

**Eighth Grade Curriculum
Unit 4: Selection & Adaptation
Number of Days: 35**

Unit Focus	Essential Questions	Next Generation Standards	Disciplinary Core Ideas (DCI)
<p>Students construct explanations based on evidence to support fundamental understandings of natural selection and evolution. They will use ideas of genetic variation in a population to make sense of how organisms survive and reproduce, thus passing on the traits of the species. Students are also expected to articulate their position of a modern day issue that requires understanding of core ideas via argumentative essay writing.</p>	<ul style="list-style-type: none"> • <i>How can changes to the genetic code increase or decrease an individual's chances of survival?</i> • <i>How can the environment effect natural selection?</i> • <i>Are Genetically Modified Organisms (GMO) safe to eat?</i> 	<p style="text-align: center;"><u>MS-LS4-4</u></p> <p style="text-align: center;"><u>MS-LS4-5</u></p> <p style="text-align: center;"><u>MS-LS4-6</u></p> <p style="text-align: center;"><u>MS-ETS1-1</u></p> <p style="text-align: center;"><u>MS-ETS1-2</u></p>	<ul style="list-style-type: none"> • <u>LS4.B: Natural Selection</u> • <u>LS4.C: Adaptation</u>
	<p>Links to Unit 4</p>		
	<p><u>https://njctl.org/courses/science/7th-grade-science/inheritance-and-variation-of-traits/attachments/dragon-crossing-activity/</u></p> <p>*All teachers must register at https://njctl.org</p>		

NGSS Framework:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><u>Constructing Explanations and Designing Solutions</u></p> <ul style="list-style-type: none"> Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena. (MS-LS4-4) <p><u>Obtaining, Evaluating, and Communicating Information</u></p> <ul style="list-style-type: none"> Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS4-5) <p><u>Using Mathematics and Computational Thinking</u></p> <ul style="list-style-type: none"> Use mathematical representations to support scientific conclusions and design solutions. (MS-LS4-6) 	<p><u>LS4.B: Natural Selection</u></p> <ul style="list-style-type: none"> Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) In <i>artificial</i> selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5) <p><u>LS4.C: Adaptation</u></p> <ul style="list-style-type: none"> Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6) 	<p><u>Cause and Effect</u></p> <ul style="list-style-type: none"> Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4-4),(MS-LS4-5),(MS-LS4-6) <p>-----</p> <p>-----</p> <p align="center"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p><u>Interdependence of Science, Engineering, and Technology</u></p> <ul style="list-style-type: none"> Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS4-5) <p>-----</p> <p align="center"><i>Connections to Nature of Science</i></p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS4-5)

Unit 4A: Genetic Variation

Standard(s):

- **MS-LS4-4 BIOLOGICAL EVOLUTION** -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.

Student Outcomes	Inquiry Based Learning Activities	Materials/Resources
<p>Students will know:</p> <ul style="list-style-type: none"> • Natural selection leads to the predominance of certain traits in a population, and the suppression of others • Your traits are determined by the dominant and recessive alleles passed to you from your parents • The difference between genotype and phenotype and how phenotype depends on genotype • Why a person may end up being born with a birth defect or disease <p>Students will be able to:</p> <ul style="list-style-type: none"> • How to properly use a Punnett Square • Your traits are determined by the dominant and recessive alleles passed to you from your parents • How to perform a test cross to determine the unknown genotype of an organism • 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. 	<p>STEM activity*-Discover Genetics Kits http://nicerc.org/product/7th-grade-discover-genetics-kit/</p> <ul style="list-style-type: none"> • Dragon Crossing Activity https://njctl.org/courses/science/7th-grade-science/inheritance-and-variation-of-traits/attachments/dragon-crossing-activity/ 	<p><i>Materials Needed:</i> <u>Dragon Crossing Activity Lab</u></p> <ul style="list-style-type: none"> • <i>Teacher Companion key guide</i> <p>https://njctl.org/courses/science/7th-grade-science/inheritance-and-variation-of-traits/attachments/dragon-crossing-activity-solutions/</p> <p><u>Discover Genetics Kit-nicerc.org</u></p> <ul style="list-style-type: none"> • <i>Assorted candy</i> • <i>Plastic eggs</i> • <i>Pipe cleaners</i> • <i>Glue</i> • <i>Modeling clay</i> <p><i>Resources:</i> www.Njctl.org www.nicerc.org Edpuzzle.com Nearpod.com</p> <p>Additional Technology Resources:</p>

		<ul style="list-style-type: none"> • <i>Explore Learning</i> • <i>Nearpod.com</i> • <i>Edpuzzle.com</i> • <i>Brainrush.com</i> • <i>YouTube</i> • <i>Phet</i> • <i>Teacher Tube</i>
<p>Differentiated Instruction:</p> <ul style="list-style-type: none"> • Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena. • Provide ELL students with multiple literacy strategies. • Structure the learning around explaining or solving a social or community-based issue. • Collaborate with after-school programs or clubs to extend learning opportunities. • Restructure lesson using UDL principals (http://www.cast.org/our- 		<p>ELL Modifications:</p>

[work/about-udl.html#.VXmoXcfD_UA\)](#)

Assessments:

[**Mendelian Genetics-Punnett Squares**](#)

[**DOQ-Edconnect**](#)

Unit 4B: Natural & Artificial Selection

Standard(s):

- **MS-LS4-5- BIOLOGICAL EVOLUTION** -Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
- **MS-LS4-6- BIOLOGICAL EVOLUTION** -Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Student Outcomes	Inquiry Based Learning Activities	Materials/Resources
<p>Students will know that:</p> <ul style="list-style-type: none"> • Natural selection leads to the predominance of certain traits in a population, and the suppression of others. • In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. <p>Students will be able to:</p> <ul style="list-style-type: none"> • Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms 	<p>STEM activity*Apply Genetics Kit http://nicerc.org/product/8th-grade-apply-genetics-kit/</p> <ul style="list-style-type: none"> • John & Jane Activity-Punnett square practice & Lab write up https://njctl.org/courses/science/7th-grade-science/inheritance-and-variation-of-traits/attachments/jane-and-john-activity/ • Charles Darwin Peppered Moth Lab Game http://sciencechannel.com/games 	<p>Apply Genetics Kit-nicerc.org</p> <ul style="list-style-type: none"> • construction paper • toothpicks • large beans • craft wire • peppercorn • rubber bands • poster board • paper plates • craft sticks • foam bowls • Play-Doh® • pipe cleaners • foam ear plugs <p>John & Jane Activity Lab</p> <ul style="list-style-type: none"> • <i>Teacher resource /solutions page</i> <hr/> <p><i>Resources:</i> <i>Jane & John Activity- www.njctl.org</i></p> <p><i>Explore Genetics Kit</i> http://nicerc.org/product/6th-grade-explore-genetics-kit/#sthash.GGgLd6y0.dpuf</p>

Differentiated Instruction:

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.

Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)

ELL Modifications:

Assessments:

- **DOQ-Edconnect**

Argumentative Essay- *Are Genetically Modified Organisms (GMO) safe to eat?*