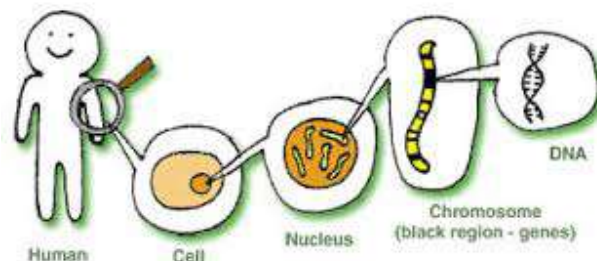


Human Genetics Lab – Background Information

Name: _____ Date: _____ Core: _____

LT: I can read and interpret information about observable characteristics and how they are transferred from parents to offspring.

Physical Traits are observable characteristics. While each of us shares some of our traits with many other people, our own individual combination of traits is what makes each of us look unique.



Physical traits are determined by specific pieces of DNA called **genes**. Multiple genes are grouped together to form chromosomes, which are stored in the nucleus of the cell. Every cell (except sperm or egg cells) in an individual's body contains two copies of each gene. Our cells each have two copies of every gene because the mother and father provide each one copy at the time of conception.

Every time our cells divide, these original genes that we got from our parents get copied so that all our cells contain the same DNA. Genes store the information needed for the cell to make proteins, which eventually cause our specific physical traits.

After Reading Physical Traits, what is the most *important* word? _____

Use your chosen word in a sentence below.















After Reading Physical Traits, what are you unclear about?

Dominant & Recessive Alleles

Most genes have two or more variations, called **alleles**. For example, the gene for hairline shape has two alleles – widow's peak or straight. An individual may inherit two identical or two different alleles from their parents.

When two different alleles are present they interact in specific ways. For many of the traits included in this activity, one version of the gene is **dominant** and the other is **recessive**.

The traits due to **dominant alleles** are always observed, even when a recessive allele is present. Traits due to **recessive alleles** are only observed when two recessive alleles are present.

Dominant Gene		Recessive Gene	
Cleft Chin		No Cleft	
Widow's Peak		No Widow's Peak	
Dimples		No Dimples	
Brown/Black Hair		Blonde Hair	
Freckles		No Freckles	
Brown Eyes		Gray/Blue Eyes	
Free Earlobe		Attached Earlobe	

For example, the allele for widow's peak is dominant and the allele for straight hairline is recessive. If an individual inherits:

- Two widow's peak alleles (both dominant) —→ their hairline will have a peak
- One widow's peak allele (dominant) and one straight hairline allele (recessive) —→ they will have a widow's peak
- Two straight hairline alleles (recessive) —→ their hairline will be straight.

Explain what is meant by dominant and recessive?

Common Misconceptions

A widespread misconception is that traits due to dominant alleles are the most common in the population. While this is sometimes true, it is not always the case. For example, the allele for Huntington's Disease is dominant, while the allele for not developing this disorder is recessive. At most, only 1 in 20,000 people will get Huntington's; most people have two recessive, normal alleles.

Most human genetic traits are the product of interactions between several genes. Many of the traits included in this activity, however, are part of the small number that may be due to only one pair of alleles.

% of Human Traits Table

Trait	Frequencies
Gender	Female – 50% Male – 50%
Thumb extension	Straight thumb – 75% Hitchhiker's thumb – 25%
Tongue rolling	Can roll tongue – 70% Cannot roll tongue – 30%
Handedness	Right handed – 93% Left handed – 7%
Hand clasping	Left thumb on top – 55% Right thumb on top – 44% No preference – 1%
Color vision	Normal females – almost 100% Colorblind females – 0.5% Normal males – 92% Colorblind males – 8%

Using % of Human Traits Table AND the Dominant Recessive Table, explain why it is incorrect to say that dominant alleles are always the most common.

More information about Common Physical traits is listed below. Note that scientists usually use the shorthand of a “dominant trait” rather than saying that a trait is due to a dominant allele.

Physical traits are determined by specific pieces of DNA called genes.

Gender – Females have two X chromosomes, while males have an X and a Y chromosome. Maleness is determined by a specific region of the Y chromosome. Femaleness results from the lack of this region.

Earlobe attachment – Some scientists have reported that this trait is due to a pair of alleles for which unattached earlobes is dominant and attached earlobes is recessive. Other scientists have reported that this trait is probably due to several genes.

Thumb extension – This trait is reportedly due to a pair of alleles; straight thumb is dominant and hitchhiker’s thumb is recessive.

Tongue rolling – Tongue rolling ability may be due to a pair of alleles with the ability to roll the tongue a dominant trait and the lack of tongue rolling ability a recessive trait. However, many twins do not share the trait, so it may not be inherited.

Dimples – Dimples are reportedly due to a pair of alleles with dimples dominant (people may exhibit a dimple on only one side of the face) and a lack of dimples recessive.

Handedness – Some scientists have reported that handedness is due to a pair of alleles with right handedness dominant and left handedness recessive. However, other scientists have reported that the interaction of four alleles is responsible for this trait

Freckles – This trait is reportedly due to a single gene; the presence of freckles is dominant, the absence of freckles is recessive.

Hair curl – Early geneticists reported that curly hair was dominant and straight hair was recessive. More recent scientists believe that more than two alleles may be involved.

Cleft chin – This trait is reportedly due to a pair of alleles with a cleft chin dominant and a smooth chin recessive.

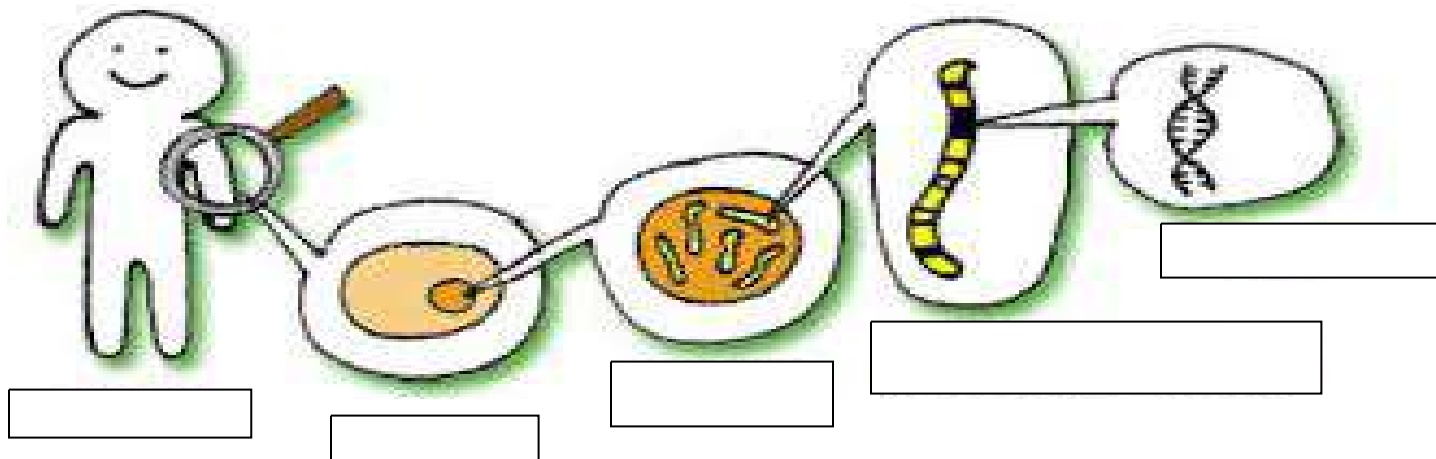
Allergies – While allergic reactions are induced by things a person comes in contact with, such as dust, particular foods, and pollen, the tendency to have allergies is inherited. If a parent has allergies, there is a one in four (25%) chance that their child will also have allergy problems. This risk increases if both parents have allergies.

Hairline shape – This trait is reportedly due to a pair of alleles with a widow’s peak dominant and a straight hairline recessive.

Hand clasping – Some scientists report that there may be a genetic component to their trait while others have found no evidence to support this.

Colorblindness – Colorblindness is due to a recessive allele located on the X chromosome. Women have two X chromosomes, one of which usually carries the allele for normal color vision. Therefore, few women are colorblind. Men only have one X chromosome, so if they carry the allele for colorblindness, they will exhibit this trait. Thus, colorblindness is seen more frequently in men than in women.

Label the following; (**DNA, Cell, Human, Nucleus, Chromosome**)



Physical Traits

