The Genetics of Eye Color

The genetics of eye color are complex, and there are many variations of eye color among humans. These variations occur because more than one gene controls the expression of the trait, in fact, over 15 different genes have been associated with eye color inheritance. While we may just say that a person has brown eyes, you might notice that there are many shades of brown, all a result of a complex pattern of inheritance.

To simplify, this activity will look at three known alleles that affect the basic shade of eye color: brown, green, or blue eyes. These alleles are located on separate chromosomes, so they independently assort during the creation of gametes. Each person then has 4 total alleles that determine their eye color (in this simplified model). The B allele (brown) is always dominant over the G allele (green). The blue eye trait is always recessive. Refer to this chart showing the genotypes and phenotypes.

BBGG	brown
BbGG	brown
BBGg	brown
BbGg	brown
BBgg	brown
Bbgg	brown
bbGg	green
bbGG	green
bbgg	blue

Rules: Use the chart above to complete these sentences

1. If a person inherits a B allele, they will [always / sometimes / never] have brown eyes.
2. In order to have blue eyes, a person must have the _____ genotype.
3. Both green and brown eyes are [dominant / recessive] to blue eyes.
4. There are [one / two / three / four] possible genotypes for green eyes.
5. A person with brown eyes [could / could not] be carrying an allele for blue eyes.
6. A person with blue eyes [could / could not] be carrying an allele for brown eyes.

Punnett Square Practice

7. Determining the probability of inheriting a combination can be accomplished using a punnett square. Consider two parents with the genotypes BbGg. What color eyes do these parents have? _____

8. A punnett square has been set up below, fill in the boxes to show the possible offspring of this cross.

	GB	Gb	gB	gb
GB				
Gb				
gB				
gb				

9. According to the cross, how many offspring will have brown eyes?

How many will have green eyes?

How many will have blue eyes?