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

Science 8th grade
Mendel and Modern Genetics
Objective(s)
Students will be introduced to the basic principals of heredity and modern genetics, starting with the contributions and tenets laid down by G Mendel.
Goal(s)
Students will be able to understand and use technical vocabulary to describe how and why physical traits are passed from parents to offspring.
Procedures
shoe sorting activity

plastic fishing lure taxonomy project

Course Material TCI Bring Science Alive- Cells and Genetics- Unit 4:8 Genes- Proteins, Genes, Chromosomes

4:9 Inheriting Genes

Assessment
class discussion
review of assignments
quizzes
tests
projects/ labs

Differentiation

Change the Pace:

pre-testing

curriculum compacting

tiered activities (start with more difficult activities and skip the easier ones)

independent study

learning centers (skip centers that student has mastered)

Change the Delivery/Content:

mini-lessons for small groups

use different resources (higher level books, higher level response questions, open ended questions/problems…)

curriculum compacting

independent study

open-ended questions

teacher conferences

reading journals

Change the Product:

choice boards or Tic Tack Toe menus

student choice options

game creation

technology-based products/presentations

Change the Process - Add Depth:

tiered activities

open-ended activities

higher-level questions

student experts

increase complexity, decrease structure

Change the Process - Add Breadth:

choice boards or Tic Tack Toe menus

interdisciplinary units

Science 8th grade

Sexual vs Asexual Reproduction Comparison

Objective(s)
Students will read and analysis information in a handout to become familiar with 6 types of asexual reproduction methods. Students will conduct online research in order to gain additional information about each specific method- spore, fragmentation, binary fission, budding, vegetative propagation, parthenagenesis, oogenesis
Goal(s)
Students will gain a working knowledge of the genetic makeup that results from asexual reproduction of offspring as well as the pros and cons of each method.
Procedures
Students will use the information packet and online sources to create Cornell Notes for each method. Once the note sheets/documents are created, students will discuss each method and debate the effectiveness of each methods pros and cons.

Course Material TCI Bring Science Alive- Cells and Genetics- Unit 2:5 Controlling Body Systems

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review of assignments
quizzes
tests
projects/ labs

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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.

9.2.8.CAP	Career Awareness and Planning
	An individual's strengths, lifestyle goals, choices, and interests affect employment and income.
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.
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
	Multiple solutions often exist to solve a problem.
	An essential aspect of problem solving is being able to self-reflect on why possible solutions for solving problems were or were not successful.
	Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
9.4.8.DC.2	Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
9.4.8.IML.12	Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

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.
8.1.8.CS.4	Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.
	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.
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.

Interdisciplinary Connections

LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
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.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
	Craft and Structure
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
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.RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LA.RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
MA.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
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.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.W.8.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.WHST.6-8.1.A	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
LA.WHST.6-8.1.B	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
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.WHST.6-8.2.A	Introduce a topic and organize ideas, concepts, and information using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.
LA.WHST.6-8.2.B	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
LA.WHST.6-8.2.C	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

LA.WHST.6-8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.WHST.6-8.2.E	Establish and maintain a formal/academic style, approach, and form.
LA.WHST.6-8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
LA.WHST.6-8.4	Produce clear and coherent writing in which the development, organization, voice, and style are appropriate to task, purpose, and audience.
LA.WHST.6-8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LA.WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
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.WHST.6-8.7	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.
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.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LA.WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
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.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.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.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.
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.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	ELL	Accelerated Students
1. Encourage students who are	1. Allow students	1. Once students have read the

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 other organisms.

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.

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 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 ACCOMMOCATIONS spreadsheet in this discipline.

Modifications and Accommodations used in this unit:

In addition to differentiated instruction, IEP's and 504 accommocations 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

MS-LS3	Heredity: Inheritance and Variation of Traits
MS-LS3-1	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. Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins. 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.
MS-LS4	Biological Evolution: Unity and Diversity
MS-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. 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. Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.