Name: Date: Class:

Science 9 Lab: Natural Selection and Evolution in TEDDY GRAHAMS!!!

Learner Outcomes:

- Identify the role of variation in species survival under changing environmental conditions *(e.g.,resistance to disease, ability to survive in severe environments)*
- Distinguish between, and identify examples of, natural and artificial selection

Key Terms:

Variation	Natural selection
Adaptation	Artificial selection

Background Information

Natural Selection is the process by which organisms become adapted to their environment. Evolution by natural selection requires:

- Variation, that is, the members of a population must differ from one another
- Many of these differences are inherited genetic differences
- Individuals that are better adapted to their environment are more likely to reproduce, and their fertile offspring will make up a greater proportion of the next generation

In this simulation, we will use Teddy Grahams to demonstrate natural selection. Teddy Grahams have many traits; not all of these traits affect Teddy Graham adaptability. For example Teddy Grahams come in several colors: honey, chocolaty-chip, and chocolate. Teddy Grahams are missing parts such as legs, arms, and ears. Neither of these traits determines a Teddy Grahams evolutionary success.

However, there is **ONE** inherited trait that is of prime importance in determining the success of Teddy Grahams and that is the position of their arms. "Happy" Teddy Grahams have arms that are permanently positioned in the air. These Teddy Grahams are most eaten by Teddy Graham predators (**YOU!**). You eat them because they are always waving their arms around and they really annoy you. "Sad" Teddy Grahams, on the other hand, have their

arms permanently fused to their side and are less easily seen and therefore will not be eaten. In the weird world of Teddy Grahams, sadness is an adaptive advantage.

Happy annoying teddy Graham
You EAT These!!

Sad Teddy Graham..
You DON'T eat these!

You are a bear-eating monster. There are two kinds of bears that are available to you in your environment: hands-up bears and hands-down bears. Hands-up bears are annoying and easy to catch so you tend to eat them more often. Hands-down bears are sad, bitter tasting, and much harder to see so you do not often eat these bears. However, during difficult times, you will eat hands-down bears if they are the only ones available to you. Each year, new bears are born at a rate of one new bear for every old bear left over from the year before.

Problem: What are the effects of natural selection on the survival of certain species?

Hypothesis:

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_____
_____
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Materials: Teddy Grahams Calculator Graph paper

Procedure: 1. Obtain a population of 10 bears from the teacher. The population will be **randomly** chosen from the bear stock.

2. Record the number of "happy" bears and of "sad" bears in the table of observations below beside "Generation #1."
3. Eat three "happy" bears. If you have less than three, eat all "happy bears"
4. Obtain a new generation of bears randomly from the bear stock at the front. You must take one new bear for every surviving bear from "last year". (Since you ate three bears, you should have 7 left over in the first generation; therefore, you should obtain 7 new bears from the teacher!)
5. Record the number of "happy" bears and of "sad" bears in your second generation of bears in the table of observations below.
6. Repeat Steps #3 – 5 three more times until you have recorded the population of each type of bear for a total of 4 generations.
7. Calculate the percentage of bears in each generation that are happy and the percentage that are sad.

$$\%\ \text{Of "happy" Teddy Grahams} = \frac{\text{Number of "happy" Teddy Grahams}}{\text{Total number of Teddy Grahams in population}} \times 100$$

$$\%\ \text{Of "sad" Teddy Grahams} = \frac{\text{Number of "sad" Teddy Grahams}}{\text{Total number of Teddy Grahams in population}} \times 100$$

Record each of these percentages in the appropriate places on the table in the **results** section.

Observations:

Title:

_____

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Generation	Total # of Bears	# of Happy Bears	# of Sad Bears	% of Happy Bears	% of Sad Bears
1	10				
2					
3					
4					

Analysis:

1. What happened to the percentage of "happy" teddy Grahams from the first to the fifth generation? Why?

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_____
_____
_____

2. What happened to the percentage of "sad" teddy Grahams from the first to the fifth generation? Why?

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3. Did the proportion of any of the other traits (colour, missing parts) change from generation to generation? Why or why not? Did these differences have anything to do with which bears survived?

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4. Make an <u>inference</u> about **NATUARL SELECTION** in Teddy Graham populations.

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5. Graph the population of "happy" vs "sad" Teddy Grahams. Use the grid at the end of the package. Don't forget a title and to label the x and y axis. (5 marks)

6. According to what you've read, are the traits in question **heritable** characteristics or **non-heritable** characteristics. Please explain.

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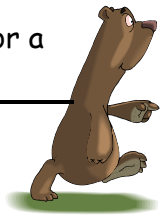
7. Is the teddy graham variation (hands up and hands down) a **discrete variation** or a **continuous variation**. Explain.



Graph of Observations:

<u>Percentage of Surviving Bears vs. Generation Number</u>

Conclusion:

What is the essential difference between **natural selection** and **artificial selection?** Give one example of each. What kind of "selection was modeled in this activity?

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Extension:

1. Biological diversity is something we need to preserve. Why is variation within species so important in terms of **Environment** (Area of interaction)? Please include 4 reasons.

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2. What are some things people can do to solve the problem of species becoming eradicated from our planet. This type of problem solving has to do with what area of interaction?

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