Unit 2: Gene Expression & Mendelian Genetics

Content Area: **Science**
Course(s): **Modern Genetics**
Time Period: **Semester 1**
Length: **5 Weeks**
Status: **Published**

Standards

HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
	Asking Questions and Defining Problems
HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
	Constructing Explanations and Designing Solutions
LS1.A	Structure and Function
	Developing and Using Models
HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
LS3.A	Inheritance of Traits
LS3.B	Variation of Traits
	Patterns
	Cause and Effect

Enduring Understandings

1. Sexually reproducing organisms inherit forms of traits from each of their parents. The way these two forms interact determines the organism's gene expression, or phenotype.

2. Statistical analysis can be performed in order to determine the inheritance pattern of a trait, or the likelihood of offspring possessing a certain trait, given the genotype of their parents.

4. Punnett square tests can be used to determine the probability of a trait occurring in offspring of a given set of parents.

5. DNA is organizes into segments known as genes. Genes contain the information to form a protein. Proteins are responsible for determining the phenotype of an organism.

6. The specific shape of a protein is determined by the amino acids that make it up. Altering the order of Amino acids in a chain can change the structure and function of the protein.

7. Certain genes are only expressed at certain times in different types of cells. This allows for cell differentiation and specialization.

Essential Questions

1. How does the genotype of an organism affect its phenotype?

2. How is the probability of inheriting certain traits greater than others?

3. Can the appearance of certain genetic traits in a population be mathematically predicted?

4. How does the order of nitrogenous bases in a segment of DNA determine the amino acid sequence of a protein?

5. How can a change in the amino acid sequence of a protein affect the functioning of that protein, and ultimately change the phenotype of an organism?

Knowledge and Skills

Knowledge:

1. The genotype of an organism is determined by the alleles inherited from an organism's parents. Genotype determines an organism's phenotype.

2. Statistical analysis can be completed to determine the inheritance patterns of certain traits and the probability of offspring inheriting certain traits.

3. DNA is organized into gene segments. These segments code for proteins.

4. Mutation is any change in the DNA sequence. Mutations can cause changes to the amino acid sequence of a protein which can alter the phenotype of an organism.

5. Not all genes are expressed in every cell. Cells have a variety of forms and functions due to the expression of different genes in these cells.

Skills:

1. Develop and use models to display understanding and convey ideas.

2. Identify problems by asking questions and work on designing solutions to these problems

3. Conduct and investigation based on a given problem.

4. Construct an explanations based on evidence gathered from a scientific investigation.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit