

Mr. Silluzio
Biology Lesson Plan



Course: 10th Grade Biology

Topic: Mendelian Genetics/Patterns of Inheritance

State Standards:

HS-LS3-3.

Apply concepts of probability to represent possible genotype and phenotype combinations in offspring caused by different types of Mendelian inheritance patterns.

Clarification Statements:

- Representations can include Punnett squares, diagrams, pedigree charts, and simulations.
- Inheritance patterns include dominant-recessive, codominance, incomplete dominance, and sex-linked.

Summary:

This activity serves as an introduction to the unit on Mendelian genetics. Students will begin to gain an understanding of how traits are passed from one generation to the next, how reproduction results in offspring with a unique genotype and phenotype, and the role of probability in the inheritance of alleles. The activity raises essential questions such as "Why do family members look alike?" and "Why do we see variation between different individuals?" This lesson should also provide context for key unit vocabulary such as: dominant, recessive, heterozygous, homozygous, allele, genotype, phenotype, and trait.

In this lesson, students will model the inheritance of traits from parents by offspring. Students will pair up, with one acting as the mother and the other as the father. Each will flip a coin, and depending on which way the coin lands that person will donate either a recessive or dominant allele to the offspring. By doing so, students establish a genotype and a corresponding phenotype for 17 different facial characteristics. They will then combine these traits to create an offspring with a unique facial phenotype.

Goals/ Objectives:

Students will be able to:

- distinguish between genotype and phenotype
- predict possible genotypes of parents based on the genotypes of offspring
- explain the role of probability in the inheritance of traits
- explain the cause of variation between individuals in a population

Time Required: 1 80 minute Period

Sequence of Events: Class will begin with a question asking students about patterns of inheritance in their own family. The teacher will then explain the activity and expectations for the activity. Students will begin by choosing a partner doing pre-lab questions with their partner. They will then follow the procedure laid out by the teacher and their packet. Each student in a pair will flip a coin, and depending on the heads/ tails combination, the offspring will inherit a specific genotype and corresponding phenotype. When they have flipped coins for all traits, they will draw their offspring. They will then reflect by completing the post-lab questions.

Time	Teacher activity	Student activity
10 mins	Introduce idea of alleles to students	Discuss traits they and their siblings have
5 mins	Explain procedure and expectations for the activity	Listen and take notes where needed
15 mins	Circulate, helping students with pre-lab questions	Answer Pre-lab questions
35 mins	Circulate the room. Clear up confusion, ask students questions about what they are observing and the role of probability in the inheritance of traits.	Flip coins to determine the genotype of offspring
10 mins	Circulate, helping students with post-lab questions	Post-lab questions
5 mins	Wrap up by emphasizing key ideas from lesson such as probability, the source of variation in offspring, and the difference between genotype and phenotype	

Homework: Finish any post lab questions that are incomplete

Lesson evaluation: If students are focused on flipping coins to determine genotype, then that is evidence of engagement. If they can explain the difference between heterozygous and homozygous in relation to their offspring, that is evidence of knowledge. If students can answer the post-lab questions accurately and thoughtfully, that is evidence of learning. If students are confused by the directions, or the relevance of the activity to the unit, then the teacher has not explained the activity clearly enough. If students are distracted and not focused on building and drawing offspring, the teacher will need to intervene.

Student assessment:

Students will be assessed based on their answers to teacher questions and to the post-lab questions. The teacher should look for the following in student responses:

- can the student differentiate between genotype and phenotype?
- can the student predict the genotypes of parents based on the genotypes of offspring?
- can the student explain the role of probability in the inheritance of traits?
- can the student explain why we observe variation between individuals in a species?

Accommodations: Some students may require additional time to complete assignments and unit assessments. One student may need very close supervision as a support.

Materials, equipment and supplies: Worksheets, coins, pencils

Safety concerns: None