

Name \_\_\_\_\_

## **Title: Teddy Grahams and Natural Selection**

### **Introduction:**

Welcome to the land of Teddy Grahams. These bears are a peaceful, herbivorous species that has long enjoyed life without a predator. Their population size remains around 12 bears. They are limited by the number of caves in which to hibernate. The bears live in a habitat with lots of shrubs.

There are two general behaviors of teddy grahams. Type A bears run around with their hands up. This was an adaptation for preventing the growth of a deadly mold under their armpits. Type B bears, much more rare than type A bears, run around with their hands down. For the past few hundred years, the mold has no longer been a problem, so neither type of behavior is better than the other, therefore this variation is neutral.

The hands-down behavior is a genetic trait caused by a dominant gene H. Therefore, hands-down bears are either HH or Hh. Hands-up bears are hh.

Recently, a terrible thing has occurred. A new monster thing has emerged. The predator has developed a taste for teddy grahams. The hands-up bears are easy to see, with their hands rising high above the shrubs and bushes. Therefore they make easy prey for the predator. The hands-down bears, however, are nicely hidden and quite safe from the predator. Fortunately, the swamp thing can only manage to eat four bears a year.

**Question:** What do you predict will happen to the population of the bears, and why?

### **Procedure:**

When the predator first arrives, there are 12 bears: 11 hands-up and only one hands-down. The hands-down is heterozygous (Hh).

- A. Get about 20 bears. Count out 11 hands-up bears and 1 hands-down bear. This will be your first generation.
- B. The predator eats four bears a year. So remove four of the bears (put them back with the rest of your bear supply.) REMEMBER: The predator can only catch hands-up bears.

C. Now it is breeding season. Put the remaining bears from the original population (not the extra) into a plastic baggy and pull them out two by two. These are their breeding pairs. Each pair will produce one new bear cub. The phenotype of the cub will depend on the genotypes of the parents. Use a dice and these rules to determine the genotype and phenotype of each bear cub:

1. Two hands-up bears  
 $hh \times hh =$  all hands up bears (hh)

2. One hands-up and one hands-down  
 $HH \times hh =$  all hands down (Hh)

$Hh \times hh =$  50% hands-down (Hh) Roll a 1, 2, or 3  
50% hands-up (hh) Roll a 4, 5, or 6

3. Two hands down-bears  
 $HH \times HH =$  all hands-down (HH)

$HH \times Hh =$  50% hands-down (HH) Roll a 1, 2, or 3  
50% hands-down (Hh) Roll a 4, 5, or 6

$Hh \times Hh =$  25% hands-down (HH) Roll a 1  
50% hands-down (Hh) Roll a 2, 3, 4, or 5  
25% hands-up (hh) Roll a 6

Mark any bears that are homozygous dominant (HH) by biting off an ear or a toe.

After the bears have reproduced, record the numbers of each in the data table.

D. Repeat steps B and C for the next 9 generations. Record the numbers of each type of bear in the table.

E. Keep going for all 10 generations, or until you run out of bears.

**Data Table:**

Generation	Hands-up bears	Hands-down bears
1	11	1
Predator	7	1
2		
Predator		
3		
Predator		
4		
Predator		
5		
Predator		
6		
Predator		
7		
Predator		
8		
Predator		
9		
Predator		
10		

**Results and Conclusions**

1. List the three conditions necessary for natural selection to occur.
  - a.
  - b.
  - c.
  
2. Describe how this model met each of the three conditions.
  - a.
  - b.
  - c.
  
3. Did natural selection occur? What is your evidence?

