Evolution and Heredity Pre-Test Practice

1. For each of the following statements indicate whether it is true or false:

A. Mutations always lead to improvements in a species

B. Individuals with a beneficial trait always produce more offspring

C. Individuals with a beneficial trait are more likely to produce more offspring

D. Sexual reproduction is advantageous to evolution because it is much quicker than asexual reproduction

E. Acquired traits can be passed on through sexual reproduction

F. Sexual reproduction leads to a greater variation in genetic makeup of a population

G. Greater genetic variance generally increases the odds of survival of a species when the environment changes

H. Evolution is driven forward by competition for niches

I. Evolution guarantees that humans will never go extinct

2. Which of these conditions should completely prevent the occurrence of natural selection in a population over time?

A. All variation between individuals is due only to environmental factors.

B. The environment is changing at a relatively slow rate.

C. The population size is large.

D. The population lives in a habitat where there are no competing species present.

E. The only competition present is intra-species competition

3. The example of the experimental breeding Russian foxes by Dmitry K. Belyaev showed which of the following:

A. Only traits that make an animal more friendly to humans can be passed on to the next generation.

B. Evolution is only possible with human assistance (artificial selection)

C. Foxes are not related to wolves in any way

D. Selecting certain traits may have unexpected effects to other, seemingly unrelated, traits

4. Which of the following is the major flaw with Lamarck’s theory of evolution?

A. Organisms cannot alter their physical structure within a lifetime

B. Only beneficial traits can be passed from one generation to the next

C. Acquired traits cannot be inherited by an individual’s offspring

D. Genetic mutations cannot lead to beneficial traits

E. Lamarck’s theory requires many generations, while evolution is much faster than that.

5. What organisms, among others, is Darwin most famous for studying when developing his theory of natural selection?

A. Giraffes

B. Wolves

C. Foxes

D. Bacteria

E. Pea Plants

F. Finches

G. Moths

6. When two organisms partially share a niche by using the same resource at different times this known as:

A. Temporal niche partitioning

B. Spatial niche partitioning

C. Morphological niche partitioning

D. Commensalism

F. Haberdashery

7. Two male bighorn sheep (rams) compete for mates by running toward one another and smashing their large curled horns together. Usually one sheep backs down, but sometimes one is badly injured or killed. This is an example of:

A. Predation

B. Parasitism

C. Intra-species competition

D. Inter-species competition

E. Tomfoolery

8. Which of the following best describes the *Competitive Exclusion Principle*?

A. In a stable ecosystem there can be no inter-species completion, only intra-species competition

B. In a stable ecosystem there can be no intra-species completion, only inter-species competition

C. In a stable ecosystem there can be competition

D. In a stable ecosystem no two species can occupy EXACTLY the same niche

9. In a forest ecosystem both foxes and hawks play the role of top predators. Foxes mainly eat larger prey like rabbits and deer, while hawks eat mice and squirrels. Both organisms hunt in the same locations. This is an example of what type of niche portioning?

A. Morphological

B. Temporal

C. Spatial

D. External

E. Capatalistic

10. In your own words describe *evolution by natural selection*. Don’t just say change over time, be specific. How does it occur, what pressures drive it forward, why is it so slow?

11. The Earth has gone through 5 mass extinctions where 50% or more of all species on the planet died off within 2 million years. Following each of these there was an evolutionary explosion, where there was a rapid proliferation of new types of organisms not seen before. Explain why.

12. What is the difference between a scientific Law and a scientific Theory?

13. Consider a species of rabbitt in which the colour of the nose is controlled by a single gene with two alleles. The alleles are:

**P: Pink Nose**

**p: black Nose**

A. What is the phenotype of a PP individual?

B. What is the phenotype of a Pp individual?

C. What is the phenotype of a pp individual?

D. List all possible genotypes for an individual with a black nose.

E. List all possible genotypes for an individual with a pink nose.

F. Draw a Punnett square showing a cross between two Pp rabbits. Beneath each offspring, within the Punnet square, write the phenotype.

G. What is the probability of each of the following in the offspring?

Pink Nose \_\_\_\_\_ % Pp \_\_\_\_\_ % Black Nose \_\_\_\_\_ % pp \_\_\_\_\_ % PP \_\_\_\_\_ %

H. Draw a punnet square for the cross of a heterozygous pinknose male with a black nose female.

14. Consider a type of plant that has two possible phenotypes for stem shape, straight and curly. When purebred straight stems are crossed with purebred curly stems, 100% of the offspring have curly stems.

A. Show the Punnett square that illustrates this cross.

B. Draw a Punnet square showing the result if two of the offspring from the first cross are bred.

C. Write the percentage of theses F2 generation plants that have straight stems.

D. What percentage of the F2 generation are homozygous?

15. In a certain type of hamster all individuals have either round ears or pointed ears. When pure breeding round eared mice are crossed with pure breeding pointed ear mice, 100% of the offspring have pointed ears.

A. Clearly define the alleles for pointed ears and round ears:

B. Draw a Punnett square showing the cross of a hamster that is heterozygous pointed eared with a round ear mouse. Clearly label on the Punnett square which parent has round ears and which parent has pointed ears.

16. In a certain breed of cow there are three possible phenotypes. Black, white or white with black spots. When black cows are bred with black cows 100% of offspring are black. When white are bred with white 100% white. When white with black spots are crossed with white with black spots 25% of offspring are black, 25% of offspring are white and 50% of offspring are white with black spots.

A. Clearly define the TWO ALLELES that control colour in cows.

B. Draw the Punnett square showing the cross of two white with black spots cows.

17. Imagine a situation in which a type of plant has three distinct flower colours: Red, Yellow and Purple. The following THREE alleles exist:

FR: Red flowers

fY: yellow flowers

fp: purple flowers.

Consider the following list of genotypes and phenotypes:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Genotype | FRFR | FRfY | FRfp | fYfY | fYfp | fpfp |
| Phenotype | Red | Red | Red | Yellow | Yellow | Purple |

A. Draw a Punnett square showing the cross of an FRfp with an fYfp individual. State the phenotype of each offspring.

B. Draw a cross in which a red flower crosses with a yellow flower to produce a purple flower.