

**Biology 280: Evolution**  
**Exam #1**

Using the separate answer sheet, mark the single letter of the best answer for each question.

1. Which of the following was NOT characteristic of the earth during the Hadean eon?

- A. The earth is mostly molten
- B. Free oxygen is a dominant constituent of the atmosphere
- C. Volcanic outgassing provided an important source of several atmospheric molecules
- D. Water exists, mostly in a vapor form until the end of the eon
- E. Meteorites become the oldest rocks on earth

2. What major building blocks of life were formed during Stanley Miller's experiment with common early earth gases?

- A. Nucleic acids
- B. Nucleotide bases
- C. Amino acids
- D. Microspheres
- E. Chromosomes

3. Which of the following most closely estimates how long ago life (living cells) originated?

- A. 4.5-5 billion years ago
- B. 3.5-4 billion years ago
- C. 2.5-3 billion years ago
- D. 1.5-2 billion years ago
- E. 0.5-1 billion years ago

4. Some of the earliest fossilized life forms were bacterial mats called

- A. Stromatolites
- B. Coacervates
- C. Choanocytes
- D. Coral Reefs
- E. Spirogyra

5. In most eukaryotic cells, each chromosome replicates to form an identical copy of itself. These are called:

- A. Sister chromatids
- B. Diploidosomes
- C. Sex chromosomes
- D. Homologous chromosomes
- E. Parental chromatids

6. What are defined as the basic units of biological inheritance?

- A. Nucleic acids
- B. DNA strands
- C. Chromosomes
- D. Genes
- E. Nucleotide bases

7. What process produces four haploid daughter cells from one parent cell?

- A. Cytokinesis
- B. Gastrulation
- C. Recombination
- D. Mitosis
- E. Meiosis

8. Normally in a diploid organism, a gene has two alleles. In sexual organisms each allele usually has a 50% chance to appear in a gamete, such that all gametes tend to have an equal share of both alleles. This illustrates what principle?

- A. Segregation
- B. Natural selection
- C. Canalization
- D. Independent assortment
- E. Recombination

9. A gene controls color in a certain flower. The R allele (for red) is dominant over the r allele (for white). The gene associated with these alleles is on a somatic (non-sex) chromosome. Two red plants are crossed (mated), each of which had one white parent and one red parent. If 4 offspring are produced, what will tend to be the proportion of offspring genotypes and traits?

- A. 1 red RR, 2 pink Rr, 1 white rr
- B. 1 red RR, 1 pink Rr, 2 white rr
- C. 2 red RR, 0 pink Rr, 2 white rr
- D. 2 red RR, 1 red Rr, 1 white rr
- E. 1 red RR, 2 red Rr, 1 white rr

10. Paedomorphosis is:

- A. Patterns added onto the end of the developmental sequence of an ancestor
- B. The situation in which a mutation is beneficial early in development, and detrimental later
- C. The tendency of adults to have traits characteristic of juveniles of an ancestor
- D. Switching of the relative sequence of developmental stages
- E. The occurrence of premature aging and death compared to an ancestor

11. Waddington noted that certain traits exhibit "developmental homeostasis"-- once developed, they do not change when there are changes in the environment. What is another word for this phenomenon?

- A. Canalization
- B. Plasticity
- C. Adaptive constraint
- D. Ontogeny
- E. Dominance

12. What is the widespread situation where one gene has many effects on the phenotype (traits)?

- A. Polygenic control
- B. Plasticity
- C. Epistasis
- D. Pleiotropy
- E. Mutation

13. What is a trait that has become prevalent through evolution by natural selection because it has provided a function?

- A. Incidental trait
- B. Polygenic trait
- C. Pleiotropic effect
- D. Adaptation
- E. None of the above

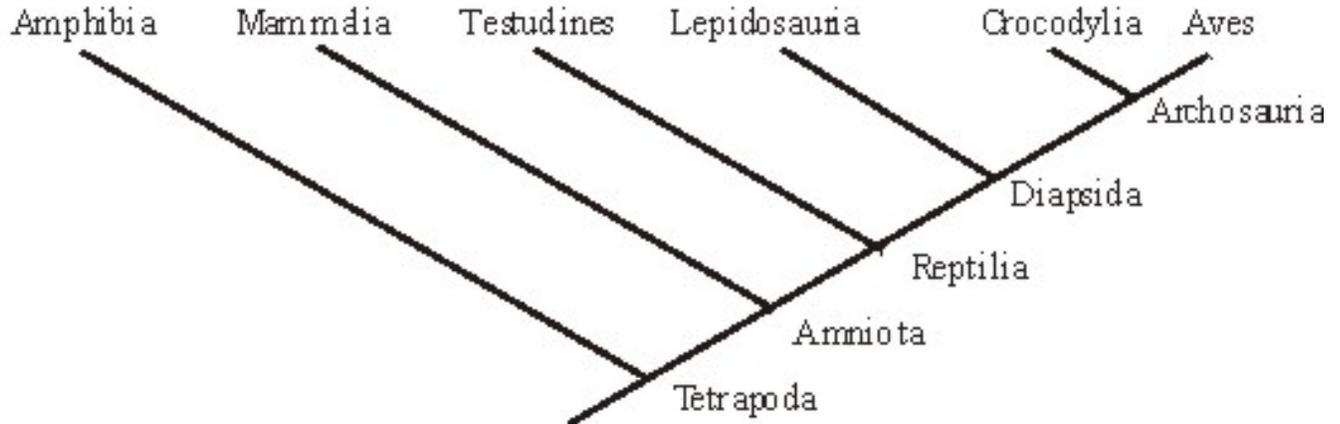
14. A certain gene is sex-linked, found on the X chromosome in humans. A father possesses a harmful recessive allele of this gene. What is the likelihood that a son of his will inherit the disease *from him*?

- A. 0%
- B. 25%
- C. 50%
- D. 75%
- E. 100%

15. Organic evolution is defined as:

- A. Change in gene frequencies over time
- B. Change in traits by the action of natural selection
- C. Change in traits over time
- D. The origin of a new species by natural selection
- E. The introduction of new variation by mutation

For questions 16-18, consult the following figure:



16. Class “Reptilia” generally includes everything above “Reptilia”, except for “Aves” (birds), which is usually put into its own class. This is a problem, under the principles of modern systematics. What’s one way of solving it?

- A. Call each name on the diagonal (Archosauria, Diapsida, etc.) a class
- B. Call each name on the top (Aves, Crocodylia, etc.) a class
- C. Include Aves in Class Reptilia.
- D. A or B
- E. B or C

17. Which of the following traits is most primitive?

- A. The hard shell of the turtle (Testudines)
- B. The amniote egg (Amniota)
- C. Feathers of birds (Aves)
- D. The four limbs of the tetrapods (Tetrapoda)
- E. There is not enough information in the diagram to answer the question

18. Both turtles (Testudines) and birds (Aves) have toothless beaks. What is an appropriate term for this situation?

- A. Homology
- B. Synapomorphy
- C. Polyphyly
- D. Monophyly
- E. Analogy