Biology Frameworks Curriculum Pacing Guide

Patterns in Heredity and Selection

Crosscutting Concepts: Patterns; Scale, Proportion, and Quantity; Systems and System Models
Topics: Sexual Reproduction and Meiosis; Law of Segregation; Punnett Squares; Karyotypes and Chromosomal Mutations; Law of Independent Assortment;
Dihybrid Cross; Non-Mendelian Genetics

6-week Instructional Segment

Anchoring Phenomenon	**GSE**	**Sample Instructional Segment**	**Disciplinary Core Ideas**	**Science and Engineering Practices**	**Instructional Notes**
Non-identical twin siblings do not look like each other or their parents. **By the end of this unit, students will explain the phenomenon using the following concepts:** Parents produce haploid gametes through meiosis that join to produce an offspring	**SB3.** a, b, c **SB6.** b, d	**Law of Segregation and Punnett Squares: Different Strokes for Different Folks (part 1)** Alleles separate during meiosis to form haploid cells that are used to show the probability patterns for inheritance of traits in offspring. **Biodiversity and Patterns in Selection: Not the Weakest Link (part 2)** Random genetic	From *A Framework for K-12 Science Education*: ***By the end of grade 12*** **LS1.B: Growth and Development of Organisms** ● The organism begins as a single cell (fertilized egg). ● In sexual reproduction, meiosis occurs that results in the production of sex cells, such as gametes in animals (sperm and eggs), which contain only one member from each chromosome pair in the parent cell. **LS3.A: Inheritance of Traits** ● In all organisms the genetic instructions are carried in the chromosomes. ● Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA.	Developing and using models Using mathematics and computational thinking Engaging in argument from evidence Asking questions and defining problems Analyzing and interpreting data	Additional notes on topic, focus, and phenomena can be found within instructional segments. By the end of this unit, students are using the following language in their speaking and writing during EXPLAIN or ELABORATE: ● Genetic continuity ● Cellular reproduction (binary fission, mitosis, and meiosis)

through sexual reproduction. The gametes contain an allele for a trait that may be dominant or recessive. The combination of these alleles produces the genotype and phenotype of the offspring. Many alleles segregate and are assorted independently during the meiosis to produce variations in siblings. Punnett squares are useful in determining probability of inheriting traits		mutations in offspring affect the biodiversity in populations, influencing fitness and population stability.	• The instructions for forming species' characteristics are carried in DNA. **LS3.B: Variation of Traits** • The information passed from parents to offspring is coded in the DNA molecules that form the chromosomes. • In sexual reproduction, chromosomes can sometimes swap sections during meiosis, thereby creating new genetic combinations and more genetic variation. • DNA errors do occur and result in mutations, which are also a source of genetic variation. • Environmental factors can also cause mutations in genes, and viable mutations are inherited. • Environmental factors can affect expression of traits, and hence affect the probability of occurrences of traits in a population. • The variation and distribution of traits observed depend on both genetic and environmental factors. **LS4.A: Evidence of Common Ancestry and Diversity** • Genetic information...provides evidence of evolution. • DNA sequences vary among species...the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms.		• Genetic variation • Crossing over and nondisjunction during meiosis • Mutations • Patterns of inheritance • Segregation and independent assortment • Probability • Asexual and sexual reproduction • Interdependence • Ecosystems • Populations • Biodiversity • Survival within changing environmental limits • Speciation • Natural selection • Genetic drift

from parents. Some alleles do not follow Mendelian genetics and may be polygenic, multiple alleles codominant, or incompletely dominant. Errors may occur during meiosis and result in increased variation among offspring.			• Common ancestry is derivable from the similarities and differences in amino acid sequences.		

This instructional segment will segue into SB5 in Stability and Change in Ecosystems by connecting adaptations in skin color (a polygenic trait) based on latitude of ancestors to animal and plant adaptations in particular ecosystems. Also, it will connect to SB6 in Stability and Change in Populations Over Time and SB2 in Structure and Function of Molecular Genetics by connecting the idea that natural selection occurs based on random genetic variations that code for traits that may increase fitness.