

**BIOL 115**  
**ESSENTIAL BIOLOGY**

**MIDTERM EXAMINATION 1 - 2012**

**Multiple Choice**

1. Which of the following is an attribute of living things that could be applied to a virus?

- (a) Growth
- (b) Reproduction
- (c) Homeostasis
- (d) Sense and respond to stimuli
- (e) Obtain and use energy

>> answer is 'b'

2. Which of the following is NOT a characteristic of bacteria?

- (a) They lack nuclei
- (b) They have a peptidoglycan cell wall
- (c) They are unicellular
- (d) They often are so-called 'extremophiles'
- (e) They can be pathogenic (cause disease) in other organisms

>> answer is 'd'

3. All prokaryotes are very closely related to each other, i.e. are found in the same domain.

- (a) True
- (b) False

>> answer is 'false' – Archae & Bacteria are separate domains

4. To test the hypothesis that chocolate is beneficial for snail reproduction, giving of chocolate would be the \_\_\_\_\_ for the experimental group.

- (a) Independent variable
- (b) Dependent variable
- (c) Control
- (d) Hypothesis
- (e) Placebo

>> answer is 'a'

5. In order to study the effect of feeding snails chocolate on snail reproduction, you map out several scenarios for collecting and division of snails into experimental versus control groups. Which of the following is most likely to give you a significant result (in the scientific sense)?

- (a) A population of 20 snails divided randomly into 2 groups

- (b) A population of 200 snails divided randomly into 2 groups
- (c) All snails from the north side of the tree divided into one group, all snails from the south side of the tree divided into another group (20 snails total).
- (d) All snails from the north side of the tree divided into one group, all snails from the south side of the tree divided into another group (200 snails total).
- (e) A population of 200 snails divided by sex into two groups.

>> answer is 'b'

6. Which of the following is considered a scientific theory?

- (a) Caffeine aids memory
- (b) Whatever can go wrong, will go wrong
- (c) Vitamin C wards off colds
- (d) All living things are made of cells
- (e) The only organisms to have cell walls are prokaryotes

>> answer is 'd'

7. Which is the strongest type of chemical bond?

- (a) Polar
- (b) Covalent
- (c) Hydrogen
- (d) Electron
- (e) Ionic

>> answer is 'b'

8. Which of the following is NOT a property of water?

- (a) Water is a polar molecule
- (b) Water can undergo hydrogen bonding with itself
- (c) Water can undergo hydrogen bonding with non-polar molecules
- (d) Hydrogen bonding of water molecules leads to cohesion that allows certain insects to walk on water
- (e) Water is an excellent solvent

>> answer is 'c'

9. Which of the following is considered evidence for the Endosymbiotic Theory of eukaryotic cell structure?

- (a) Mitochondria and chloroplasts have their own DNA
- (b) Mitochondria and chloroplasts have their own nuclei
- (c) Mitochondria and chloroplasts are found in all eukaryotes
- (d) Mitochondria and chloroplasts both contain electron transport chains
- (e) Mitochondria and chloroplasts resemble viruses

>> Answer is 'a'

10. Meats are a good source of the macronutrients \_\_\_\_\_ and \_\_\_\_\_.

- (a) Protein; carbohydrates
- (b) Protein; fat
- (c) Protein; nucleic acids
- (d) Fat; carbohydrates
- (e) Fat; nucleic acids

>> answer is 'b'

11. Which of the following statements about enzymes is FALSE?

- (a) They are biological catalysts
- (b) They speed reactions by lowering the activation energy of chemical reactions
- (c) They may work with a mineral (ion) coenzyme
- (d) They are re-usable
- (e) They help facilitate chemical reactions by placing stress on chemical bonds

>> answer is 'c'

12. Helping a small child close a jack-in-the-box is like being an enzyme because:

- (a) The person helping is not physically changed by closing the toy
- (b) It facilitates the process of play
- (c) The spot in the centre of the box where the 'jack' sits is analogous to the active site of an enzyme
- (d) 'a' and 'b'
- (e) 'a', 'b' and 'c'

>> answer is 'd'

13. Which of the following is NOT an example of potential energy

- (a) A stone poised at the top of a hill
- (b) A cereal bar
- (c) A loaded spring (e.g. a mouse trap or closed-jack-in-the-box)
- (d) Wood
- (e) Heat

>> answer is 'e'

14. Which of the following is NOT an element commonly seen in organic molecules?

- (a) Carbon (C)
- (b) Oxygen (O)
- (c) Boron (B)
- (d) Hydrogen (H)

(e) Nitrogen (N)

>> answer is 'c'

15. A cartoon posted in the lecture has one scuba diver yelling at another for the loss of some oxygen tanks, saying 'That stuff doesn't grow on trees, you know!'. Where is oxygen produced during photosynthesis?

- (a) As a byproduct of the Calvin cycle sugar synthesis
- (b) As a byproduct of ATP synthesis in the thylakoid membrane
- (c) As a result of 'splitting' carbon dioxide molecules to release electrons
- (d) As a result of 'splitting' water molecules to release electrons
- (e) As a byproduct of NADPH synthesis in the thylakoid membrane

>> answer is 'd'

16. In a brilliant and elegant experiment, Engelmann used a prism to cast a rainbow of light colours across a slide to see in which colours of light photosynthesis occurred in the algae *Spirogyra*. In which light colour would you expect the least photosynthesis take place?

- (a) Red
- (b) Orange
- (c) Green
- (d) Yellow
- (e) Blue

>> answer is 'c' - 'green'

17. Poisoning by carbon monoxide is a danger of using natural gas for heating and cooking, leading to both the addition of nasty-smelling chemicals to natural gas for warning purposes and suggestions to have carbon monoxide detectors in houses. One of the effects of carbon monoxide poisoning is in aerobic respiration. What step does it inhibit?

- (a) Glycolysis
- (b) Calvin cycle
- (c) Krebs/citric acid cycle
- (d) Transport of pyruvic acid into the mitochondria
- (e) Electron transport chain

>> answer is 'e'

18. Fermentation always gives the same product in all organisms. True or false?

- (a) True
- (b) False

>> false – muscles yield lactic acid, while yeast give alcohol plus carbon dioxide

19. Which of the following statements about aerobic respiration and fermentation is FALSE?
- (a) Aerobic respiration is a complex, multistep process
  - (b) Aerobic respiration takes place exclusively in the mitochondria
  - (c) Fermentation produces much less ATP than aerobic respiration
  - (d) The weight loss drug DNP works by inhibiting production of ATP by the electron transport chain.
  - (e) Marathon runners rely upon aerobic respiration

>> answer is 'b'

4. What is a key difference between protists and other eukaryotes such as plants or animals?
- (a) Protists can be heterotrophic
  - (b) Protists contain mitochondria
  - (c) Protists are primarily unicellular
  - (d) Protists never have cell walls
  - (e) Protists have no organelles

>> answer is 'c'

21. What is the source of the 30 ATP made during aerobic respiration?
- (a) Glycolysis
  - (b) Krebs/Citric acid cycle
  - (c) Electron transport chain + oxidative phosphorylation
  - (d) 'a' and 'c'
  - (e) 'a', 'b' and 'c'

>> answer is 'e'

### Fill-in-the-Blank

1. Suppose you found a new organism in a remote desert and noted the following characteristics: unicellular, has organelles, chitin cell wall, heterotrophic, lives on trees. What type of organism (domain or kingdom) have you most likely identified? \_\_\_\_\_

>> answer is 'fungi'

2. An autotroph is an organism that uses \_\_\_\_\_ for energy.

>> sunlight

3. A hypothesis must be testible and \_\_\_\_\_.

>> answer is 'falsifiable'

4. In atoms number of electrons always equals the number of \_\_\_\_\_.

>> answer is 'protons'

5. Phospholipids are critically important macromolecules that make up the majority of cellular membranes due to their unique properties of having a polar 'head', and non-polar tails made out of \_\_\_\_\_.

>> answer is 'fatty acids'

6. Movement of water through a cell membrane from an area of low solute concentration (= high concentration of water molecules) to an area of high solute concentration (= low concentration of water) would be expected to move via: \_\_\_\_\_

>> 'simple diffusion'

7. The organelle composed of flattened stacks of membranes that acts as a protein processing and shipping station, as well as the site of complex polysaccharide synthesis in plants is known as the \_\_\_\_\_.

>> answer is 'Golgi' (stacks, body, apparatus, complex)

8. An enzymatic reaction in which a molecule is broken down is known as a(n) \_\_\_\_\_ reaction.

>> answer is 'catabolic'

9. The Calvin cycle takes place in the chloroplast \_\_\_\_\_.

>> answer is 'stroma'