

Jan. 2A Gr.8: Influencing Inheritance

Content Area: **Science**
Course(s):
Time Period: **January**
Length: **1 Weeks**
Status: **Published**

Unit Overview

This unit explores Genetic traits and influences on inheritance.

Enduring Understandings

By the end of the lesson, students should be able to:

- Distinguish between two categories of genetic engineering.
- Explain how humans can influence certain characteristics of organisms by selective breeding.
- Explain why gene modification, animal husbandry, and gene therapy are examples of artificial selection.
- Evaluate the impacts of human use of technology to influence the desired traits of organisms.

Essential Questions

- **Overarching Questions**
 - How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?
 - How does biodiversity affect humans?
- **Focus Question**
 - How does genetic variation among organisms affect survival and reproduction?
- **Lesson Questions**
 - How do different types of genetic engineering vary?
 - How do humans apply technology to select for certain traits in other organisms?
 - What social and environmental impacts result from the use of technology to influence the desired traits of organisms?
- **Can You Explain?**

- How do humans influence certain traits of organisms through various techniques?

Instructional Strategies & Learning Activities

- [The Five E Instructional Model](#)

Science Techbook follows the 5E instructional model. As you plan your lesson, the provided Model Lesson includes strategies for each of the 5Es.

- [Engage \(45–90 minutes\)](#)

Students are presented with different dog breeds, and are asked to think about the traits and patterns of inheritance of each breed. Students begin to formulate ideas around the Can You Explain? (CYE) question.

- [Explore \(180 minutes\)](#)

Students investigate questions about genetic engineering and the social and ethical considerations of gene technology. Students complete a Hands-On Lab about GMO testing.

- [Explain \(45–90 minutes\)](#)

Students construct scientific explanations to the CYE question by including evidence of how humans influence the genes of other organisms.

- [Elaborate with STEM \(45–135 minutes\)](#)

Students apply their understanding of inheritance by exploring careers in genetic engineering, the process of making GMO crops, and the cost/benefit analysis of GMO crops.

- [Evaluate \(45–90 minutes\)](#)

Students are evaluated on the state science standards, as well as Standards in ELA/Literacy and Standards in Math standards, using Board Builder and the provided concept summative assessments.

Integration of Career Readiness, Life Literacies and Key Skills

Students will work in small groups or partnerships to conduct investigations, build models or prototypes and present findings.

An individual's strengths, lifestyle goals, choices, and interests affect employment and income.

	for an authentic audience.
	Multiple solutions often exist to solve a problem.
WRK.9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
WRK.9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
WRK.9.2.8.CAP	Career Awareness and Planning
WRK.9.2.8.CAP.1	Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.
	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
	An essential aspect of problem solving is being able to self-reflect on why possible solutions for solving problems were or were not successful.
TECH.9.4.8.DC.2	Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).

Technology and Design Integration

Technology is fully integrated using Discovery Techbook.

	Troubleshooting a problem is more effective when knowledge of the specific device along with a systematic process is used to identify the source of a problem.
CS.6-8.8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
	People use digital devices and tools to automate the collection, use, and transformation of data. The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.
CS.6-8.8.1.8.CS.4	Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.

Interdisciplinary Connections

MA.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
LA.SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LA.RI.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
LA.W.8.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
LA.W.8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

LA.RI.8.7	Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to present a particular topic or idea.
MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.RI.8.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
LA.RI.8.10	By the end of the year read and comprehend literary nonfiction at grade level text-complexity or above, with scaffolding as needed.
MA.7.SP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:
MA.6.SP.B.5a	Reporting the number of observations.
MA.7.SP.A.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Differentiation

Struggling Students

1. Encourage students who are struggling to develop Scientific Explanations to think about their personal experiences with genetic engineering. For example, ask: *How are the crops and animals with which you interact on a regular basis influenced by artificial selection?*
2. Ask students to think about how inheritance occurs naturally. For example: Why do children often have similar features as the parents? Then ask them to consider ways humans affect the inheritance of

ELL

1. Allow students to describe a genetics career in their native language and then summarize it in English.
2. Draw a diagram or a model to show genetic inheritance. Point out key terms on the model.

Accelerated Students

1. Once students have read the passage, have them read it carefully a second or third time, making a list of questions that come to mind as they read. Questions can be about the relevant concepts directly (for example, genetic engineering) or about anything else related to the text. Extend this activity by having students research the answers to their questions on the Internet or asking one another the questions to solicit feedback and input from classmates.
2. Challenge accelerated students to take any activity in which they are involved a step further with more complete explanations or connections to other concepts (for example, gene therapy; world hunger).
3. Challenge students to conduct additional research or interviews to find out more about

other organisms.

careers in genetic engineering.

[Differentiation in science](#) can be accomplished in several ways. Once you have given a pre-test to students, you know what information has already been mastered and what they still need to work on. Next, you design activities, discussions, lectures, and so on to teach information to students. The best way is to have two or three groups of students divided by ability level.

While you are instructing one group, the other groups are working on activities to further their knowledge of the concepts. For example, while you are helping one group learn the planet names in order, another group is researching climate, size, and distance from the moon of each planet. Then the groups switch, and you instruct the second group on another objective from the space unit. The first group practices writing the order of the planets and drawing a diagram of them.

Here are some ideas for the classroom when you are using differentiation in science:

- Create a tic-tac-toe board that lists different activities at different ability levels. When students aren't involved in direct instruction with you, they can work on activities from their tic-tac-toe board. These boards have nine squares, like a tic-tac-toe board; and each square lists an activity that corresponds with the science unit. For example, one solar system activity for advanced science students might be to create a power point presentation about eclipses. For beginning students, an activity might be to make a poster for one of the planets and include important data such as size, order from the sun, whether it has moons, and so on.
- Find websites on the current science unit that students can explore on their own.
- Allow students to work in small groups to create a project throughout the entire unit. For example, one group might create a solar system model to scale. Another group might write a play about the solar system. This is an activity these groups can work on while they are not working directly with you.

Differentiation in science gets students excited to learn because it challenges them to expand their knowledge and skills, instead of teaching the whole group concepts they have already mastered

Modifications & Accommodations

Refer to QSAC EXCEL SMALL SPED ACCOMMODATIONS spreadsheet in this discipline.

Modifications and Accommodations used in this unit:

In addition to differentiated instruction, IEP's and 504 accommodations will be utilized.

In addition to differentiated instruction, IEP's and 504 accommodations will be utilized.

Benchmark Assessments

Benchmark Assessments are given periodically (e.g., at the end of every quarter or as frequently as once per month) throughout a school year to establish baseline achievement data and measure progress toward a standard or set of academic standards and goals.

Schoolwide Benchmark assessments:

Aimsweb benchmarks 3X a year

Linkit Benchmarks 3X a year

Additional Benchmarks used in this unit:

Pre and post assessments to measure growth.

Formative Assessments

Assessment allows both instructor and student to monitor progress towards achieving learning objectives, and can be approached in a variety of ways. **Formative assessment** refers to tools that identify misconceptions, struggles, and learning gaps along the way and assess how to close those gaps. It includes effective tools for helping to shape learning, and can even bolster students' abilities to take ownership of their learning when they understand that the goal is to improve learning, not apply final marks (Trumbull and Lash, 2013). It can include students assessing themselves, peers, or even the instructor, through writing, quizzes, conversation, and more. In short, formative assessment occurs throughout a class or course, and seeks to improve student achievement of learning objectives through approaches that can support specific student needs (Theal and Franklin, 2010, p. 151).

Formative Assessments used in this unit:

See assessments located in links above.

Summative Assessments

Summative assessments evaluate student learning, knowledge, proficiency, or success at the conclusion of an instructional period, like a unit, course, or program. Summative assessments are almost always formally graded and often heavily weighted (though they do not need to be). Summative assessment can be used to great effect in conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches.

Summative assessments for this unit:

See assessments located in links above.

Instructional Materials

See materials located in links above.

Discovery Techbook

Teacher made materials

Additional labs are available through NJCTL on-line curriculum

Standards

SCI.MS-LS3-1	<p>Develop and use a model to describe why 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 the organism.</p> <p>Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.</p> <p>Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.</p>
SCI.MS-LS4-5	<p>Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p> <p>Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes(mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits.</p> <p>Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.</p>
SCI.MS-LS3	Heredity: Inheritance and Variation of Traits
SCI.MS-LS4	Biological Evolution: Unity and Diversity