

Unit 3: Heredity
7th Grade Science
12 Class Meetings

Edited July 2021

Essential Questions

- How do structural changes to genes effect the function and structure of organisms?
- How do nature and humankind effect organism phenotypes?

Enduring Understandings with Unit Goals

EU 1: Genetic mutations effect the structure and function of organisms.

- Discover that gene structure directly effects protein structure.
- Conclude that altered protein structure and function modifies observable organism traits.

EU 2: Variations in traits and their effects on reproduction and survival.

- Compare and contrast the transfer of genetic information through mitosis and meiosis (sexual and asexual reproduction).
- Assess how the environment alters observable phenotype over generations (Natural selection, bottlenecking, etc).
- Discover how human technologies alter phenotype.

Standards

Next Generation Science Standards:

- MS-LS1-4: Use argument based on empirical data and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- MS-LS3-1: Develop and use a model to describe whys structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of an organism.
- MS-LS3-2: Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
- MS-LS4-3: Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
- MS-LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in population increase some individuals' probability of surviving and reproducing in a specific environment.
- MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
- MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increase and decrease of specific traits in populations over time.

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Common Core State Standards:

- 7.RP.A.2b: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- CCSS.ELA-LITERACY.RL.7.1: Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Gene structure and location

- Discover gene structure and location on a chromosome.
- Compare and contrast genetic transfer between sexual and asexual reproduction.
- Use Punnett squares to predict genotype.

2. Protein structure

- Track the transfer of information from genes to amino acids to polypeptides to proteins.

3. Phenotypic Traits

- Compare and contrast genotype and phenotype
- Analyze the different types of phenotypic presentation.
- Assess how the environment effects phenotype.
- Analyze how human technologies have been used to alter phenotype.

Interdisciplinary Connection:

- Language Arts - Word Problems
- Art – Illustrating mitosis and meiosis

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Daily Learning Objectives with *Do Now Activities*

Students will be able to...

- Evaluate and explain gene structure and location.
- Compare and contrast genetic transfer between meiosis and mitosis.**
- Predict and explain genotype using Punnett Squares.**
- Model the transfer of information from genes to polypeptide chains/proteins.
- Discover how proteins affect phenotype.
- Compare and contrast genotype and phenotype.
- Distinguish different types of phenotypic presentation
- Determine and explain how the environment can affect phenotype.**
- Demonstrate content knowledge for success on the unit exam.

Instructional Strategies/Differentiated Instruction

- Whole group instruction
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Graphic Organizer
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Homework
- Word walls with visuals
- Small group instruction

Assessments

FORMATIVE ASSESSMENTS:

- Warm-ups (NGSS IAB LS4-4 and LS4-6)
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Accountable Talk Discussions
- Do Now
- Student-led instruction
- Homework
- Performance Task- “Avatar Creator”
 - Future Rubric Assessment in 2021-2022

SUMMATIVE ASSESSMENTS:

- Quiz – EU 1

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- Quiz – EU 2
- Performance Task – “Avatar Creator”
- Unit 3 Test

Unit Task

Unit Task Name: “Avatar Creator”

Description: In this task, students will use their knowledge of genotypes and phenotypes to create an animal avatar for future unit tasks. They will choose the physical characteristics of an organism that represents their avatar and use Punnett Squares to represent the necessary genotype. They will use the Glencoe virtual lab to create these Punnett Squares and they will conclude possible parent combinations and environments of their avatar using the information taught in class (EU 1)(EU 2).

Evaluation: Summative Assessment and Future Rubric in 2021-2022 school year

Unit Resources

- Next Gen Science Standards
- Khan Academy
- OpenSciEd
- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- NGSS review online
- Glencoe Punnett Square Virtual Lab