Natural selection Review Sheet

**SC.912.l.15.13: Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.**

* What are the principles of natural selection?  
  Over production of offspring (lots of babies)
* Offspring have variation in traits
* Some traits are better suited to the environment than others (struggle to survive/competition)
* Organisms with better traits survive and reproduce

 How do mechanisms like genetic drift, gene flow and nonrandom mating result in evolutionary change?

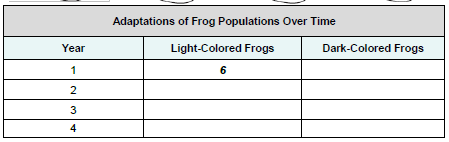
* ***Genetic drift*** is the process by which allele frequencies in a population change as a result of random events, or chance.
  + Ex: Stepping on an ant
  + It can result in substantial changes within a population.
  + Only significant in small and medium-sized populations.
* Gene flow- Immigration/Emigration; movement of genes to a new population
* Nonrandom mating- Nonrandom mating occurs whenever individuals may choose partners
  + Decreases genetic variation= less chance of surviving an environmental change.
  + Influenced by geographic proximity and assortative mating
  + Sexual selection occurs when certain traits increase an individual’s success at mating.

How do mutation and genetic recombination increase genetic variation?

* Mutation and genetic recombination increase genetic variation because they create new DNA sequences and combination
  + What are mutations?
    - A ***mutation*** is a change in the genetic material of a cell.
    - Mutations affect evolution by producing totally new alleles.
    - ***Germ mutations*** occur in the reproductive cells, or gametes, of an individual.
      * These mutations can be passed on to the offspring.
      * They can affect the survival of an individual organism or a genetic line of organisms.
* Mutations can be:
  + Neutral- No affect, No pattern of increase or decrease in allele frequency
  + Harmful, Usually naturally selected against and rid of in short time
  + Beneficial, usually increase over time

1. Populations of organisms have many genetic variations. Where do these come from?
2. Organisms could reproduce exponentially but they don’t. Why not? What are they restricted by?
3. Identify an example of natural selection that has occurred sometime in the history of life on earth & explain how mutation, environmental factors, & genetic drift have contributed to your example, and thus how that contributed to change in that species over time.
4. Explain why mutation and natural selection make development of new flu vaccines necessary every year?
5. An adaptation is an inherited characteristic that helps an organism survive and reproduce in its environment. Over time, adaptations become more and more common in the population. For example, suppose that the water in a pond gets darker over a period of four years. The diagrams and table below show what might happen to a frog population living in the pond.





* 1. In which year was the number of light-colored frogs greater than the number of dark-colored frogs?
  2. How did the numbers of light- and dark-colored frogs change over time?
  3. Those organisms with adaptations that better fit them to an environment will survive, reproduce and pass on their genes. Which adaptation is best suited to life in the pond in Year 3?

Circle the answer: light coloring dark coloring

* 1. How do the dark-colored frogs show “survival of the fittest”? What does it mean to be “fit” to an environment?

1. At one point, mosquitoes were susceptible to DDT, which resulted in many mosquito deaths. Some, however, proved resistant to DDT and survived, passing this resistance on to their offspring. How does this mutation affect the mosquito population? How does it affect the human population?
2. How does genetic recombination affect genetic variation?
3. Over time, the climate of an island became drier, which resulted in changes to the populations of various island finch species. Finch populations with a certain beak shape thrived, while those not having that beak shape decreased. Which of the following describes a necessary condition for these changes in the finch populations to occur?

A. fewer mutations

B. limited food resources

C. limited beak variations

D. overproduction of offspring

1. Which of these would have the least effect on natural selection in a subspecies of giraffes that is geographically isolated from other subspecies of giraffes?
   1. available niches
   2. existing predators
   3. chromosome number
   4. available food resources
2. A small population of chimpanzees lives in a habitat that undergoes no changes for a long period. How will genetic drift probably affect this population?
3. It will accelerate the appearance of new traits.
4. It will promote the survival of chimpanzees with beneficial traits.
5. It will increase the number of alleles for specific traits.
6. It will reduce genetic diversity.
7. In his book On the Origin of the Species, Charles Darwin described how species change over time. Which of the following is NOT part of his observations that describes the mechanisms of natural selection?
8. Organisms produce more offspring than can survive.
9. Disease and natural disaster will limit population growth.
10. Species today descended with modifications from ancestral species.
11. Organisms with advantages will survive and reproduce.
12. Theodosius Dobzhansky discovered that successful species tend to have a wide variety of genes that do not appear to be useful to the species in its present environment. What did this discovery help explain about genetics and the changes that occur in a species over time?
13. Environments with more organisms tend to have more successful species.
14. Species with greater genetic diversity adapt more easily to changing environments.
15. Changing environments prevent species from adapting and surviving.
16. Species in a stable environment are more resistant to a changing environment.