**Genotype and phenotype practice**

So far, we have been talking about *phenotype*—your observable traits. For every characteristic (such as eye color), there are different forms or varieties that someone can actually have (for example, people can have blue, green, hazel, or brown eyes).

All of these traits are caused by variations in your genes. Many genes can come in one of two different forms. We represent those forms with either a capital letter or a lowercase letter. For example, the gene for eye color can come in the B form (brown) or the b form (not brown). These different forms are called *alleles.*

Every individual has two copies of each gene, one from the mother and the other from the father. Thus, for eye color, you could be:

BB: two brown alleles

Bb: one brown allele, one nonbrown allele

bb: two nonbrown alleles

One allele is dominant. The other allele is recessive. The dominant allele masks or covers up the other gene. Brown eyes are dominant over blue eyes. If you have a brown allele, your eyes will be brown no matter whether the other allele is. Thus, if a person is Bb with one brown allele and one nonbrown allele, then that person will have brown eyes, not a mixture of brown and blue.

If you are BB, your eyes will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If you are Bb, your eyes will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If you are bb, your eyes will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Many genes have two alleles or forms, one that is dominant and one that is recessive. For each of the traits we looked at, there is a dominant and a recessive form.

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| --- | --- | --- |
| **Trait** | **Dominant** | **Recessive** |
| Brown eyes | Brown (BB or Bb) | Nonbrown (bb) |
| Freckles | Freckles (FF or Ff) | No freckles (ff) |
| Tongue rolling | Can roll (RR or Rr) | Can’t roll (rr) |
| Dimples | Dimples (DD or Dd) | No dimples (dd) |
| Earlobe attachment | Unattached (EE or Ee) | Attached (ee) |
| Widow’s peak | Widow’s peak (WW or Ww) | Straight hairline (ww) |
| Cleft chin | Cleft chin (CC or Cc) | Smooth chin (cc) |
| Hair color | Dark (HH or Hh) | Light (hh) |

Hair texture is a more complicated because textured hair (T) is not completely dominant over straight hair (t). If you have one curly allele and one straight allele (Tt), then you end up with wavy hair. This is called incomplete dominance.

Step 1: Figure out your genotype

What’s your genotype? Remember, you have two copies of every gene! One gene comes from each parent.

If your phenotype (your observable traits, such as eye color) is recessive (b), then your genotype (the forms of a gene that you have) must have two recessive alleles (bb).

If your phenotype is dominant (B), then your genotype could be either two dominant alleles (BB) or one dominant and one recessive allele (Bb). In this exercise, if you have the dominant phenotype, assume that you have one dominant and one recessive allele (Bb) unless you know for sure that no relative (grandparent, aunt, uncle, parent, or sibling) has the recessive trait. Only if no relative is recessive should you record two dominant alleles (BB)

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| --- | --- | --- | --- | --- |
| **Trait** | **Dominant** | **Recessive** | **Phenotype** | **Genotype** |
| Brown eyes | Brown (BB or Bb) | Nonbrown (bb) |  |  |
| Freckles | Freckles (FF or Ff) | No freckles (ff) |  |  |
| Tongue rolling | Can roll (RR or Rr) | Can’t roll (rr) |  |  |
| Dimples | Dimples (DD or Dd) | No dimples (dd) |  |  |
| Earlobes | Unattached (EE or Ee) | Attached (ee) |  |  |
| Widow’s peak | Widow’s peak (WW or Ww) | Straight hairline (ww) |  |  |
| Cleft chin | Cleft chin (CC or Cc) | Smooth chin (cc) |  |  |
| Hair color | Dark (HH or Hh) | Light (hh) |  |  |
| Hair texture | Curly (TT) Wavy (Tt) | Straight (tt) |  |  |