Name _____   Date _____

Lab: NATURE AT WORK

Background Information:
In this lab, you will investigate how natural selection can lead to changes in a species over time. You'll explore how both genetic and environmental factors play a part in natural selection.

Problem: How do species change over time?

Environment – White sand dunes of the dessert

Materials:
> *50 Mouse Cards*
> 25 "**W**" cards – Dominant alleles for white fur
> 25 "**w**" cards – recessive allele for brown fur
> *25 Event Cards*
> 5 "**S**" cards – mouse survives
> 1 "**D**" card – mouse is killed by disease
> 1 "**P**" card – mouse is killed by a predator (brown and white mouse)
> 18 "**C**" cards – Predator kills mice that contrast with the environment.
> (Note: only brown mice will die on the white sand beach, white mice die on a brown forest floor)

Procedure:

Part I – White Sand Beach

1. Count your mouse cards and event cards and make sure you have a full set of each.
2. Make a pile of mouse cards and a separate pile of event cards. Make sure you shuffle each pile so that your cards are mixed up.
3. Begin by using the cards to model what might happen to a group of mice in an environment of white sand dunes. Choose two mouse cards. Alleles pairs **WW** and **Ww** produce a white mouse. Allele pair **ww** produces a brown mouse. Record the dolor of the mouse with a tally mark in the data table. ****Make sure you keep your cards in order.
4. After you have recorded the color of the mice, using the mouse card pairs, pick an **event card** (**S, D, P**, and **C** – see above for meaning). An "S" card means the mouse survives. A "D" or a "P" card means the mouse dies. A "C" card means the mouse dies if its color contrasts with the white sand dunes. (Only brown mice will die when a "C" card is drawn.) Record each death with a tally mark in the table.
5. If the mouse lives, Place it in a pile in front of the "**Live Mice**" card and if your mouse dies, place it in a pile in front of the "**Dead Mice**" card. Place the **event** card at the bottom of its pile.
6. Repeat steps 4 – 5 with the remaining mouse cards to study the first generation of mice. Record results.
7. **Do NOT touch the Dead Mice cards**. Mix up the cards from the **Live Mice** pile. Mix up the **event** cards.
8. Repeat steps 4 – 7 for the second generation. Then repeat steps 4 – 7 for the third generation.

Part II – Brown Forest Floor Environment

9. How would the data differ if the mice in this model lived in a dark brown forest floor? Record your prediction in the space provided.

_____

_____

10.   Use the cards to test your prediction. Follow the same procedures as in Part 1. Remember that a "**C**" card now means that any mouse with white fur will die.

Lab Report:

Part 1:

Type of Environment: **A White Sand Environment**				
	Population		Deaths	
Generation	White Mice	Brown Mice	White Mice	Brown Mice
1				
2				
3				
	Total White Mice	**Total Brown Mice**	**Total Deaths**	**Total Deaths**
			Death Rate	**Death Rate**

(Hint: To calculate the death rate for white mice, divide the number of white mice that died by the total number of white mice, then multiply by 100.)

Part 2:

Type of Environment: **A Forest Floor Environment**				
	Population		Deaths	
Generation	White Mice	Brown Mice	White Mice	Brown Mice
1				
2				
3				
	Total White Mice	**Total Brown Mice**	**Total Deaths**	**Total Deaths**
			Death Rate	**Death Rate**

(Hint: To calculate the death rate for white mice, divide the number of white mice that died by the total number of white mice, then multiply by 100.)

Analyze and Conclude

1.   **Calculating:** In part 1, how many white mice were there in each generation? _____

       How many brown mice? _____

       In each generation, which color mouse had the higher death rate? _____(To calculate the death rate for the white mice, divide the number of white mice that died by the total number of white mice, then multiply by 100%.)

2.   **Predicting.** If the events in Part 1 occurred in nature, how would the group of mice change over time?

3.   **Observing.** How did the results in Part 2 differ from those in Part 1?

4.   **Making Models.** How would it affect your model if you increased the number of "**C**" cards?

       What would happen if you decreased the number of "**C**" cards?

5.   **Communicating**. What are some ways in which this investigation models natural selection?

       What are some ways in which natural selection differs from this model?