Genetics Basics

Introduction

Heredity is the characteristics that are transmitted from 2 parents to their offspring. Depending on the **alleles** that are passed on by the parents, the offspring's **genes** will express certain **traits**. In this activity, you will work with your group to explore the basics of heredity.

Model 1: Genetics

Gronckles: Gronckles are gigantic dragons. Gronckles have a gene that controls the size of their wings. There are 2 variations of that gene: the B allele and the b allele. The B allele expresses the trait of big wing. The b allele expresses the trait of little wing.

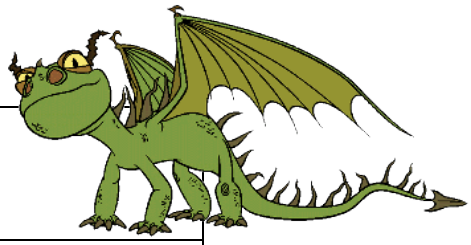
1. What is the gene in the paragraph above? _____
2. What are the alleles that control the size of the Gronckle's wings? _____ & _____
3. What are the two traits that can be expressed? _____ and _____

Monstrous Nightmares: Monstrous Nightmares are dragons that are known for their fire breathing ability, but not all Nightmares can breathe fire. This dragon has a gene which controls whether it can or cannot breathe fire. There are 2 variations of that gene, the F allele and the f allele. The F allele expresses the trait of fire breathing ability. The f allele expresses the trait of not being able to breathe fire.

4. What is the gene in the paragraph above? _____
5. What are the alleles that control fire breathing ability? _____ & _____
6. What are the two traits that can be expressed? _____ & _____

7. Based on the information above, come up with a definition for a gene. _____
   _____
8. Based on the information above, come up with a definition for an allele. _____
   _____
9. Based on the information above, come up with a definition for a trait. _____
   _____

Model 2: Dominant and Recessive



Dragon Genetics Key Capital letters represent **dominant** alleles; lowercase letters represent **recessive** alleles	
N = LONG NECK n = short neck	E = RED EYE e = white eye
H = HORN PRESENT h = horn absent	F = FIRE BREATHING f = not fire breathing
G = GREEN BODY g = grey body	L = LONG TAIL l = short tail
S = SPIKES ON END OF TAIL s = no spikes on end of tail	B = BIG WINGS b = little wings

1. Dominant alleles are represented by _____ letters.
2. Recessive alleles are represented by _____ letters.
3. Which letters are used to represent the gene for body color? _____
4. Which letters are used to represent the gene for neck length? _____
5. Which letters are used to represent the gene for fire breathing ability? _____
6. List 2 dominant dragon traits: _____ & _____
7. List 2 recessive dragon traits: _____ & _____
8. Based on the information above, what is a dominant trait? _____
   _____
9. Based on the information above, what is a recessive trait? _____
   _____

Model 3: Heterozygous and Homozygous

Offspring get 1 copy of each chromosome from their parents. This also means that they get 1 copy of every gene from their parents. Sometimes, the alleles that the offspring get are the same and sometimes they are different. When the two alleles are the same, they are called **homozygous** or **purebred**. When the two alleles are different, they are called **heterozygous** or **hybrid**. Label the following pairs of alleles are either homozygous (homo) or heterozygous (hetero).

SS _____ ff _____ Hh _____ EE _____ Gg _____
Ll _____ hh _____ NN _____ ee _____ RR _____

1. Which genotypes would be considered purebred? _____
2. Which genotypes would be considered hybrid? _____

Model 4: Genotype and Phenotype

Gene A	
Genotype	**Phenotype**
NN	long neck
Nn	long neck
nn	short neck

Gene B	
Genotype	**Phenotype**
EE	red eye
Ee	red eye
ee	white eye

1. What do the two genes in the table above control? _____ & _____
2. What are the 2 alleles that control neck length? _____ & _____
3. What are the 2 alleles that control eye color? _____ & _____
4. What is a genotype? (Use the terms: dominant, recessive, heterozygous, and homozygous) _____

   _____

   _____
5. What is a phenotype? _____

   _____
6. What determines phenotype? _____

   _____