Arlington Public School Science Curriculum Maps
Course/Class: General Science
Grade(s): 8th

UNIT: Genetics

LESSON(S): Punnett Squares, Advantages and Disadvantages of Asexual vs Sexual reproduction, Meiosis Posters, DNA Structure and Function, Protein Synthesis

Essential Questions:

- Why do living things reproduce?
- How do environmental and genetic factors influence the growth of organisms?
- What are the advantages and disadvantages of asexual and sexual reproduction?
- How are traits passed from parents to offspring?

Frameworks Standards:

8.MS-LS1-5. Construct an argument based on evidence for how environmental and genetic factors influence the growth of organisms.

8.MS-LS3-1. Develop and use a model to describe that structural changes to genes (mutations) may or may not result in changes to proteins, and if there are changes to proteins there may be harmful, beneficial, or neutral changes to traits.

8.MS-LS3-2. Construct an argument based on evidence for how asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. Compare and contrast advantages and disadvantages of asexual and sexual reproduction.

8.MS-LS3-3(MA). Communicate through writing and in diagrams that chromosomes contain many distinct genes and that each gene holds the instructions for the production of specific proteins, which in turn affects the traits of an individual.

8.MS-LS3-4(MA). Develop and use a model to show that sexually reproducing organisms have two of each chromosome in their cell nuclei, and hence two variants (alleles) of each gene that can be the same or different from each other, with one random assortment of each chromosome passed down to offspring from both parents.

Learner Outcomes (Knowledge):

Students will:

- Understand how environmental and genetic factors influence growth of an organism;

- Use models and diagrams to show that sexually reproducing organisms have two of each chromosome, hence two variations of each gene (alleles) and that random assortments of each alleles are passed down to offspring (Punnett Squares);
- Compare and contrast the advantages and disadvantages of asexual and sexual reproduction;
- Use diagrams and writing to explain the structure of chromosomes, genes, DNA, and how genetic information codes for proteins;
- Develop a model to understand mutations and understand that mutations change proteins and may either be harmful, beneficial, or neutral;

Vision of the Student as Learner skills:

Arlington Public School students will:

- work independently and collaboratively
- observe, analyze and synthesize information from a variety of sources to enhance existing understandings and construct new knowledge
- demonstrate perseverance by using repeated reasoning and inquiry
- participate in rigorous, focused discourse
- develop and defend arguments based on evidence and respectfully consider different perspectives
- create and critique original work

Vision of the Student as Global Citizen skills:

Arlington Public School students will:

- speak with and listen to others in a manner that is respectful of multiple perspectives
- cultivate and maintain healthy and rewarding relationships with diverse individuals and groups
- develop self-awareness and self-understanding
- think critically and reflect upon choices and their impact on others
- participate as a consumer of and contributor to the cultural and civic life of local and global communities

Instructional Strategies:

- Setting Objectives
- Cooperative Learning
- Summarizing & Note Taking
- Identifying Similarities and Differences
- Generating & Testing Hypotheses
- Direct & Scaffolding Instruction
- Inquiry-Based Teaching
- Alternative Assessments

Assessment Practices: Scientific modeling, On-line interactive labs, summative assessments, and CER writing.

Resources:

- Massachusetts Curriculum Frameworks 2016 - Science and Technology/Engineering
- McGraw Hill iScience Cause and Effect Grade 8
- Gizmos

- Edpuzzle
- pHet simulations
- Hands-on experiments