

URI CMB 190
Issues in Biotechnology
Lesson 5: Study Guide

Name _____ Date _____

1. A common feature of life on earth is the occurrence:

- (A) an ability to live without any apparent source of energy
- (B) of feedback loops that provide control of biological inputs and outputs through cycles, like a locomotive engine that can not run out of control, so that even in complex pathways 'life works in cycles'
- (C) biochemical processes that consist of a series of linear reactions that will use all of the available resources until they are extinguished
- (D) of organisms that can spontaneously generate from inorganic matter
- (E) an evidenced based external life force that guides all life

2. 'Life' is said to be opportunistic and is present in nearly every environment on the planet because:

- (A) of variation and differences in a population of organisms that will be genetically selected for survival and reproductive success
- (B) each individual organism chooses where to live
- (C) living organisms all exhibit a strong will to live no matter what
- (D) the ends justify the means and organisms and biological organisms given half a chance will always decide to cheat in order to survive
- (E) there is strong evidence for the purpose and planning of organisms

3. A cellular structure that captures sunlight to produce sugar using CO₂ is called a:

- (A) chloroplast
- (B) nucleus
- (C) ribosome
- (D) chromosome
- (E) transcriptome

4. Water is important to life on earth because:

- (A) it is everywhere, like air, so it is in every environment on earth
- (B) it forms strong bonds with itself, has low surface tension and is nonpolar
- (C) it is always a liquid so it can form compartments, using lipid membranes
- (D) most biological molecules and compounds important to life dissolve in liquid water
- (E) it only occurs on the planet Earth

5. Rachel Carson is famous as the author of 'Silent Spring' (1962) which discussed the broad effects of the insecticide DDT on the 'web of life'. The ecology of a coral reef is another good example that:

- (A) extinction doesn't matter because something will always take its place
- (B) every organism can exist on its own
- (C) life is interconnected and interdependent
- (D) the diversity of life makes it resistant to toxic pollutants and effect of global climate change
- (E) life on earth quickly corrects for environmental pollutants

6. Complex biological structures like the horn of a ram, a chambered nautilus shell or a growing plant tendril seem complex but are actually the result of:

- (A) environmental pollutants
- (B) a purpose created by the organism
- (C) infections from a virus causing disease
- (D) emergent patterns that result in complex structures when simple units follow simple rules
- (E) intentional will of the organism to change

7. Emergent patterns and self assembly are wide spread phenomena in biology. Through the application of a few very simple rules:

- (A) synthetic life will be generated
- (B) a purpose is created for the organism
- (C) the theory of evolution is easily disproven
- (D) complex structures can be developed
- (E) phylogeny acquires teleology

8. To exist, life requires organization and organization requires energy, which means that life's molecules breakdown over time. Literally you are not the 'same' person you were seven years ago, or even seven days ago. Life maintains itself by the process of:

- (A) turnover
- (B) spontaneous combustion
- (C) internal combustion
- (D) hopeful purpose
- (E) totally random processes

9. Biological life tends to:

- (A) decrease in complexity
- (B) use materials that it cannot recycle
- (C) never change from one generation to the next
- (D) optimize rather than maximize, where function is selected for by the environment
- (E) disobey the second law of thermodynamics

10. All Life on this planet has the ability to replicate information with variation. The flow of information in biological life is generally from:

- (A) the transfer of gases through the cell membrane
- (B) the transfer of information from viruses to Mars
- (C) the transfer of DNA through a gel matrix by electrophoresis
- (D) the transfer of information from DNA to RNA to proteins
- (E) water and sunlight

11. Life competes within a cooperative framework where:

- (A) every creature acts in its own interests
- (B) cooperation facilitates survival
- (C) creatures are generally self-interested but not self-destructive
- (D) the living world works through cooperation
- (E) all answers shown are generally correct

12. All energy for biological life on earth:

- (A) comes from gravity
- (B) is derived from water
- (C) is used entirely to copy DNA
- (D) is derived from sunlight
- (E) comes from uranium

13. Critics of evolution state that that it is not possible since it disobeys the second law of thermodynamics. The tendency of energy to dissipate as described by the second law of thermodynamics is called:

- (A) equilibrium: where everything must remain in an equal balance
- (B) entropy: where order tends to become disordered
- (C) metabolism: referring to the breakdown of sugars
- (D) endothermic: where reactions require heat
- (E) nuclear: where reactions in life occur only in atomic chain reactions

14. A cellular structure which contains most of a cell's DNA in animals, fungi or plants:

- (A) ribosome
- (B) chloroplast
- (C) cell membrane
- (D) nucleus
- (E) centriole

15. The energy flow through life on earth starts with:

- (A) sunlight and producers, like plants
- (B) decomposition, like bacteria and fungi
- (C) herbivores, like cattle and sheep
- (D) carnivores, like lions and tigers, and bears
- (E) humans as the only significant consumer

16. If you were to look into a light microscope and view an unknown cell, what might you see that would tell you whether the cell is prokaryotic or eukaryotic?

- (A) a rigid cell wall
- (B) a nucleus
- (C) a plasma membrane
- (D) ribosomes
- (E) DNA

17. If you wanted to film the movement of chromosomes during cell division, the best choice for optical equipment would be:

- (A) a light microscope, because you can view living cells
- (B) a transmission electron microscope for its resolution
- (C) a scanning electron microscope, because chromosomes are on the cell surface
- (D) an x-ray crystallography image
- (E) your cell phone would suffice if you have a good one

18. Which of the following are inputs to photosynthesis?

- (A) CO₂
- (B) O₂
- (C) glucose
- (D) fossil fuels
- (E) hydrogen peroxide

19. Of the following which one is common to both photosynthesis and cellular respiration?

- (A) they both convert light energy into chemical energy
- (B) splitting H₂O and releasing O₂
- (C) storing energy by creating H⁺ gradients across membranes
- (D) converting CO₂ into sugar
- (E) none of the above