

# Traits and Inheritance

- Mendel knew from his experiments with pea plants that there must be \_\_\_\_\_ sets of “instructions” for each \_\_\_\_\_.
- In his experiments, the \_\_\_\_\_-generation plants had carried the instructions for both the dominant and the recessive trait. These sets of instructions are now called \_\_\_\_\_.

**Gene** – One set of instructions for an inherited trait.

- Each \_\_\_\_\_ gives one set of genes to the offspring.
- Because the offspring get one set of genes from each parent, they have two forms of the same gene (two sets of “instructions”) for each characteristic.
- The different forms of a gene (often dominant or recessive) are called \_\_\_\_\_.

**Allele** – One of the alternative forms of a gene that governs a characteristic, such as hair color.

**Phenotype** – An organism’s \_\_\_\_\_ or other detectable characteristic.

- **For example, in pea plants possible phenotypes for the characteristic of flower color are purple flowers or white flowers.**

**Genotype – The combination of \_\_\_\_\_ for one or more specific traits.**

- **The allele for the \_\_\_\_\_ trait is often represented with a capital letter (i.e. “*P*”).**
- **The allele for the \_\_\_\_\_ trait is often represented with a lower-case letter (i.e. “*p*”).**
- **Because purple flowers is the dominant trait in pea plants, the plant only needs one purple flower allele to exhibit the phenotype of purple flowers. (a plant with either genotype *PP* or *Pp* will show purple flowers)**
- **Because white flowers is the recessive trait in pea plants, the plant needs two white flower alleles to exhibit the phenotype of white flowers. (a plant with the genotype *pp* will show white flowers)**
- **An organism with two dominant or two recessive alleles (i.e. *PP* or *pp*) is said to be \_\_\_\_\_.**
- **An organism with one dominant and one recessive allele (i.e. *Pp*) is said to be \_\_\_\_\_.**

## Punnett Squares

- A Punnett square is used to organize and predict all the possible outcomes of offspring from particular parents.
- The \_\_\_\_\_ between true-breeding purple flowered plants and true-breeding white flowered plants would be shown as:

$$PP \times pp$$

- A Punnett square showing this cross would be:

	<i>p</i>	<i>p</i>
<i>P</i>	<i>Pp</i>	<i>Pp</i>
<i>p</i>	<i>Pp</i>	<i>Pp</i>

- Each of the four smaller squares within the Punnett square represents a \_\_\_\_\_% chance of the offspring having that genotype.
- In the above cross, all of the offspring would have the genotype \_\_\_\_\_, and therefore would have \_\_\_\_\_ flowers.

## **What Are the Chances?**

- **Each parent has \_\_\_\_\_ alleles for each gene. Offspring are equally likely to receive either allele, so there is a \_\_\_\_\_% chance of getting either.**

**Probability – The likelihood that a possible future event will occur in any given instance of the event.**

**EX: If you toss a coin, the probability of tossing tails is  $\frac{1}{2}$  or 50%.**

- **To have white flowers, a pea plant must receive a recessive allele from each parent. In a  $Pp \times Pp$  cross, the offspring have a  $\frac{1}{2}$  or 50% chance of getting a recessive allele from either parent. The probability of receiving a  $p$  allele from *both* parents is  $\frac{1}{2} \times \frac{1}{2}$ , which equals \_\_\_\_\_ or \_\_\_\_\_%.**

## **More About Traits:**

- **Mendel's experiments outlined the basics in the way that inheritance works, but as scientists learned more about genetics, they discovered \_\_\_\_\_ to**

**Mendel's principles:**

- \_\_\_\_\_ **dominance** – **When one trait is not completely**

**dominant over the other, but both traits have some degree of influence.**

**EX: red snapdragons crossed with white snapdragons will produce pink snapdragons.**

- **One Gene, Many traits – Sometimes one gene influences more than one trait.**

**EX: The gene that causes white fur in a tiger also causes blue \_\_\_\_\_.**

- **Many Genes, One Trait – Some traits are the result of many genes acting together, making it difficult to pin down a dominant or recessive gene.**

**EX: skin, \_\_\_\_\_, and eye color in humans**

➤ \_\_\_\_\_ also plays a part in the traits exhibited by an organism.

**EX: A person's genes may make it possible for them to be tall, but if they don't eat a healthy diet they won't grow to full height.**