

Name _____

(Natural Selection)
Lab

DATA COLLECTION

1. After you have chosen your "environment" cloth, write down your **prediction** of which color morph of this species of butterfly will better be able to survive in this environment _____
2. Record your **raw data** in the table below:

| | number of butterflies entering generation | | | | | |
|----------------|---|-----------|-----------|-----------|-----------|-----------|
| Color variants | 1 | 2 | 3 | 4 | 5 | 6 (final) |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| TOTALS | 20 | 20 | 20 | 20 | 20 | 20 |

3. Calculate the **percentages** of each butterfly color and record in the table below:

| | percentage of color variants entering generation | | | | | |
|----------------|--|------------|------------|------------|------------|------------|
| Color variants | 1 | 2 | 3 | 4 | 5 | 6 (final) |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| TOTALS | 100 | 100 | 100 | 100 | 100 | 100 |

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SUMMARY QUESTIONS

1. Describe the "environment" that you used in this simulation.

2. How many butterflies of each color did you start with in Generation #1? _____

What was the frequency of each color at the start of Generation #1? _____

3. Did the number of each color stay the same from generation to generation? Explain.

4. a. Which color was the ***most fit*** in this environment? _____

b. How did you determine that? _____

c. How many of this color did you start with in Generation #1? _____

d. What was the frequency of this color at the start of Generation #1? _____

e. How many of this color did you end up with in Generation #6? _____

f. What was the frequency of this color at the start of Generation #6? _____

g. Suggest a possible explanation of why this color was more fit in this environment.

5. a. Which color was the ***least fit*** in this environment? _____

b. How did you determine that? _____

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- c. How many of this color did you start with in Generation #1? _____
- d. What was the frequency of this color at the start of Generation #1? _____
- e. How many of this color did you end up with in Generation #6? _____
- f. What was the frequency of this color at the start of Generation #6? _____
- g. Suggest a possible explanation of why this color was less fit in this environment.

6. Separate from your specific environment used in this lab, consider the following "thought experiments" in natural selection— what outcome might you expect under the following conditions described below.

- a. If the color differences were less distinct (ex. all butterflies were only shades of reds and oranges), would you expect similar results? Explain what you would expect and why.

- b. What if you had a population with all 5 colors again, but the red butterflies made the predator very ill; would you expect similar results? Explain what you would expect and why.

- c. What assumptions must you make about the predator's abilities for your prediction to come about in the question above (7b)?

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d. What if the red butterflies made the predator very ill and it learned to stay away from them, and there also was a new group of butterflies very similar in color (a close red-orange color). What would happen to the red-orange butterflies? Explain your answer.

e. Over the long term, what trait (ability) could be strongly selected for in the predator population in the situation of similar color variants proposed above (7d)?

f. In 7(e) you identified a trait (ability) that would strongly benefit the predator population. Does that mean the population will evolve that trait, since it is a "need" they have.

7. Consider the results in this lab. Did any of the butterflies survive because they chose to be the more fit color? Did any supernatural power design the surviving butterflies to be more fit? What did you learn about how evolution works from this lab?

8. Don't forget to graph your calculated percentages using a bar graph/histogram.