Lab: Black-Footed Ferrets

Name _____

BACKGROUND:

A genetic population bottleneck occurs when a **population experiences a** sharp reduction in size of a population due to environmental events (such as earthquakes, floods, fires, or droughts) or human activities. Using the color code key below ***(paper color = gene characteristic)***, evaluate the generic characteristics your hypothetical black-footed ferret population received through the genetic bottleneck event. Then answer the questions related to genetic diversity, bottleneck events, and characteristics.

PROCEDURES:

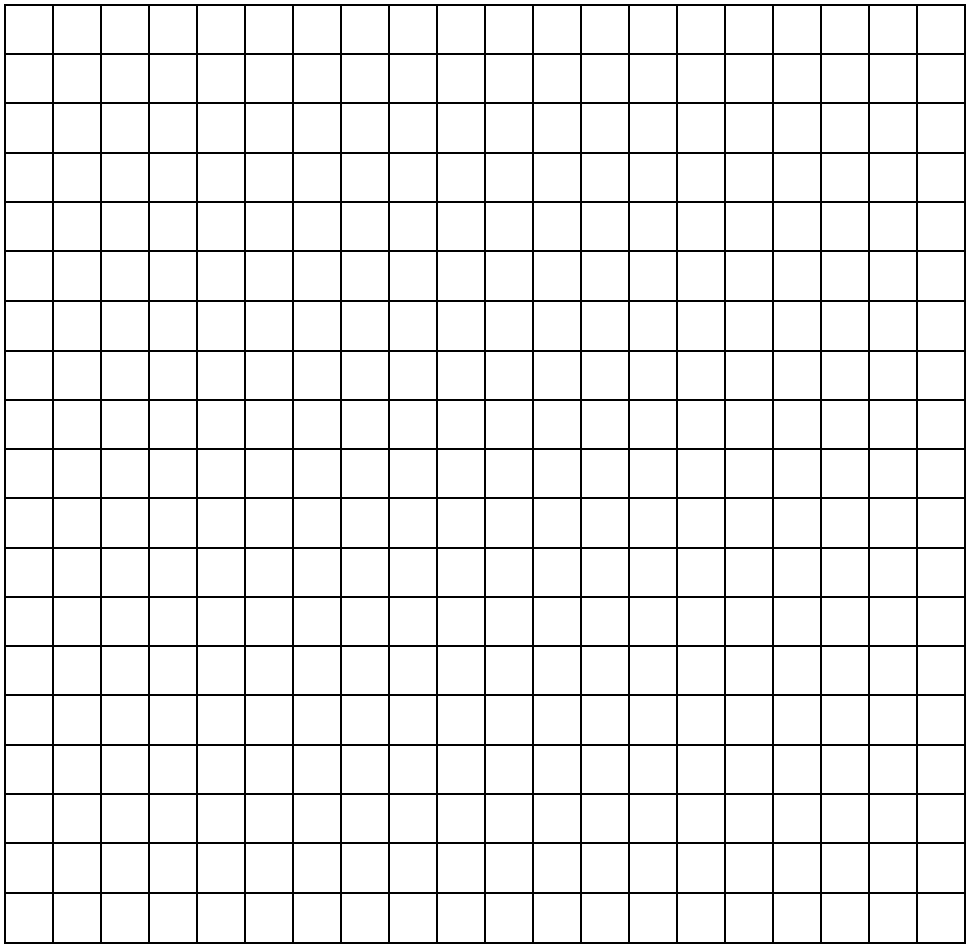
1. Sort, count, and record your population's genes (color squares).

   Black: precise vision
   Orange: accurate smell
   Red: large litter size
   Pink: strong claws/legs
   White: immunity to canine distemper
   Purple: accurate hearing
   Green: agility
   Yellow: camouflage
   Dark blue: strong jaw and teeth
   Light blue: immunity to Sylvatic plague

   Gene Frequency:

Gene	Frequency *(# of each trait)*
Precise Vision	
Accurate Smell	
Large Litter Size	
Strong Claws/Legs	
Immunity to Canine Distemper	
Accurate Hearing	
Agility	
Camouflage	
Strong Jaw and Teeth	
Immunity to Sylvatic Plague	

2. Calculate the percent genetic diversity of your hypothetical black-footed ferret population. 10 genes represent 100% genetic diversity in the original black-footed ferret population.
   a. How many genes do you have? _____/10 genes
   b. Calculate the percentage of genes (from those possible) within your population: _____%
3. Create a **BAR GRAPH** showing the population's **gene frequency**.
   a. Title (compares independent and dependent variables)
   b. Frequency of Gene: Y-axis label and scale
   c. Gene/Characteristic: X-axis label and scale
   d. Color-coded bar graph to match genes received



4. Impact of genes on ferret population:
   In order for your population to pass along genes from one generation to the next, there must be **<u>at least 3 copies of the same gene</u>** in the population. Any less than that means only a few individuals will be impacted instead of the population as a whole.
   a. On the graph, indicate with a ***<u>horizontal line</u>*** the threshold for genes to be passed on to the next generation.
   b. In what ways will your population of ferrets be strong?

   c. In what ways will your population of ferrets by weak?

ANALYSIS/CONCLUSION:

Using the situations below that have taken place where your hypothetical back-footed population lives, what is the impact to your population? Use the genetic information to **decide whether your ferret population with survive and thrive or if they will die off. Discuss what will happen to your population based on their genes and the event.**

Scenario	**Impact on Population** (Detailed discussion of how the event/scenario and your population's genes result in said impact)
A. Prairie dog population evolves tougher skin and thicker fur.	Impact: Discussion:
B. Fewer opportunities for females to become pregnant.	Impact: Discussion:
C. Ranchers allow their dogs to run loose (can spread canine distemper disease).	Impact: Discussion:
D. A new group of captive-born black-footed ferrets is released at a nearby location (no additional resources provided).	Impact: Discussion:

E. A coyote (with a strong odor) prowls at night.	Impact: Discussion:
F. A great horned own relies on its keen eyesight to spot potential prey in the dark. (Visual hunter)	Impact: Discussion:
G. A predatory badger sneaks around the prairie dog town. (Makes only a small amount of noise)	Impact: Discussion:
H. Drought causes the prairie soil to compact and harden, making it harder to burrow into the soil.	Impact: Discussion: