

Where did you get those Genes?

Objectives:

- demonstrate how genes are transmitted from parent to child
- identify genes and chromosomes
- understand terms: dominant, recessive, homozygous, and heterozygous

Missouri Curriculum Frameworks:

5-8

Strand VII Living Systems (D. Reproduction/Heredit)

1a. present a visual representation of variation in offspring due to sexual reproduction or how asexual reproduction results in genetic clones of the parent (1.3, 1.8, 3.5, 4.6)

2a. use models to demonstrate how genetic material is transmitted and how gene traits are expressed in offspring (1.3, 2.2)

3a. organize data, information, and ideas into a visual representation of the patterns and relationships involved in the chromosome contributions of gametes in sexual reproduction (1.6, 1.7, 1.10, 2.1, 3.2, 4.6)

Materials:

Paper cut into X's to resemble a chromosome- 3 per participant (see figure 2, on page 4)

Scissors

Tape

Pens or markers

Vocabulary:

Sexual reproduction - reproduction involving the union or fusion of a male and a female gamete; produces variation in populations.

Asexual reproduction - reproduction without the fusion of gametes, identical clones are produced, no variation.

Chromosome - A threadlike linear strand of DNA that carries the genes and transmits hereditary information.

Allele - one of two alternative forms of a gene, are responsible for alternative traits.

Homozygous - pair of identical alleles for a character

Heterozygous - having 2 different alleles for a character.

Phenotype - an organism's outward appearance.

Genotype - an organism's genetic makeup

Pedigree chart - a test in which you look at the offspring of parents to determine the genotypes of the parents.

Dominant - an allele that produces the same phenotype whether its allele is identical or dissimilar

Recessive - designating an allele that does not produce a characteristic trait when present with a dominant allele. (or a trait that is expressed when determining allele is homozygous)

Discussion: Why does everyone look different? (because of sexual reproduction NOT asexual). Review and/or explain how sexual reproduction allows for alleles within the genes on chromosomes to cross over which results in a different look. Define and give examples of dominant, recessive, heterozygous, and homozygous. Examine and explain a pedigree chart. (See figure 1, page 3.)

Activity:

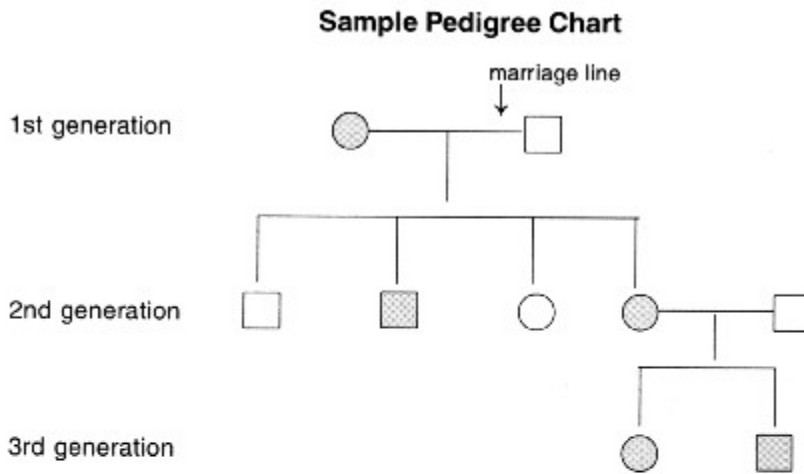
1. Each participant should record the eye color and hair color of both parents and make a pedigree chart.

Discussion: With the pedigree charts, decide what traits are dominant and which are recessive. For example black hair is dominant and red is recessive. Then explain heterozygous and homozygous again. For example, if mom had black hair and dad had black hair but the child has red then mom and dad both were heterozygous for black and gave the recessive alleles to the child resulting in red hair. (it's rare but good example!)

2. Look at the paper Xs, which represent chromosomes. The left arm (everything left of the centromere) represents the gene for hair color and the right arm (everything right of the centromere) represents the gene for eye color.
3. Create your own traits by coloring each arm with appropriate colors (i.e. red for red hair, blue for blue eyes).
4. The second X represents your mother. Color in her characteristics.
5. Do the same for the other X, which is your father.
6. Cut each arm off the parents' chromosomes only. Try to rearrange the arms of the parent chromosomes to show your traits. (This exercise could get tricky with heterozygous traits. By working backwards you can figure out if the parents were heterozygous, which makes it easier.)

Figure 1 – Sample Pedigree Chart

From: Lucy Daniel East Carolina University, Greenville, NC, Encarta Schoolhouse
<http://encarta.msn.com/alexandria/templates/lessonFull.asp?page=1537>



Key to Pedigree Chart

Symbol	Meaning
○	female without the trait
●	female with the trait
□	male without the trait
■	male with the trait

Figure 2 – Chromosome X

