

Nov. 2E Gr.8: Mendel and Heredity

Content Area: **Science**
Course(s):
Time Period: **November**
Length: **4-5 Weeks**
Status: **Published**

Unit Overview

A monk named Gregor Mendel found out that you can predict what the offspring of two parents will look like. When the offspring changes over time, the entire species can change. In this concept, you will learn about heredity and how it came to be.

Enduring Understandings

Lesson Objectives

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

- Describe how dominant and recessive traits may be inherited.
- Predict the probable genotype of offspring based on the genotypes of the parents.
- Describe the discovery and process of artificial selection.

Essential Questions

- **Overarching Questions**

- How are characteristics of one generation passed to the next?
- How can individuals of the same species and even siblings have different characteristics?
- 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 Questions**

- How are the characteristics of one generation related to the previous generation?
- Why do individuals of the same species vary in how they look, function, and behave?
- How does genetic variation among organisms affect survival and reproduction?

- **Lesson Questions**

- What is heredity, and how were the principles of heredity discovered?
 - How do scientists make predictions about genetic inheritance and expression of traits?
 - How do humans select for certain traits in some organisms?
- **Can You Explain?**
 - What did Gregor Mendel’s work teach us about the passing of traits from one generation to the next?

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 various phenomena of inherited traits. Students begin to formulate ideas around the Can You Explain? (CYE) question.

- [Explore \(90 minutes\)](#)

Students investigate questions about how traits are inherited by using evidence from text and media assets. Students complete an Exploration and learn to use Punnett squares.

- [Explain \(45–90 minutes\)](#)

Students construct scientific explanations to the CYE question by including evidence of what Mendel’s work teaches us about the passing of traits from one generation to the next.

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

Students apply their understanding of Mendel and heredity as they learn about research conducted by geneticists, design a GMO farming process, and investigate blood types.

- [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.

Students will learn about what geneticists do.

Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.

Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.

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

Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.

WRK.9.2.8.CAP.10

Evaluate how careers have evolved regionally, nationally, and globally.

TECH.9.4.8.GCA.2

Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

TECH.9.4.8.GCA

Global and Cultural Awareness

Increases in the quantity of information available through electronic means have heightened the need to check sources for possible distortion, exaggeration, or misrepresentation.

Multiple solutions often exist to solve a problem.

WRK.9.2.8.CAP.12

Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.

WRK.9.2.8.CAP.11

Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics.

TECH.9.4.8.IML.1

Critically curate multiple resources to assess the credibility of sources when searching for information.

TECH.9.4.8.TL.2

Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).

Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.

TECH.9.4.8.GCA.1

Model how to navigate cultural differences with sensitivity and respect (e.g., 1.5.8.C1a).

TECH.9.4.8.TL.3

Select appropriate tools to organize and present information digitally.

TECH.9.4.8.IML.4

Ask insightful questions to organize different types of data and create meaningful visualizations.

Technology and Design Integration

Technology is fully integrated using Discovery Techbook.

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.

Interdisciplinary Connections

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.
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.
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.

Differentiation

Struggling Students

1. Show students the video segment "[Mendel's Contribution to Genetics](#)." Ask the questions: How did people think heredity occurred before Gregor Mendel did his research? How did Mendel's work change scientists' ideas about heredity? Show the video segment again. Then ask the questions again and facilitate a discussion around students' answers.
2. Provide students with clear examples of alleles and gene inheritance using rabbits. Assume that white-haired rabbits have two recessive alleles (cc). Dark-haired rabbits have at least one dominant allele (Cc or CC).

ELL

1. Assist students in identifying familiar prefixes and/or words within words (for example, "inherit" can be related to "inheritance") for each term.

Accelerated Students

1. Before completing the Core Interactive Text, ask students to use their existing knowledge to describe how traits get passed from parent to offspring. Do this with each Lesson Question and have students amend their answers after each lesson.
2. Using their previous knowledge of heredity, ask students to examine Punnett squares as evidence of dominant traits. Use the Punnett square example of ear

[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.

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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

	Natural selection leads to the predominance of certain traits in a population, and the suppression of others.
SCI.MS.LS4.B	Natural Selection
	Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena.
SCI.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.
	Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited.
	Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.
	Cause and Effect
	Emphasis is on using simple probability statements and proportional reasoning to construct explanations.
SCI.MS-LS3	Heredity: Inheritance and Variation of Traits
SCI.MS-LS4	Biological Evolution: Unity and Diversity
SCI.MS-LS4-4	Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

