

# Englewood Public School District

## Science

### Grade 7

#### First Marking Period

#### Unit 1: Cell Structure and Function

**Overview:** Students demonstrate age appropriate abilities to plan and carry out investigations to develop evidence that living organisms are made of cells. Students gather information to support explanations of the relationship between structure and function in cells. They are able to communicate an understanding of cell theory and understand that all organisms are made of cells. Students understand that special structures are responsible for particular functions in organisms. They then are able to use their understanding of cell theory to develop and use physical and conceptual models of cells. The crosscutting concepts of scale, proportion, and quantity and structure and function provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in planning and carrying out investigations, analyzing and interpreting data, and developing and using models. Students are also expected to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

**Time Frame:** 10-15 Days

#### Enduring Understandings:

*Living things are made of cells; either one cell or many different numbers and types of cells*  
*Cells work together to form tissues, organs, organ systems, and organisms*

#### Essential Questions:

*How do cells contribute to the functioning of an organism?*  
*How will astrobiologists know if they have found life elsewhere in the solar system?*  
*How do the functions of cells support an entire organism?*

Standards	Topics and Objectives	Activities	Resources	Assessments
<b>(MS-LS1-1)</b> <b>Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</b>	<b>Topics</b> Cell Theory Cell Structure Cellular Transport Twenty-First Century Themes and Skills include:	Students will complete the text activities: 1. Discover Activity (p6) – Is Seeing Believing? 2. Discover Activity (p16) How large are cells? 3. Lab - Gelatin Cell (p18) 4. Discover Activity (p25) What's a compound? 5. Lab - Which foods are Fat-	<b>Text:</b> Prentice Hall Science Explorer: Cells and Heredity  <b>Materials:</b> For Discover Activity (p6) – Is Seeing Believing? • Black and white newspaper photograph • Color newspaper photograph • Hand lens	<b>Formative Assessments:</b>  • Journals • Learning/Response Logs • Discussions • Students will distinguish between living/nonliving

<p><b>(MS-LS1-2)</b>  <b>Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.</b></p>	<ul style="list-style-type: none"> <li>• The Four C's</li> <li>• Life and Career Skills</li> </ul> <p style="text-align: center;"><b>Objectives</b></p> <p>Students will:</p> <p>Conduct an investigation to produce data that provides evidence distinguishing between living and nonliving things.</p> <p>Conduct an investigation to produce data supporting the concept that living things may be made of one cell or many and varied cells.</p> <p>Distinguish between living and nonliving things.</p> <p>Observe different types of cells that can be found in the makeup of living things.</p> <p>Develop and use a model to describe the function of a cell as a whole.</p> <p>Develop and use a model to describe how parts of cells contribute to the cell's function.</p> <p>Develop and use models to describe the relationship between the structure and function of the cell wall and cell membrane.</p>	<p>free? PBL Health Class (p31)</p> <p>6. Discover Activity (p32) How do molecules move? Air freshener</p> <p>7. Lab - Diffusion in action. (p35) Clear plastic cups, food coloring, cold water, plastic dropper</p> <p>Students will learn how to use a microscope and look at plant and animal cells during Microscope Labs: 1) "e" 2) Cheek Cells 3) Elodea (also see <a href="https://www.biologycorner.com/worksheets/comparing_plant_animal.html">https://www.biologycorner.com/worksheets/comparing_plant_animal.html</a>). (MS-LS1-1, CRP8, 6.1.8.C.4b)</p> <p>Students will interact with virtual cells and play cell puzzles and games by exploring the website <a href="http://www.cellsalive.com/">http://www.cellsalive.com/</a>. (MS-LS1-2)</p> <p>Students will assess their knowledge of cells by completing the <u>Virtual Lab - Plant and Animal Cell</u>. (MS-LS1-1, 7.NS.A.3)</p> <p>Students will explore cell transport in the <u>Lab – Egg Osmosis</u>.</p> <p><b><u>Enrichment Activities:</u></b>  Students will determine if slides are plant or animal samples by completing the <u>Lab - Plant or</u></p>	<ul style="list-style-type: none"> <li>• Microscope</li> <li>• Scissors</li> </ul> <p>For Discover Activity (p16) How large are cells?</p> <ul style="list-style-type: none"> <li>• Calculator</li> <li>• Metric ruler</li> </ul> <p>For Gelatin Cell (p18)</p> <ul style="list-style-type: none"> <li>• Packet colorless gelatin</li> <li>• Warm water</li> <li>• Craft-type material</li> <li>• Stirrer</li> <li>• Rectangular or round pan</li> </ul> <p>For Discover Activity (p25) What's a compound?</p> <ul style="list-style-type: none"> <li>• Labeled containers of chemical compounds such as baking soda, salt, zinc oxide sun block</li> </ul> <p>For Lab - Which foods are Fat-free? PBL Health Class (p31)</p> <ul style="list-style-type: none"> <li>• 5 different snack dips in containers with labels</li> <li>• 5 fat-testing strips with key</li> <li>• Permanent marker</li> <li>• 5 cotton swabs</li> <li>• 5 small squares of paper towels</li> </ul> <p>For Discover Activity (p32) How do molecules move?</p> <ul style="list-style-type: none"> <li>• Air freshener</li> </ul> <p>For Diffusion in action. (p35)</p> <ul style="list-style-type: none"> <li>• Clear plastic cups</li> <li>• Food coloring</li> <li>• Cold water</li> <li>• Plastic dropper</li> </ul>	<p>things, single/multicellular organisms, and plant/animal cells by completing the <i>Microscope Labs: 1) "e" 2) Cheek Cells 3) Elodea</i>. Observation, Discussion</p> <p><b>Summative Assessments:</b>  Unit quizzes and test</p> <p>Students will demonstrate their knowledge of cell parts and functions by completing the <i>Lab - Gelatin Cell (p18)</i>, <i>visiting the website <a href="http://www.cellsalive.com/">http://www.cellsalive.com/</a></i> and completing the <u><i>Virtual Lab - Plant and Animal Cell</i></u>. Computer research, Rubric</p> <p>Students will be graded on responses to <u><i>Lab – Egg Osmosis</i></u> to demonstrate understanding of cell transport and function of the cell wall and membrane. Response Logs, Journals</p> <p><b>Benchmark Assessments:</b></p>
--	---	---	---	---

Animal Cell Mystery Slides.

Students will distinguish between carbohydrates and lipids in foods by completing the Lab – What’s in Your Lunch.

Students will explore cell transport further in the Lab – Observing Osmosis in Gummi Bears.  
(7.EE.B.4)

For Microscope Labs: 1) “e” 2) Cheek Cells 3) Elodea

- Microscope
- Printed letter “e”
- Toothpick
- Microscope slides
- Elodea

For Lab – Egg Osmosis

- Raw egg (hard boiled also works but is not as dramatic)
- 300 ml vinegar, tap water, salt water, and a liquid of your choice
- Metric tape
- Balance
- Beaker
- Marker
- Masking tape

**Websites:**

- Microscope Labs Supplement: [https://www.biologycorner.com/worksheets/comparing\\_plant\\_animal.html](https://www.biologycorner.com/worksheets/comparing_plant_animal.html)
- <http://www.cellsalive.com/>
- Virtual Lab - Plant and Animal Cell
- Lab – Egg Osmosis
- Let's Talk Science: Seeding Argumentation About Cells and Growth:
- Movement of Molecules Into or Out of Cells:

**Videos:**

- Cell Theory
- [https://www.youtube.com/channel/UCNI0qOojpkhsUtaQ4\\_2NUhQ](https://www.youtube.com/channel/UCNI0qOojpkhsUtaQ4_2NUhQ)

<https://www.teachertube.com/>

- Common Formative Assessment
- Exact Path

**Alternative Assessments:**

Students will distinguish between living and nonliving things.  
Graphic Organizers

Students will observe different types of cells that can be found in the makeup of living things.

Self-Assessments  
Students will conduct a short research project collecting evidence that living things are made of cells to answer a question (including a self-generated question).  
Research Projects

Students will integrate multimedia and visual displays of cells and specific cell parts into presentations to clarify information, strengthen claims and evidence, and add interest.  
Computer Research, Rubric

[video/osmosis-amp-diffusion-138155](https://www.youtube.com/watch?v=138155)

**Books:**

<http://www.thinkscience.org/cellbook/celltheory1.html>

<https://www.amazon.com/Cells-Are-Us-Things/dp/0876146361>

**Enrichment Lesson Plans:**

- [Lab - Plant or Animal Cell Mystery Slides](#)
- [Lab – What’s in Your Lunch](#)
- [Lab –Observing Osmosis in Gummi Bears](#)

**Additional Resources:**

Osmosis Jones: A Blood-And-Guts Adventure...Set Inside the Human Body (Osmosis Jones, Graphic Novel)  
by James Patrick

**Accommodations and Modifications:**

***Students with special needs:*** Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

***ELL/ESL students:*** Students will be supported according to the recommendations for “can do’s” as outlined by WIDA – [https://www.wida.us/standards/CAN\\_DOs/](https://www.wida.us/standards/CAN_DOs/)  
This particular unit has limited language barriers due to the physical nature of the curriculum.

***Students at risk of school failure:*** Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

***Gifted and Talented Students:*** Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity In planning and carrying out investigations and analyzing and interpreting data.

<b>English Language Learners</b> <ul style="list-style-type: none"> <li>● Speak and display terminology</li> <li>● Teacher modeling</li> <li>● Peer modeling</li> <li>● Provide ELL students with multiple literacy strategies.</li> <li>● Word walls</li> <li>● Use peer readers</li> <li>● Give page numbers to help the students find answers</li> <li>● Provide a computer for written work</li> <li>● Provide two sets of textbooks, one for home and one for school</li> <li>● Provide visual aides</li> <li>● Provide additional time</li> </ul>	<b>Special Education</b> <ul style="list-style-type: none"> <li>● Provide concrete examples</li> <li>● Utilize modifications &amp; accommodations delineated in the student's IEP</li> <li>● Work with paraprofessional</li> <li>● Use multi-sensory teaching approaches.</li> <li>● Work with a partner</li> <li>● Provide concrete examples</li> <li>● Restructure lesson using UDL principals (<a href="http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA">http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA</a>).</li> <li>● 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).</li> </ul>	<b>At-Risk</b> <ul style="list-style-type: none"> <li>● Using visual demonstrations, illustrations, and models</li> <li>● Give directions/instructions verbally and in simple written format. Oral prompts can be given.</li> <li>● Peer Support</li> <li>● Increase one on one time</li> <li>● Teachers may modify instructions by modeling what the student is expected to do</li> <li>● Instructions may be printed out in large print and hung up for the student to see during the time of the lesson.</li> <li>● Review behavior expectations and make adjustments for personal space or other behaviors as needed.</li> <li>● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.</li> <li>● 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).</li> </ul>	<b>Gifted and Talented</b> <ul style="list-style-type: none"> <li>● Use project-based science learning to connect science with observable phenomena.</li> <li>● Inquiry-based instruction</li> <li>● Independent study</li> <li>● Higher order thinking skills</li> <li>● Adjusting the pace of lessons</li> <li>● Interest based content</li> <li>● Real world scenarios</li> <li>● Student Driven Instruction</li> <li>● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.</li> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Collaborate with after-school programs or clubs to extend learning opportunities.</li> </ul>
<b>Interdisciplinary Connections:</b> <b>ELA-NJSLS/ELA:</b> <b>RL.7.2:</b> Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text. <b>W.7.4:</b> Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. <b>RI.7.1:</b> Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. <b>W.7.2:</b> Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.			

**Mathematics:**

**7.EE.B.4:** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

**7.NS.A.3:** Solve real-world and mathematical problems involving the four operations with rational numbers.

**Social Studies:**

**6.1.8.C.4.b:** Explain how major technological developments revolutionized land and water transportation, as well as the economy, in New Jersey and the nation.

**Career Ready Practices:**

**CRP4:** Communicate clearly and effectively and with reason.

**CRP8:** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP6:** Demonstrate creativity and innovation.

**Integration of Technology Standards NJSLS 8:**

**8.1.8.E.1:** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

**Integration of 21<sup>st</sup> Century Standards NJSLS 9:****9.2.8.B.3**

Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

# Englewood Public School District

## Science

### Grade 7

### First Marking Period

## Unit 2: Cell Processes and Energy

**Overview:** Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of *matter and energy* and *structure and function* provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in *developing and using models*. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

**Time Frame:** 10-15 Days

### Enduring Understandings:

*All living things rely on the existence of photosynthesis*

*Respiration provides living things with energy*

### Essential Questions:

*How do some organisms turn electromagnetic radiation into matter and energy?*

*What is the role of photosynthesis in the cycling of matter and flow of energy into and out of an organism?*

*How is food rearranged through chemical reactions to form new molecules that support growth and/or release energy as this matter moves through an organism?*

Standards	Topics and Objectives	Activities	Resources	Assessments
<b>(MS-LS1-6)</b> <b>Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.</b>	<b>Topics</b>  Photosynthesis  Respiration	Students will complete the text activities: 1. Discover Activity (p44) Where does the energy come from? 2. Lab - Looking at pigments (p47)	<b>Text:</b> Prentice Hall Science Explorer: Cells and Heredity  <b>Materials:</b> For Discover Activity (p44) Where does the energy come	<b>Formative Assessments:</b>  <ul style="list-style-type: none"> <li>• Journals</li> <li>• Learning/Response Logs</li> <li>• Discussions</li> </ul>



**(MS-LS1-7)**

**Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.**

Food Chain/Web/Pyramid

Twenty-First Century Themes and Skills include:

- The Four C's
- Life and Career Skills
- Information, Media, and ITC Literacy
- Environmental Literacy

**Objectives**

Students will:

Construct a scientific explanation for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Develop and use a model to describe how food is rearranged through chemical reactions during respirations and fermentation.

3. Discover Activity (p49)  
What is a product of respiration?
4. Lab - Exhaling Carbon Dioxide (p54) 2 250 mL beakers, brothymol blue solution(0.01%) 30mL, stop watch, graduated cylinder, paper towels

Students will connect photosynthesis to the food they eat by watching a video and engaging in an online discussion in The Simple Story of Photosynthesis and Food. (MS-LS1-6, RL.7.2)(9.2.8.B.3)

Students will watch and sing along with the Photosynthesis Song and the Respiration Song. (CRP4)

Student will construct diagram or model showing the relationship between cellular respiration and photosynthesis and provide a written explanation of the diagram/model. (MS-LS1-7, CRP8)

**Enrichment Activities:**

Students will explore the connection between where plant material comes from and the carbon cycle in the Plant Growth and Gas Exchange Unit. (CRP4, W.7.2)

from?

- Solar powered calculator that doesn't use batteries

For Lab - Looking at pigments (p47)

- Coffee filters
- Scissors
- Leaf
- Metric ruler
- Dime
- Rubbing alcohol
- Plastic cup

For Discover Activity (p49)

What is a product of respiration?

- 2 test tubes with stoppers
- Warm water
- 5mL sugar
- Test tube rack
- 1.0mL dried yeast
- 2 straws

For Lab - Exhaling Carbon Dioxide (p54)

- 2 250 mL beakers
- Brothymol blue solution (0.01%) 30mL,
- Stop watch
- Graduated cylinder
- Paper towels

**Websites:**

- The Simple Story of Photosynthesis and Food

**Videos:**

- Photosynthesis and Food
- Photosynthesis Song

**Summative Assessments:**  
Unit quizzes and test

Students will demonstrate knowledge of photosynthesis by completing an online discussion in The Simple Story of Photosynthesis and Food. Computers, Rubric, Questioning

Students will receive a grade for their analysis of the *Lab - Exhaling Carbon Dioxide* to demonstrate their understanding of respiration. Research Analysis

Students will be assessed on the accuracy of their *Photosynthesis/Respiration Diagram and Description. A rubric will be used to assess work.*

Assessments, Rubrics

**Benchmark Assessment:**

See Unit 1 for quarterly assessment

**Alternative Assessment:**

Students will observe different types of cells that can be found in the makeup of living things. Graphic Organizer, Checklists



Students will model the photosynthesis and respiration system in the Virtual Lab – Snails and Elodea. (CRP6)

- Respiration Song

**Enrichment Lesson Plans:**

Plant Growth and Gas Exchange Unit

Virtual Lab – Snails and Elodea - Lab Sheet

Link to Virtual Lab - Snails and Elodea

**Additional Resources:**

<https://www.storyjumper.com/book/index/12147102/The-Adventures-of-Photosynthesis->

<https://photosynthesiseducation.com/photosynthesis-for-kids/>

<http://www.biologyreference.com/Fo-Gr/Gas-Exchange.html>

Plant Growth and Gas Exchange Unit:

**Accommodations and Modifications:**

***Students with special needs:*** Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

***ELL/ESL students:*** Students will be supported according to the recommendations for “can do’s” as outlined by WIDA – [https://www.wida.us/standards/CAN\\_DOs/](https://www.wida.us/standards/CAN_DOs/)

This particular unit has limited language barriers due to the physical nature of the curriculum.

***Students at risk of school failure:*** Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

**Gifted and Talented Students:** Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity In planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> <li>● Speak and display terminology</li> <li>● Teacher modeling</li> <li>● Peer modeling</li> <li>● Provide ELL students with multiple literacy strategies.</li> <li>● Word walls</li> <li>● Use peer readers</li> <li>● Give page numbers to help the students find answers</li> <li>● Provide a computer for written work</li> <li>● Provide two sets of textbooks, one for home and one for school</li> <li>● Provide visual aides</li> <li>● Provide additional time to complete a task</li> <li>● Use graphic organizers</li> </ul>	<ul style="list-style-type: none"> <li>● Provide concrete examples</li> <li>● Utilize modifications &amp; accommodations delineated in the student’s IEP</li> <li>● Work with paraprofessional</li> <li>● Use multi-sensory teaching approaches.</li> <li>● Work with a partner</li> <li>● Provide concrete examples</li> <li>● Restructure lesson using UDL principals (<a href="http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA">http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA</a>).</li> <li>● 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).</li> </ul>	<ul style="list-style-type: none"> <li>● Using visual demonstrations, illustrations, and models</li> <li>● Give directions/instructions verbally and in simple written format. Oral prompts can be given.</li> <li>● Peer Support</li> <li>● Increase one on one time</li> <li>● Teachers may modify instructions by modeling what the student is expected to do</li> <li>● Instructions may be printed out in large print and hung up for the student to see during the time of the lesson.</li> <li>● Review behavior expectations and make adjustments for personal space or other behaviors as needed.</li> <li>● Structure lessons around questions that are authentic, relate to students’ interests, social/family background and knowledge of their community.</li> <li>● Provide opportunities for students to connect with people of similar</li> </ul>	<ul style="list-style-type: none"> <li>● Use project-based science learning to connect science with observable phenomena.</li> <li>● Inquiry-based instruction</li> <li>● Independent study</li> <li>● Higher order thinking skills</li> <li>● Adjusting the pace of lessons</li> <li>● Interest based content</li> <li>● Real world scenarios</li> <li>● Student Driven Instruction</li> <li>● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.</li> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Collaborate with after-school programs or clubs to extend learning opportunities.</li> </ul>

		backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).	
<b>Interdisciplinary Connections:</b>			
<b>ELA-NJSLS/ELA:</b> <b>RL.7.2:</b> Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text. <b>W.7.4:</b> Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. <b>RI.7.1:</b> Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. <b>W.7.2:</b> Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.			
<b>Mathematics:</b> <b>7.EE.B.4:</b> Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <b>7.NS.A.3:</b> Solve real-world and mathematical problems involving the four operations with rational numbers.			
<b>Career Ready Practices:</b> <b>CRP4:</b> Communicate clearly and effectively and with reason. <b>CRP8:</b> Utilize critical thinking to make sense of problems and persevere in solving them. <b>CRP6:</b> Demonstrate creativity and innovation.			
<b>Integration of Technology Standards NJSLS 8:</b> <b>8.1.8.E.1:</b> Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.			
<b>Social Studies:</b> <b>6.1.8.C.4.b:</b> Explain how major technological developments revolutionized land and water transportation, as well as the economy, in New Jersey and the nation.			
<b>Integration of 21<sup>st</sup> Century Standards NJSLS 9:</b> <b>9.2.8.B.3</b>			

Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)</li> </ul> <p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-7)</li> </ul>	<p><b>LS1.C: Organization for Matter and Energy Flow in Organisms</b></p> <ul style="list-style-type: none"> <li>Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)</li> <li>Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)</li> </ul> <p><b>PS3.D: Energy in Chemical Processes and Everyday Life</b></p> <ul style="list-style-type: none"> <li>The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6)</li> <li>Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)</li> </ul>	<p><b>Energy and Matter</b></p> <ul style="list-style-type: none"> <li>Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)</li> <li>Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)</li> </ul> <p>-----</p> <p>--</p> <p><i>Connections to Nature of Science</i></p> <p><b>Scientific Knowledge is Based on Empirical Evidence</b></p> <p>Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)</p>

**Englewood Public School District**  
**Science**  
**Grade 7**  
**First Marking Period**

**Unit 3: Inheritance and Variation of Traits**

**Overview:** Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction. Students use data and conceptual models to understand how the environment and genetic factors determine the growth of an individual organism. They connect this idea to the role of animal behaviors in animal reproduction and to the dependence of some plants on animal behaviors for their reproduction. Students provide evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. The crosscutting concepts of *cause and effect* and *structure and function* provide a framework for understanding how gene structure determines differences in the functioning of organisms. Students are expected to demonstrate proficiency in *analyzing and interpreting data, using models, conducting investigations, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas.

**Time Frame:** 20-25 Days

**Enduring Understandings:**

*Chromosomes carry traits that are transferred from parents to offspring*

*DNA determines the size, shape and many other traits of an organism.*

Genetic factors are related to the survival of a species

**Essential Questions:**

*Why do kids look similar to their parents?*

*How do asexual reproduction and sexual reproduction affect the genetic variation of offspring?*

*How do structural changes to genes (mutations) located on chromosomes affect proteins or affect the structure and function of an organism?*

*What influences the growth and development of an organism?*

*How do characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively?*

*How do environmental and genetic factors influence the growth of organisms?*

Standards	Topics and Objectives	Activities	Resources	Assessments
-----------	-----------------------	------------	-----------	-------------

<b>(MS-LS3-1)</b> <b>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.</b>	<b>Topics</b> Cell Division (mitosis/meiosis) DNA Cancer Mendel's Work Probability and Heredity Chromosomes Mutation Genetic Disorders Twenty-First Century Themes and Skills include: <ul style="list-style-type: none"> <li>• The Four C's</li> <li>• Life and Career Skills</li> <li>• Information, Media, and ITC Literacy</li> </ul>	Students will complete the text activities: <ol style="list-style-type: none"> <li>1. Discover Activity (p55) What are yeast cells doing?</li> <li>2. Modeling Mitosis (p56)</li> <li>3. Lab - Multiply by Dividing (p63)</li> <li>4. Discover Activity (p92) Which chromosome is which?</li> <li>5. Lab - Take a Class Survey (p82)</li> <li>6. Discover Activity (p84) What's the chance?</li> <li>7. Lab - Make the right call. PBL Math (p90)</li> <li>8. Discover Activity (p97) Can you crack the code?</li> <li>9. Discover Activity (p110) How Tall is Tall?</li> <li>10. Lab - The Eyes Have It (p113)</li> <li>11. Discover Activity (p117) How Many Chromosomes?</li> <li>12. Lab - Family Puzzle (p122) (7.NS.A.3)</li> </ol>	<b>Text:</b> Prentice Hall Science Explorer: Cells and Heredity  <b>Materials:</b> For Discover Activity (p55) What are yeast cells doing? <ul style="list-style-type: none"> <li>• Plastic dropper</li> <li>• yeast culture</li> <li>• stained microscope slide</li> <li>• coverslip</li> <li>• microscope</li> </ul> For Modeling Mitosis (p56) <ul style="list-style-type: none"> <li>• Construction paper</li> <li>• different color pipe cleaners</li> </ul> For Lab - Multiply by Dividing (p63) <ul style="list-style-type: none"> <li>• Microscope</li> <li>• colored pencils</li> <li>• calculator</li> <li>• slides of onion tip roots undergoing cell division</li> </ul> For Discover Activity (p92) Which chromosome is which? <ul style="list-style-type: none"> <li>• 4 craft sticks</li> <li>• 3 pieces of paper</li> <li>• marking pen</li> </ul> For Lab - Take a Class Survey (p82) <ul style="list-style-type: none"> <li>• Mirror</li> </ul> For Discover Activity (p84) What's the chance? <ul style="list-style-type: none"> <li>• Coins</li> </ul> For Lab - Make the right call.	<b>Formative Assessments:</b> <ul style="list-style-type: none"> <li>• Journals</li> <li>• Learning/Response Logs</li> <li>• Discussions</li> </ul> <b>Summative Assessments:</b> Unit quizzes and test  Students will demonstrate understanding of cell division and DNA by creating models in the <i>Modeling Mitosis (p56)</i> and <i>DNA Models</i> activity. Models, Rubrics  Students will receive a grade for analysis questions for Lab - <i>Take a Class Survey (p82)</i> , <i>Lab - Make the right call. PBL Math (p90)</i> , and <i>Lab - Family Puzzle (p122)</i> . Questioning, Checklists  Students will demonstrate understanding of objectives by completing <i>Research Projects</i> about cancer and genetic diseases. Projects, Models, Flowcharts  <b>Alternative Assessment:</b> Students will construct an explanation about how scientists breed healthy organisms to help threatened populations. (Science Dimensions Unit 3 Performance Task: Save the Whitebark Pines!)
	<b>Objectives</b> Students will: Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information. Develop and use a model to describe why sexual reproduction results in offspring with genetic variation. Use models such as Punnett	Students will interact with virtual models of cell division and genetics on the <a href="http://www.cellsalive.com/">http://www.cellsalive.com/</a> website. (CRP6, 6.1.8.C.4b)  Student will model genetic probability in the Ugly Babies Lab. (MS-LS3-2,W.7.2)  Students will create DNA Models using straws and gumdrops.		

squares, diagrams, and simulations to describe the cause-and effect-relationship of gene transmission from parent(s) to offspring and resulting genetic variation.

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.

(CRP8)

Research Projects:

- Create a brochure about cancer and how it can be treated
- Create a website about a genetic disorder.

(RL.7.2)(9.2.8.B.3)

**Enrichment Activity:**

Students will explore topics by completing Genetics Web Labs. ( CRP4)

PBL Math (p90)

- 2 small paper bags
- markers
- 3 blue marbles
- 3 white marbles

For Discover Activity (p110)  
How Tall is Tall?

- Meter stick
- graph paper
- pencil

For Lab - Family Puzzle (p122)

- 12 index cards
- scissors
- markers

For Ugly Babies Lab

- Small paper cup
- two coins
- highlighters, paper
- colored pencils

For DNA Models

- Gum drops
- Straws, 5 different colors
- Toothpicks
- Florist wire

**Websites:**

- <http://www.cellsalive.com/>
- Genetics Web Labs

**Videos:**

- Mendel's Peas
- Albinism

**Enrichment Lesson Plans:**

See Genetics Web Labs



**(MS-LS1-4)**

Use argument based on empirical evidence 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.

Topics		Text:	Formative Assessments:
Probability of Successful Reproduction	Students will investigate how the structure of a flower aids in reproductive function in the hands-on and virtual lab <u>The Beauty of a Flower</u> . (8.1.8.E.1)	Prentice Hall Science Explorer: Cells and Heredity	Journals Learning/Response Logs Discussions
Environmental Effects	Student will investigate environmental effects on genes by completing the <u>Virtual Lab – Color of Light and Plant Growth</u> . (7.EE.B.4)	<b>Websites:</b> <a href="http://learn.genetics.utah.edu/VirtualLab-ColorofLightandPlantGrowth">http://learn.genetics.utah.edu/Virtual Lab – Color of Light and Plant Growth</a>	<b>Summative Assessments:</b> Students will use data from <u>The Beauty of a Flower</u> And <u>Virtual Lab – Color of Light and Plant Growth</u> and information from the <u>Animal and Plant Adaptations Website</u> to construct an oral or written explanation that external factors influence genetic growth, development, and successful reproduction of organisms. Data charts, Rubrics Response Logs
Twenty-First Century Themes and Skills include: <ul style="list-style-type: none"> <li>The Four C's</li> <li>Life and Career Skills</li> <li>Information, Media, and ITC Literacy</li> </ul>	Students will compare reproductive strategies of plants and animals using the <u>Animal and Plant Adaptations Website</u> . (MS-LS1-4, CRP6)	<b>Videos:</b> <u>What is Epigenetics?</u>  Enrichment Lesson Plans: See <u>What is Epigenetics?</u> and <u>Epigenetics Website</u>	
<b>Objectives</b>		<b>Books:</b> <a href="https://books.google.com/book/s/about/Epigenetics.html?id=aqrxbSiTcC">https://books.google.com/book/s/about/Epigenetics.html?id=aqrxbSiTcC</a>  <a href="https://sciencebookaday.com/2013/08/12/10-great-books-on-genetics/">https://sciencebookaday.com/2013/08/12/10-great-books-on-genetics/</a>  <a href="https://www.goodreads.com/shelf/show/genetics">https://www.goodreads.com/shelf/show/genetics</a>  <a href="https://www.librarything.com/tag/animal+adaptations">https://www.librarything.com/tag/animal+adaptations</a>  <a href="https://study.com/academy/lesson/animal-adaptations-lesson-for-kids.html">https://study.com/academy/lesson/animal-adaptations-lesson-for-kids.html</a>  <a href="http://www.mybooklibrary.com/pdf/plant-and-animal-adaptations-for-kids.pdf">http://www.mybooklibrary.com/pdf/plant-and-animal-adaptations-for-kids.pdf</a>	<b>Alternative Assessments:</b> Students will use mathematics to model why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. Models, Self-Assessments, Peer Review  Students will determine the meaning of symbols, key terms, and other domain-specific phrases as they are used to describe why asexual reproduction results in offspring with identical genetic information and
Students will:	Students will explore how the environment effects genetics and engage in an online discussion in <u>What is Epigenetics?</u> (W.7.4)		
Identify and describe possible cause-and effect relationships affecting the reproductive success of plants and animals using probability.	Student will explore how behavior and environment can influence genes by interacting with the <u>Epigenetics Website</u> .		
Support or refute an explanation of how characteristic animal behaviors and specialized plant structures affect the probability of successful plant reproduction using oral and written arguments.	Students will conduct hands-on experiments and collect data on the environmental conditions that effect the growth of plants (e.g., the effect of variables such as food, light, space, and water). (CRP8)		
Use evidence from experiments and other scientific reasoning to support oral and written explanations of how environmental and genetic factors influence the growth of organisms.			

sexual reproduction results in offspring with genetic variation.

**Benchmark Assessment:**  
See Unit 1 for quarterly assessment

### Accommodations and Modifications:

**Students with special needs:** Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

**ELL/ESL students:** Students will be supported according to the recommendations for “can do’s” as outlined by WIDA – [https://www.wida.us/standards/CAN\\_DOs/](https://www.wida.us/standards/CAN_DOs/)  
This particular unit has limited language barriers due to the physical nature of the curriculum.

**Students at risk of school failure:** Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

**Gifted and Talented Students:** Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity  
In planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"><li>● Speak and display terminology</li><li>● Teacher modeling</li><li>● Peer modeling</li><li>● Provide ELL students with</li></ul>	<ul style="list-style-type: none"><li>● Utilize modifications &amp; accommodations delineated in the student’s IEP</li><li>● Work with paraprofessional</li></ul>	<ul style="list-style-type: none"><li>● Using visual demonstrations, illustrations, and models</li><li>● Give directions/instructions verbally and in simple written format. Oral</li></ul>	<ul style="list-style-type: none"><li>● Curriculum compacting</li><li>● Inquiry-based instruction</li><li>● Independent study</li><li>● Higher order thinking skills</li><li>● Adjusting the pace of lessons</li><li>● Interest based content</li></ul>

<p>multiple literacy strategies.</p> <ul style="list-style-type: none"> <li>● Word walls</li> <li>● Use peer readers</li> <li>● Give page numbers to help the students find answers</li> <li>● Provide a computer for written work</li> <li>● Provide two sets of textbooks, one for home and one for school</li> <li>● Provide visual aides</li> <li>● Provide additional time to complete a task</li> <li>● Use graphic organizers</li> </ul>	<ul style="list-style-type: none"> <li>● Use multi-sensory teaching approaches.</li> <li>● Work with a partner</li> <li>● Provide concrete examples</li> <li>● Restructure lesson using UDL principals (<a href="http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA">http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA</a>).</li> <li>● 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).</li> </ul>	<p>prompts can be given.</p> <ul style="list-style-type: none"> <li>● Peer Support</li> <li>● Increase one on one time</li> <li>● Teachers may modify instructions by modeling what the student is expected to do</li> <li>● Instructions may be printed out in large print and hung up for the student to see during the time of the lesson.</li> <li>● Review behavior expectations and make adjustments for personal space or other behaviors as needed.</li> <li>● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.</li> <li>● 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).</li> </ul>	<ul style="list-style-type: none"> <li>● Real world scenarios</li> <li>● Student Driven Instruction</li> <li>● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.</li> <li>● Use project-based science learning to connect science with observable phenomena.</li> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Collaborate with after-school programs or clubs to extend learning opportunities.</li> </ul>	
---	---	---	--	--

### **Interdisciplinary Connections:**

#### **ELA-NJSLS/ELA:**

**RL.7.2:** Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.

**W.7.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

**RI.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.

**W.7.2:** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

#### **Mathematics:**

**7.EE.B.4:** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

**7.NS.A.3:** Solve real-world and mathematical problems involving the four operations with rational numbers.

#### **Career Ready Practices:**

**CRP4:** Communicate clearly and effectively and with reason.

**CRP8:** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP6:** Demonstrate creativity and innovation.

#### **Integration of Technology Standards NJSLS 8:**

**8.1.8.E.1:** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

#### **Social Studies:**

**6.1.8.C.4.b:** Explain how major technological developments revolutionized land and water transportation, as well as the economy, in New Jersey and the nation.

**Integration of 21<sup>st</sup> Century Standards NJSL 9:  
9.2.8.B.3**

Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Developing and Using Models</b></p> <ul style="list-style-type: none"> <li>Develop and use a model to describe phenomena. (MS-LS3-1),(MS-LS3-2)</li> </ul>	<p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (<i>secondary to MS-LS3-2</i>)</li> </ul> <p><b>LS3.A: Inheritance of Traits</b></p> <ul style="list-style-type: none"> <li>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-LS3-1)</li> <li>Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)</li> </ul> <p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1)</li> </ul> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)</li> </ul>

	<ul style="list-style-type: none"><li>• In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)</li></ul>	
--	---	--