

# Englewood Public School District

## Science

### Grade 2

### Third Marking Period

### Unit 3: Changes to Matter

**Overview:** In this unit of study, students continue to develop an understanding of observable properties of materials through analysis and classification of different materials. The crosscutting concepts of cause and effect and energy and matter are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in constructing explanations, designing solutions, and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on 2-PS1-3 and 2-PS1-4.

**Time Frame:** 15 to 20 Days

#### Enduring Understandings:

*Objects may break into smaller pieces and be put together into larger pieces or change shapes.*

*Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.*

#### Essential Questions:

*In what ways can an object made of a small set of pieces be disassembled and made into a new object?*

*Can all changes caused by heating or cooling be reversed?*

Standards	Topics and Objectives	Activities	Resources	Assessments
<b>2-PS1-3:</b> <b>Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.</b>  <b>2- PS1-4:</b> <b>Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.</b>	<b>Topics</b>  Observable Properties of Materials  Twenty-First Century Themes and Skills include: Environmental Literacy <ul style="list-style-type: none"> <li>• The Four C's</li> <li>• Environmental Literacy</li> <li>• Global Awareness</li> </ul>	<b><u>Take It Apart:</u></b> Students work in groups to take various old machines apart. Each group will journal the process as they take items apart. Once the group has the item apart, they will then work together to create something new. Students will share their new creations with the class. Students will record their new creation in their journals and reflect on the process. (2-PS1-3)	<b><u>Video:</u></b>  <b><u>The Science of Macaroni Salad</u></b>  <b><u>Websites:</u></b>  <a href="http://www.bbc.co.uk/schools/scienceclips/ages/10_11/rev_irrev_changes_fs.shtml">http://www.bbc.co.uk/schools/scienceclips/ages/10_11/rev_irrev_changes_fs.shtml</a>  <a href="http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_state_fs.shtml">http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_state_fs.shtml</a>	<b>Formative Assessments:</b>  Do Now/Ticket to Leave  <b><u>Take It Apart:</u></b> Student Science journals  <b><u>Building Things in Different Ways:</u></b> Student science journal entries  <b>Benchmark Assessment:</b> Exact Path
	<b>Objectives</b>			

**Take It Apart:**

Students will reinforce their understanding that things can be taken apart and recombined in novel ways.

**Building Things in Different Ways:**

The student will be able to build many different things using the same materials.

**This Candy Is Not What It Seems:**

Student will conduct an investigation using gummy bears to explore physical changes.

**Heat It Up, Cool It Down:**

Students will understand the effects of temperature on changes in matter caused by heating and cooling.

**Building Things in Different Ways:**

Students are challenged to take apart a cube and rebuild it using all the pieces within five minutes. Students then complete a room walk looking at all the new pieces. In a large group, students discuss if it is always possible to take things apart and put them back together in different ways. Answers are recorded and voted on. The top two approaches will be tried in the next lab. (2-PS1-3, CRP6, 8.2.2.C.1,MP.2)

**This Candy Is Not What It Seems:**

**Day One:** Students read Gummy Bear Math and make an estimate on how many bears they have. They then sort the bears by color and create a bar graph to show that information. They then write comparison statements. Students then write their hypothesis and set up the experiment for the over night portion of the activity. (2.MD.D.10, RI.2.3)

**Day Two:** Students record the data from the Gummy Bear experiment. Students then complete conclusion statements from the activity. (CRP4, CRP8)

**Additional Text:**

Seuss, Dr. Bartholomew and the Oobleck.  
Zoehfeld, Kathleen Weidner. What is the World Made of? : All about Solids, Liquids, and Gases.  
Sarquis, Mickey. Exploring Matter with TOYS.  
Friedhoffer, Robert. Matter and Energy.

**Take It Apart:****Materials:**

4-5 old machines (CD player, VCR etc.)  
Screw drivers  
Pliers  
Tweezers

**Building Things in Different Ways:**

A snap cube made of 27 pieces for each student

**This Candy Is Not What It Seems:**

Gummy Bear Math Book

Gummy Bear Power Point

Gummy Bear Student Packet

**Materials:**

- Scale
- Ruler
- Cup
- Gummy Bears

**Summative Assessments:****This Candy Is Not What It Seems:**

Student Learning Packet

**Heat It Up, Cool It Down:**

Student Observation Data

**Alternative Assessments:**

Construct an argument with evidence to support a claim.

Construct an argument with evidence that some changes caused by heating or cooling can be reversed, and some cannot.

- ✓ Examples of reversible changes could include materials such as water and butter at different temperatures.
- ✓ Examples of irreversible changes could include
  - Cooking an egg
  - Freezing a plant leaf
  - Heating paper

Make observations to construct an evidence-

**Heat It Up, Cool It Down:**

**Day One:** Students explore the impact of heat on eggs, ice, and butter. They record temperature and observations in their data table. Place the heated materials into the freezer over night. (MP.2, RI.2.8)

**Day Two:**

Students explore impact of heat on eggs, ice, and butter. They record temperature and observations in their data table. (2.MD.D.10, RI.2.1, 9.2.4.A.1)

**Explore Scientists /**  
**Physicists** such as Albert Einstein

**Heat It Up, Cool It Down:**

- Temperature probe or thermometer
- Water, ½ cup (room temperature)
- Hot plate
- Ice, ½ cup
- Freezer
- Egg, 1 (raw)
- Heat resistant containers (3)
- Egg, 1 (cooked)
- Oven mitt
- Butter, ¼ stick (solid)
- Instructions (this guide)
- Butter, ¼ stick (melted)
- Student Worksheet Pages 8 and 9

based account of how an object made of a small set of pieces can be disassembled and made into a new object.

Draw pictures.

Write in their science journals.

Research using trade books and online resources in order to learn more about physical changes to matter.

Data sheets

## 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>● Use graphic organizers</li><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></ul>	<ul style="list-style-type: none"><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>● 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>● Provide students with multiple choices for how</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</li></ul>	<ul style="list-style-type: none"><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>● 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><li>● Real world scenarios</li><li>● Student Driven Instruction</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</li></ul>

<ul style="list-style-type: none"> <li>● Provide visual aides</li> <li>● Provide additional time to complete a task</li> </ul>	<p>they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).</p>	<p>adjustments for personal space or other behaviors as needed.</p> <ul style="list-style-type: none"> <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>	<p>community-based issue.</p> <ul style="list-style-type: none"> <li>● Collaborate with after-school programs or clubs to extend learning opportunities.</li> </ul>
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<p><b>Interdisciplinary Connections:</b></p>			
<p><b>ELA-NJSLS/ELA:</b></p> <p><b>RI.2.1:</b> Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4)</p> <p><b>RI.2.3:</b> Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)</p> <p><b>RI.2.8:</b> Describe how reasons support specific points the author makes in a text. (2-PS1-4)</p>			
<p><b>Mathematics:</b></p> <p><b>MP.2:</b> Model with mathematics.</p> <p><b>2.MD.D.10:</b> Draw a picture graph and a bar graph(with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</p>			

**Career Ready Practices:****CRP6:** Demonstrate creativity and innovation.**CRP4:** Communicate clearly and effectively and with reason.**CRP8:** Utilize critical thinking to make sense of problems and persevere in solving them.**Integration of Technology Standards NJSLS 8:****8.2.2.C.1** Brainstorm ideas on how to solve a problem or build a product.**Integration of 21st Century Standards NJSLS 9:****9.2.4.A.1:** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.**Key Vocabulary:****Matter:** Anything that has mass and takes up space.**Properties:** describes how an object looks, feels, or acts.**Heating:** to make warm or hot**Cooling:** to make less warm

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<b><u>Analyzing and Interpreting Data</u></b> <ul style="list-style-type: none"> <li>Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)</li> </ul> <b><u>Constructing Explanations and Designing Solutions</u></b> <ul style="list-style-type: none"> <li>Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)</li> </ul> <b><u>Engaging in Argument from Evidence</u></b> <ul style="list-style-type: none"> <li>Construct an argument with evidence to</li> </ul>	<b><u>PS1.A: Structure and Properties of Matter</u></b> <ul style="list-style-type: none"> <li>Different properties are suited to different purposes. (2-PS1-3)</li> <li>A great variety of objects can be built up from a small set of pieces. (2-PS1-3)</li> </ul> <b><u>PS1.B: Chemical Reactions</u></b> <ul style="list-style-type: none"> <li>Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)</li> </ul>	<b><u>Cause and Effect</u></b> <ul style="list-style-type: none"> <li>Events have causes that generate observable patterns. (2-PS1-4)</li> </ul> <b><u>Energy and Matter</u></b> <ul style="list-style-type: none"> <li>Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)</li> </ul> <p>-----</p> <p>-----</p> <p><i>Connections to Nature of Science</i></p> <p><b>Science Models, Laws, Mechanisms, and Theories Explain Natural</b></p>

	support a claim. (2-PS1-4)		<b>Phenomena</b> <ul style="list-style-type: none"><li>• Science searches for cause and effect relationships to explain natural events. (2-PS1-4)</li></ul>	
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