposematic coloration?

1. A tiger
2. A gecko
3. A peacock
4. A poisonous frog
5. A chameleon