

Name _____

Creating a Baby One Flip At a Time!!



Heredity is the passing of traits from parent to offspring. The genetic makeup of an individual is known as its **genotype**. The physical characteristics of an individual, which are the result of its genotype and its environment, are known as **phenotype**.




Some alleles are expressed only when the genotype is homozygous. These alleles are said to produce **recessive phenotypes**. Alleles that are expressed whether the genotype is homozygous or heterozygous produce **dominant phenotypes**. If someone displays a recessive phenotype you will know their genotype. However, if they display a dominant phenotype you will not know if they are homozygous or heterozygous. An allele that codes for a dominant trait is represented by a capital letter, while an allele that codes for a recessive trait is represented by a lower case letter. Sometimes when the genotype is heterozygous, neither the dominant nor the recessive phenotype occurs. In this situation, called **incomplete dominance**, a phenotype that is a blending of the two alleles is produced.



In humans, the sex of an individual is determined by the particular combination of two chromosomes called the **sex chromosomes**. Individuals who have two X chromosomes (XX) are females, whereas those who have an X and a Y chromosome (XY) are males. In this investigation, you will observe how the results of different allele combinations produce certain traits.

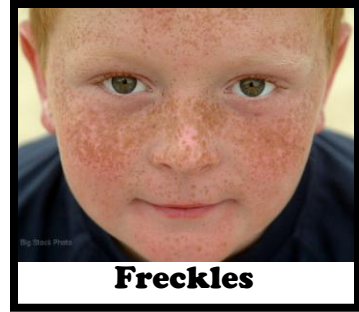
Many human traits are **polygenic traits**. "Poly" means many. A polygenic trait is where many genes affect one trait. Human height, hair, skin and eye color are all examples of polygenic traits.

1. What does a single side of a double-sided coin represent?
 2. What is the probability (%) that a single coin toss will result in heads? _____ in tails? _____
 3. Why is a coin toss a good way to represent allele combinations that occur in nature?
 4. Can you accurately determine an organism's genotype by observing its phenotype? Explain your answer.
 5. What is it called when many genes affect one trait?
1. Determine which partner will toss for the female and which will toss for the male (just in case there are groups of 2 boys or 2 girls). Remember that there are 2 genes per trait—one from mom and one from dad.
 2. Have the partner who is representing the male flip a coin to determine the sex of the offspring. Heads up is a female, tails up is a male. It's a **BOY** or **GIRL** (circle one)
 3. For all coin tosses you will now make, **heads will represent the dominant allele** and **tails will represent the recessive allele**. For review, **HEADS**= _____ allele and **TAILS** = _____ allele.
 4. You and your partner should flip your coins at the same time to determine the phenotype of the first trait—shape of face. Each side of the coin represents an allele. For example, if mom flips a head, that is R and dad flips a tail, that is r so the offspring would have a genotype of Rr and a phenotype of Round (refer to the "Trait Sheet" for alleles and phenotypes). Since in a coin toss you have a 50/50 chance of heads/tails it is a good way to represent the allele possibilities of a heterozygous parent.
 5. Record the alleles that resulted from the coin flips and determine the genotype and phenotype for each trait. (You do NOT get to pick the traits you want; life doesn't work that way!) Remember that Dominant alleles are written with an uppercase letter and recessive alleles are lowercase.
 6. Repeat steps 4 and 5 for each of the traits.
 7. **Using the recorded traits**, draw a picture of your baby on the back in the space provided—be sure to color it too. Remember you are drawing a baby—no tattoos, no mustaches, no pierced ears, nose, etc. and not too much hair!

| | Trait | Allele from Mom | Allele from Dad | Genotype (actual alleles) | Phenotype (physical characteristics-what you see) |
|--|---|-----------------|-----------------|---------------------------|---|
| | Shape of Face | | | | |
| | Cleft in Chin | | | | |
| | Texture of Hair | | | | |
| | Widow's Peak | | | | |
| | Spacing of Eyes | | | | |
| | Shape of Eyes | | | | |
| | Position of Eyes | | | | |
| | Size of Eyes | | | | |
| | Length of Eyelashes | | | | |
| |  Shape of Eyebrows | | | | |
| | Position of Eyebrows | | | | |
| | Size of Nose | | | | |
| | Shape of Lips  | | | | |
| | Size of Ears  | | | | |
| | Size of Mouth | | | | |
| | Freckles | | | | |
| | Dimples | | | | |



Widows Peak



Freckles



Dimples

**The actual combination of genes is much more complicated than is indicated by this investigation. Some of the traits result from multiple alleles, but in order to simplify the investigation, assume that all of the traits used are the result of the combination of 2 alleles.

1. What are the possible genotypes of the parents of an offspring who has wavy hair?
2. Do you think that another pair of students in your class would have an offspring genetically identical to yours? Support your answer.
3. How is this coin-toss method similar to the way in which traits are inherited in living things? How is it different?
4. What is a polygenic trait? List some examples.
5. Place an "X" next to the traits in the table above that represent incomplete dominance.