**Unit 6: Genetics**

**Guided Notes: Genes and Chromosomes**

**Big Idea:** The main idea of this lesson is to understand the relationship between \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and how they contribute to \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Key Concepts:**

* Genes are small sections of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Chromosomes are found in the cell's \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Sister chromatids are joined at a point called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Most genes code for specific \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Proteins determine \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in living things.

****

**Real World Examples:**

1. Think of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as a book in a library. Every \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is like a chapter in that book. Each chapter contains information that contributes to the whole story (trait) of the book.
2. Imagine a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as a school locker Inside the locker, there are many folders (chromosomes). Each folder contains several pages (genes) that have important information (genetic information) about different subjects (traits).

**Guided Notes: Define Genotypes and Phenotypes**

**Big Idea:** The main idea of this lesson is to describe \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Key Concepts:**

* Living things have traits, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Chromosomes are microscopic structures in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of cells.
* The different forms of a gene are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The combination of alleles an organism has is its \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The observable traits of organisms are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Some alleles, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ alleles, determine the trait whenever they are present.
* Other alleles, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ alleles, only determine the trait if no dominant alleles are present.



**Real World Examples:**

1. If you think of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as a recipe book, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the different recipes for making cookies. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is like the list of ingredients you have, and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the actual cookie (observable trait) you make.
2. In a house, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is like the blueprint of the house, while the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the different designs. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the specific design you choose, and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the house you build.

**Guided Notes: Relate Genotypes and Phenotypes**

**Big Idea:** The main idea of this lesson is to explain the relationship between \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Key Concepts:**

* Traits, such as the height of pea plants, are determined by \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Genes have different forms, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the set of alleles a living thing has for a trait.
* The term \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or purebred describe having two of the same alleles for a trait.
* The term \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or hybrid describe having two different alleles for a trait.
* Some alleles are \_\_\_\_\_\_\_\_\_\_\_\_\_\_. They are expressed whenever they are present.
* Some alleles are \_\_\_\_\_\_\_\_\_\_\_\_\_\_. They are expressed only when a dominant allele is not present.
* An organism’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_ leads to its \_\_\_\_\_\_\_\_\_\_\_\_\_\_, or observable trait.



**Real World Examples:**

1. In a garden, there are two types of pea plants: tall and short. The tall trait is \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the short trait is \_\_\_\_\_\_\_\_\_\_\_\_\_\_. A pea plant with the genotype Tt is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for height and will have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ phenotype.
2. In a litter of puppies, some have black fur, and some have brown fur. The black fur trait is \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the brown fur trait is \_\_\_\_\_\_\_\_\_\_\_\_\_\_. A puppy with the genotype bb is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for fur color and will have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ phenotype.

**Guided Notes: Modeling Mutations**

**Big Idea:** The main idea of this lesson is to understand how a change in a gene, called a \_\_\_\_\_\_\_\_\_\_, can affect the \_\_\_\_\_\_\_\_\_\_ produced by that gene, which can lead to disorders such as sickle cell anemia.

**Key Concepts:**

* A \_\_\_\_\_\_\_\_\_\_ is a section of a chromosome that contains information about making a specific protein.
* \_\_\_\_\_\_\_\_\_\_ is a protein that carries oxygen in our blood.
* A \_\_\_\_\_\_\_\_\_\_ is a change in genetic information.
* \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is the molecule that carries information from genes to the site of protein synthesis in the cell.
* \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ are the building blocks of proteins.
* A \_\_\_\_\_\_\_\_\_\_ is a structure in the nucleus of cells that contains genetic information.
* The \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is the information in a gene.
* Sickle cell anemia is one example of a disorder that results from a \_\_\_\_\_\_\_\_\_\_.

**Real World Examples:**

1. If you change one letter in a recipe, like changing "salt" to "silt," the dish might taste very different. This is like how a \_\_\_\_\_\_\_\_\_\_ in a gene can change the \_\_\_\_\_\_\_\_\_\_ that is produced.
2. Imagine building a LEGO model using instructions. If one step is wrong, the whole model might look different. This is like how a mutation in the \_\_\_\_\_\_\_\_\_\_ can affect the sequence of \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_, leading to a different protein.

**Guided Notes: Explain Effects of Mutations**

**Big Idea:** The main idea of this lesson is to understand that mutations can have different effects on an organism. These effects can be \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_.

**Key Concepts:**

* A \_\_\_\_\_\_\_\_\_\_ is a change in an organism’s genetic information.
* A \_\_\_\_\_\_\_\_\_\_ mutation causes a disease, disorder, or other negative impact.
* A \_\_\_\_\_\_\_\_\_\_ mutation helps a living thing survive in its environment.
* A \_\_\_\_\_\_\_\_\_\_ mutation does not affect an organism.
* \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is a disorder caused by a mutation that results in very thick secretions that impact digestion and breathing.
* \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is a disorder caused by a mutation that leads to uncontrolled cell division.
* \_\_\_\_\_\_\_\_\_\_ is anything that helps an organism better survive in its environment.
* \_\_\_\_\_\_\_\_\_\_ is coloring or shape that helps an organism blend with its environment.
* \_\_\_\_\_\_\_\_\_\_ is the variety among living things in an area.

**Real World Examples:**

1. If a student changes one letter in a word, like changing "cat" to "bat," the meaning of the word changes. Similarly, a \_\_\_\_\_\_\_\_\_\_ in DNA can change the \_\_\_\_\_\_\_\_\_\_ that is formed.
2. Imagine a student wearing a camouflage jacket in a forest. This helps them blend in and avoid being seen, similar to how a \_\_\_\_\_\_\_\_\_\_ mutation might help an animal \_\_\_\_\_\_\_\_\_\_ in its environment.

**Guided Notes: Genetic Factors and Growth**

**Big Idea:** The main idea of this lesson is to understand how \_\_\_\_\_\_\_\_\_\_ factors influence the \_\_\_\_\_\_\_\_\_\_ of organisms.

**Key Concepts:**

* \_\_\_\_\_\_\_\_\_\_ rate is the amount of growth per specified time.
* \_\_\_\_\_\_\_\_\_\_ factors are inherited genes a living thing receives from its parents.
* \_\_\_\_\_\_\_\_\_\_ data are measurements describing growth.
* \_\_\_\_\_\_\_\_\_\_ average height is the calculated mean of the final plant heights.

**Real World Examples:**

1. If you and your siblings are all different heights, this is because of \_\_\_\_\_\_\_\_\_\_ factors. You inherited different genes from your parents that influence your \_\_\_\_\_\_\_\_\_\_ rate.
2. Think about different breeds of dogs. A Great Dane is much larger than a Chihuahua because of \_\_\_\_\_\_\_\_\_\_ factors that affect their \_\_\_\_\_\_\_\_\_\_.

**Guided Notes: Environment and Growth**

**Big Idea:** The main idea of this lesson is to understand how \_\_\_\_\_\_\_\_\_\_ factors influence the \_\_\_\_\_\_\_\_\_\_ of organisms.

**Key Concepts:**

* \_\_\_\_\_\_\_\_\_\_ is a long period of time without rain.
* An \_\_\_\_\_\_\_\_\_\_ factor is any part of a living thing’s surroundings.
* \_\_\_\_\_\_\_\_\_\_ is a substance that can be added to soil that provides nutrients to plants.
* \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ are two nutrients used by plants.

****

**Real World Examples:**

1. Imagine you have two identical plants. You place one in a sunny window and the other in a dark room. The plant in the sunny window grows taller and healthier because of the \_\_\_\_\_\_\_\_\_\_ factor, which is the amount of \_\_\_\_\_\_\_\_\_\_ it receives.
2. Think about a garden. If you add \_\_\_\_\_\_\_\_\_\_ to the soil, the plants grow better because they get more \_\_\_\_\_\_\_\_\_\_, which helps them develop strong roots and leaves.