

Name: _____

Date: _____

Period: _____

Biology: Natural Selection

Background:

This activity will explore how the processes of natural selection operate within a specific environment to favor the survival of organisms with certain characteristics while limiting the success of others. In this activity, the prey species will be represented by beans. There is slight variation in the bean population → members of the population have slightly different colored coats, although they are of the same species. The predator species is a population of bipedal vertebrates who have a special appendage for gathering prey. Again, there is variation in the predator population; some have hands with opposable thumbs at the end of the appendages, others have hands without thumbs. The organism uses the appendage to gather prey and feed them into their cup-shaped mouth. The environment the predator and prey species live in is the blacktop basketball court.

Materials:

Beans
Dixie Cups
Masking Tape
String

Prelab Questions:

Define the following terms: population, bipedal, vertebrate, fitness

Purpose:

To investigate how adaptations and environmental conditions influence the survival rates of organisms, as well as variation within a population and the process of natural selection can cause a population to evolve.

Hypothesis:

- 1) Which type of prey will be eaten the most? the least? Explain.
- 2) Which type of predator will gather the most prey? Explain.
- 3) What kind of changes would you expect to see in the predator and prey populations in future generations?

Procedure:

- 1) Obtain a cup that will serve as your "mouth;" if necessary, tape your hand as instructed.
- 2) You will be allowed to gather food (beans) for a set amount of time, from a specific location.
- 3) Upon returning to the room count and record the number of each type of prey you "ate" and the total number "eaten."
- 4) The class will share data and produce a graph of the effect of coat color on prey survival.

Data:

Effect of coat color on prey survival

color of prey	# beans eaten	class data
black		
white		
red		
TOTAL		

Effect of adaptations on predator survival

predator type	average # of prey eaten
opposable thumbs	
no opposable thumbs	

Graph:

Make a bar graph of "The effect of coat color on prey survival". Be sure to label each axis with a title and units.

Analysis: Answer the following questions in complete sentences.

- 1) Which variation of prey was eaten the most? Which was eaten the least? Explain.
- 2) Which type of predator ate the most prey? Explain.
- 3) If the bean population migrated to a sandy volleyball court, how would this affect the prey population?
- 4) How is natural selection and evolution related to the environment the population lives in?
- 5) How has the evolution of the adaptation of opposable thumbs benefited the human species?
- 6) Use the terms fitness and adaptation to describe the variations of prey and predators in your answer to question #1.
- 7) Evolution occurs with characteristics that are inheritable and determined by an organism's genes (DNA). If opposable thumbs is dominant (AA or Aa) and no opposable thumbs is recessive (aa), what do you think will happen to the genetic makeup of the population (%s of AA, Aa and aa) over successive generations?
- 8) Natural selection is the means by which evolution occurs - explain this statement in your own words.
- 9) Populations, not individual organisms evolve - explain this statement in your own words.
- 10) What if the environment slowly changed from terrestrial (land) to aquatic (water) and it became beneficial for the predator to have flippers or fins to catch prey. Explain what would happen to the predator population in terms of adaptations and genetics (A's or a's).