



Shelby County Schools Science Vision

Shelby County Schools' vision of science education is to ensure that from early childhood to the end of the 12th grade, all students have heightened curiosity and an increased wonder of science; possess sufficient knowledge of science and engineering to engage in discussions; are able to learn and apply scientific and technological information in their everyday lives; and have the skills such as critical thinking, problem solving, and communication to enter careers of their choice, while having access to connections to science, engineering, and technology.

To achieve this, Shelby County Schools has employed The Tennessee Academic Standards for Science to craft meaningful curricula that is innovative and provide a myriad of learning opportunities that extend beyond mastery of basic scientific principles.

Introduction

In 2014, the Shelby County Schools Board of Education adopted a set of ambitious, yet attainable goals for school and student performance. The District is committed to these goals, as further described in our strategic plan, Destination 2025. In order to achieve these ambitious goals, we must collectively work to provide our students with high quality standards aligned instruction. The Tennessee Academic Standards for Science provide a common set of expectations for what students will know and be able to do at the end of each grade, can be located in the [Tennessee Science Standards Reference](#). Tennessee Academic Standards for Science are rooted in the knowledge and skills that students need to succeed in post-secondary study or careers. While the academic standards establish desired learning outcomes, the curricula provide instructional planning designed to help students reach these outcomes. The curriculum maps contain components to ensure that instruction focuses students toward college and career readiness. Educators will use this guide and the standards as a roadmap for curriculum and instruction. The sequence of learning is strategically positioned so that necessary foundational skills are spiraled in order to facilitate student mastery of the standards.

Our collective goal is to ensure our students graduate ready for college and career. Being College and Career Ready entails, many aspects of teaching and learning. We want our students to apply their scientific learning in the classroom and beyond. These valuable experiences include students being facilitators of their own learning through problem solving and thinking critically. The Science and Engineering Practices are valuable tools used by students to engage in understanding how scientific knowledge develops. These practices rest on important "processes and proficiencies" with longstanding importance in science education. The science maps contain components to ensure that instruction focuses students toward understanding how science and engineering can contribute to meeting many of the major challenges that confront society today. The maps are centered around five basic components: the Tennessee Academic Standards for Science, Science and Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts, and Phenomena.



The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, [A Framework for K-12 Science Education](#) as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science classrooms. Thinking about science had become memorizing concepts and solving mathematical formulae. Practicing science had become prescribed lab situations with predetermined outcomes. The framework proposes a three-dimensional approach to science education that capitalizes on a child's natural curiosity. The Science Framework for K-12 Science Education provides the blueprint for developing the effective science practices. The Framework expresses a vision in science education that requires students to operate at the nexus of three dimensions of learning: Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The Framework identified a small number of disciplinary core ideas that all students should learn with increasing depth and sophistication, from Kindergarten through grade twelve. Key to the vision expressed in the Framework is for students to learn these disciplinary core ideas in the context of science and engineering practices. The importance of combining Science and Engineering Practices, Crosscutting Concepts and Disciplinary Core Ideas is stated in the Framework as follows:

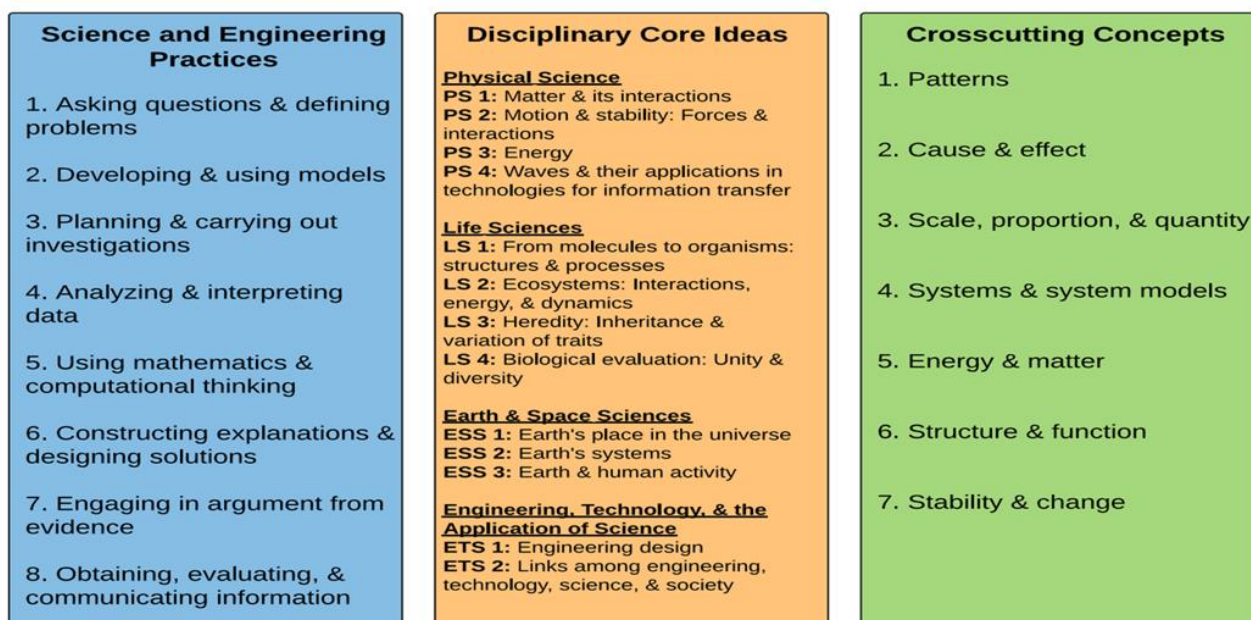
Standards and performance expectations that are aligned to the framework must take into account that students cannot fully understand scientific and engineering ideas without engaging in the practices of inquiry and the discourses by which such ideas are developed and refined. At the same time, they cannot learn or show competence in practices except in the context of specific content. (NRC Framework, 2012, p. 218)

To develop the skills and dispositions to use scientific and engineering practices needed to further their learning and to solve problems, students need to experience instruction in which they use multiple practices in developing a particular core idea and apply each practice in the context of multiple core ideas. We use the term "practices" instead of a term such as "skills" to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Students in grades K-12 should engage in all eight practices over each grade band. Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. Crosscutting concepts have value because they provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. There are seven crosscutting concepts that bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering. Their purpose is to help students deepen their understanding of the disciplinary core ideas and develop a coherent and scientifically based view of the world.

The map is meant to support effective planning and instruction to rigorous standards. It is *not* meant to replace teacher planning, prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, text(s), task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected—with the support of their colleagues, coaches, leaders, and other



support providers—to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade level specific standards, including purposeful support of literacy and language learning across the content areas.



Learning Progression

At the end of the elementary science experience, students can observe and measure phenomena using appropriate tools. They are able to organize objects and ideas into broad concepts first by single properties and later by multiple properties. They can create and interpret graphs and models that explain phenomena. Students can keep notebooks to

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record sequential observations and identify simple patterns. They are able to design and conduct investigations, analyze results, and communicate the results to others. Students will carry their curiosity, interest and enjoyment of the scientific world view, scientific inquiry, and the scientific enterprise into middle school.

At the end of the middle school science experience, students can discover relationships by making observations and by the systematic gathering of data. They can identify relevant evidence and valid arguments. Their focus has shifted from the general to the specific and from the simple to the complex. They use scientific information to make wise decision related to conservation of the natural world. They recognize that there are both negative and positive implications to new technologies.

As an SCS graduate, former students should be literate in science, understand key science ideas, aware that science and technology are interdependent human enterprises with strengths and limitations, familiar with the natural world and recognizes both its diversity and unity, and able to apply scientific knowledge and ways of thinking for individual and social purposes.

Structure of the Standards

- **Grade Level/Course Overview:** An overview that describes that specific content and themes for each grade level or high school course.
- **Disciplinary Core Idea:** Scientific and foundational ideas that permeate all grades and connect common themes that bridge scientific disciplines.
- **Standard:** Statements of what students can do to demonstrate knowledge of the conceptual understanding. Each performance indicator includes a specific science and engineering practice paired with the content knowledge and skills that students should demonstrate to meet the grade level or high school course standards.



Purpose of Science Curriculum Maps

This map is a guide to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the Tennessee Academic Standards for Science, which define what to teach and what students need to learn at each grade level. The map is designed to reinforce the grade/course-specific standards and content (scope) and provides *suggested* sequencing, pacing, time frames, and aligned resources. Our hope is that by curating and organizing a variety of standards-aligned resources, teachers will be able to spend less time wondering what to teach and searching for quality materials (though they may both select from and/or supplement those included here) and have more time to plan, teach, assess, and reflect with colleagues to continuously improve practice and best meet the needs of their students.

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3rd Grade Quarter 1 Curriculum Map


Quarter 1 Curriculum Map Feedback

Quarter 1		Quarter 2	Quarter 3		Quarter 4		
Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	Unit 4 Solar System	Unit 5 Weather and Climate	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	3 weeks	6 weeks	3 weeks	6 weeks

UNIT 1: Matter (5 weeks)

Overarching Question(s)

How can one explain the structure, properties, and interactions of matter?

Unit 1: Lesson 1	Lesson Length	Essential Question	Vocabulary
Properties of Matter	2.5 weeks	What is matter?	matter, property, physical property, volume, mass, magnetism, texture
Standards and Related Background Information	Instructional Focus	Instructional Resources	
<p>DCI(s) 3.PS1 Matter and Its Interactions</p> <p>Standard(s) 3.PS1.1: Describe the properties of solids, liquids, and gases and identify that matter is made up of particles too small to be seen.</p> <p>3.PS1.3: Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.</p> <p>Explanation(s) 3.PS1.1</p>	<p>Learning Outcomes Students will be able to define matter and compare and contrast various properties.</p> <p>Suggested Phenomena <i>Click on the phenomenon picture to view the video.</i></p> <p>Phenomenon #1</p> 	<p>Curricular Resources</p> <p><u>Engage</u> TE, p. 183-184 TE, p.183, Phenomenon TE, p. 184, Essential Question TE, p.184, Science and Engineering Practices</p> <p><u>Explore</u> TE, pp. 184-185 (LAB) Be a Scientist Notebook, p. 189, Inquiry Activity: How Do You Describe Objects?</p> <p><u>Explain</u></p>	

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Third grade is the first time that students study things that are not visible, either because they are too small to see or are a hidden internal structures.

Students should understand that matter repeatedly divided into smaller pieces still exists (particles). For example, chalk broken into increasingly smaller pieces, eventually powder, does not cease to exist simply because it is no longer visible. Our eyes just cannot detect it any longer.

We can see evidence for invisible particles of matter by observing their effects (e.g., A balloon expanding as it is filled with gas or wind blowing leaves or pieces of paper) or when invisible particles of matter become visible, such as water vapor becoming visible on the side of a glass, in clouds, or in the contrails of a jet.

Properties should be those which distinguish one phase of matter from another such as hardness, visibility, flexibility, and the ability to stand up independently. Additionally, students should understand that all phases of matter are constructed of particles we cannot see.

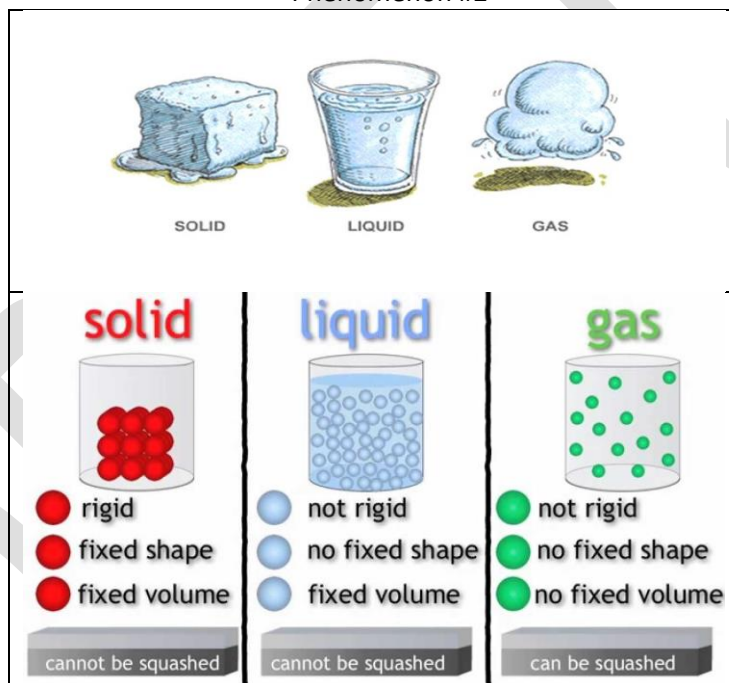
(Properties in this standard are not the same as those physical properties that are used to identify a type of matter, such as hardness in 3.PS1.3.)

Phenomenon #1 Explanation:

Scientists use changes in certain physical properties of a material, such as color, as evidence of chemical reactions.

Click on the phenomenon picture to view the video.

Phenomenon #2



TE, pp. 186-190

Be A Scientist Notebook, p. 186:

Vocabulary

Science File: Matter; States of Matter

(LAB) Be A Scientist Notebook, p. 192,

Inquiry Activity: Comparing Solids,

Liquids, and Gases; p. 194: Classifying

Matter

Elaborate

TE, pp. 191-192

(LAB) Be a Scientist Notebook, p. 191,

Inquiry Activity: Designing and Building a

House

Evaluate

TE, pp. 192-195

(LAB) Be A Scientist Notebook, p. 200

Performance Task: Comparing Similar

Objects

eAssessment

Additional Resources

Lesson: [States of Matter](#)

Simulation: [Thermometer color sheet](#)

Simulation: [States of Matter SIM](#)

(Resource) [State of Matter](#)



3.PS1.3

There are two varieties of physical properties included in this standard. Some of these properties can be used to identify a particular sample of matter, while other properties are included to build measurement acumen.

Properties such as hardness, reflectivity, and color can be used as a set to identify some materials. Other physical properties that can be used for identification include conductivity, response to magnets, and solubility.

Properties such as shape, length, mass, and temperature do not remain fixed for any particular sample of matter. It is important that students become familiar with these properties because of their roles in carrying out investigation, but they are not necessarily useful for identification purposes.

We can consider aluminum as an example to distinguish between these two sets of properties. There are some properties that remain generally fixed: aluminum will be a gray color, is generally a dull shine, but is soft, allowing it to be polished or bent. However, aluminum can be found in a variety of different shapes, lengths, and masses. Therefore, these latter properties cannot be used to identify an unknown sample as aluminum.

ESL Supports and Scaffolds

[WIDA Standard 4](#)

The Language of Science

To support students in speaking, refer to this resource:

[WIDA Doing and Talking Science](#)

Pre-teach vocabulary: (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**)
too, particle, matter

Provide word banks to support language learners in describing the properties of matter.

Provide sentence frames to support speaking and writing about matter:

This is a solid because_____.

Water is a liquid because_____.

Create a 3-column chart for students to categories matter into solid, liquid, gas.

Provide words and/or pictures for students to sort.

- [Properties of matter flashcards](#)
- Understanding comparisons help students understand the endings –er and –est for comparing two or more things.



Suggested Science and Engineering Practice(s)

Obtaining, Evaluating, and Communicating Information

Suggested Crosscutting Concept(s)

Energy and Matter

Teacher Overview

A physical change occurs when matter changes in size, shape, or state, but the type of matter itself does not change. Matter can be put together and broken apart. Mass is the amount of matter an object contains. The mass of matter remains the same, even though the shape of matter may change. For example, the total mass of a board will remain the same if the board is cut into two pieces. The mass of a lump of clay stays the same even if the shape of the clay changes.

Misconceptions

Students may confuse mass and weight or think they are the same. An object's mass is a measure of the amount of matter in the object, whereas weight is a measure of the pull of gravity on the object. Mass is generally measured in grams or kilograms, while weight is measured in the customary units of ounces or pounds.

- Using a pan balance, measure and compare several objects masses. Write findings in science notebook, discuss.
- Using a graduated cylinder, measure the volume of a liquid. This can also be used to find the volume of a solid.

Challenge

- Do you think there is matter you cannot see? Explain.

The mass of water in a pitcher is 1,000 grams. A student pours the water in 10 glasses and finds the mass of the water is now 970. Why are the measurements different?



3rd Grade Quarter 1 Curriculum Map


[Quarter 1 Curriculum Map Feedback](#)

Quarter 1		Quarter 2	Quarter 3		Quarter 4		
Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	Unit 4 Solar System	Unit 5 Weather and Climate	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	3 weeks	6 weeks	3 weeks	6 weeks

UNIT 1: Matter (5 weeks)

Overarching Question(s)

How can one explain the structure, properties, and interactions of matter?

Unit 1: Lesson 2	Lesson Length	Essential Question	Vocabulary
Changes of State	2.5 weeks	How are the three states of matter alike and different?	physical change, chemical change
Standards and Related Background Information	Instructional Focus		Instructional Resources
<p>DCI(s) 3.PS1 Matter and Its Interactions</p> <p>Standard(s) 3.PS1.2: Differentiate between changes caused by heating or cooling that can be reversed and that cannot.</p> <p>Explanation(s) 3.PS1.2 The purpose of this standard is to prepare students to justify when chemical reactions have or have not occurred in later grades. It is important that students see that the changes are caused by heating or cooling. Examples of</p>	<p>Learning Outcomes Students will be able to investigate ways to change matter and determine that some changes can be reversed and other cannot.</p> <p>Suggested Phenomena <i>Click on the phenomenon picture to view the video.</i> Phenomenon #1</p> 		<p>Curricular Resources <u>Engage</u> TE, pp. 197-198 TE, p. 197 Phenomenon TE, Essential Questions, p. 198 TE, Science and Engineering Practices, p. 198</p> <p><u>Explore</u> TE, pp. 198-199 (LAB) Be a Scientist Notebook, p. 205 Inquiry Activity: How Can You Change Matter?</p> <p><u>Explain</u></p>



reversible changes may include ice and butter in an ice cube tray melting outside and then refreezing back in the tray to original shape. Examples of irreversible changes may include taking a raw egg, cooking or hard boiling it, and trying to unfreeze it to go back to raw, or taking a piece of paper and burning it, considering whether or not the paper could be reconstructed.

Suggested Science and Engineering Practice(s)

Obtaining, Evaluating, and Communicating information

Suggested Crosscutting Concept(s)

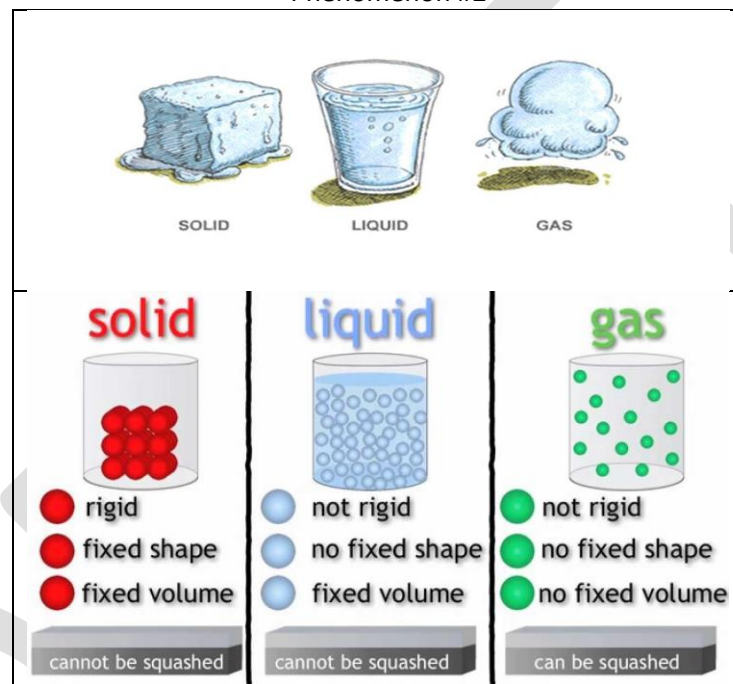
Energy and Matter

Teacher Overview

A physical change such as melting or cutting alters the size, shape, or state of matter without changing its identity. In other words, no new substance is made. Paper that is cut into little bits is still paper. Water that is frozen into ice cures is still water. However, a chemical change, such as baking or burning, produces a new substance with properties that are burning, produces a new substance with properties that are different from those of the original materials. Muffins taste different from the ingredients that are used to make them. A pile of

Click on the phenomenon picture to view the video.

Phenomenon #2



TE, pp. 200-205
Be a Scientist Notebook, p. 207: Vocabulary; (LAB) p. 208: Inquiry Activity: How Can Matter Change?
Science File: Changes in Matter
Video: How Matter Changes
Digital Interactive: Physical and Chemical Changes

Elaborate

TE, pp. 205-206
(LAB) Be a Scientist Notebook, p. 213
Inquiry Activity: Investigate a Physical Change

Evaluate

TE, pp. 207-209
(LAB) Be a Scientist Notebook, p. 215,
Performance Task: Physical vs. Chemical Changes
eAssessment

Additional Resources

- Lesson: [Science starter lesson](#)
- Lesson: [What's the Matter?](#)
- Lesson: [Properties of Matter Lesson](#)
- Lab: [Properties of Matter ppt slides](#)
- Video: [Physical and Chemical Changes for Kids](#)



ash is different from the log that was burned. Physical changes can sometimes be easily reversed; a melting ice cube can be refrozen. In general, chemical changes are difficult to reverse: you cannot “unburn” a log.

Misconceptions

Some students may think that changing water to ice is a chemical change because the properties of ice are different from those of water. Clarify that, although the properties are different, changing water to ice is a physical change. Ice can easily be changed back to water. Another misconception students may have is that air does not have volume. Although we cannot see the gases that make up air, it does have volume. Gas fills the capacity, or volume, of the container it is in.

Worksheet(s)
[Chemical VS Physical States of Matter](#)

PowerPoint: [States of Matter](#)

ESL Supports and Scaffolds

[WIDA Standard 4](#)

The Language of Science

Provide word banks to support language learners in describing the properties of matter.

Provide sentence frames to support speaking and writing about matter:

This is a solid because _____.

Water is a liquid because _____.

Create a 3-column chart for students to categories matter into solid, liquid, gas.

Provide words and/or pictures for students to sort.

[Properties of matter flashcards](#)



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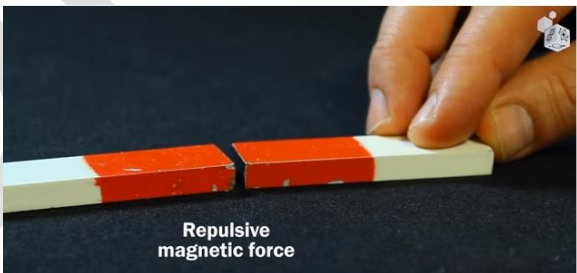
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UNIT 2: Magnetic Forces (3 weeks)


Overarching Question(s)

How can one explain and predict interactions between objects and within systems of objects?

Unit 2: Lesson 1	Lesson Length	Essential Question	Vocabulary
Magnets	1.5 weeks	How do magnets affect other objects?	electrical charge, static electricity, magnet magnetism, attract, repel, pole, magnetic field

Standards and Related Background Information	Instructional Focus	Instructional Resources
<p>DCI(s) 3.PS2 Motion and Stability 3.PS3 Energy</p> <p>Standard(s) 3.PS2.1: Explain the cause and effect relationship of magnets.</p> <p>3.PS3.3: Evaluate how magnets cause changes in the motion and position of objects, even when the objects are not touching the magnet.</p> <p>Explanation(s) 3.PS2.1</p>	<p>Learning Outcomes Students will be able to investigate how magnets can cause changes to other objects.</p> <p>Suggested Phenomenon <i>Click on the phenomenon picture to view the video.</i></p> 	<p>Curricular Resources</p> <p><u>Engage</u> TE, pp. 215-216 Science in My World, p. 215 (Phenomenon) Essential Questions, p. 216 Science and Engineering Practices, p. 216</p> <p><u>Explore</u> TE, pp. 217-218 (LAB) Be a Scientist Notebook, p. 225 Inquiry Activity: Investigate with Magnets</p> <p><u>Explain</u> TE, pp. 218-226</p>



<p>Prior to this grade, the words “push” or “pull” have been used instead of the word force. A major focus of the investigations of magnets should be on the idea that some forces happen even when the objects aren’t touching each other. This idea of non-contact forces will extend further when as students explore static electricity and gravity in later grades.</p> <p>There are two specific relationships that students should be uncovering through investigation. The strength of the force exerted by a magnet depends of properties of the magnet (i.e. its magnetic strength) and how far the magnet is from another magnetic material (distance).</p> <p>Student investigations can include the interactions of two permanent magnets or electromagnets and magnetic materials such as paperclips. The force between an electromagnet and steel paperclips, and the force exerted by one magnet verses the force exerted by two magnets.</p> <p>3.PS3.3 Pushes or pulls occur when objects touch each other (2.PS2), but now students should see that magnets are special because they are able to exert forces (pushes/pulls) on other magnets or magnetizable objects without any contact.</p> <p>This standard gets its full meaning when explored along with 3.PS3.1. There we see that moving objects have a type of energy referred to as simply “energy of motion.”</p>	<p>Phenomenon Explanation: Two opposite poles of a magnet will attract, but like poles of a magnet will repel.</p>	<p>Be a Scientist notebook, p. 227: Vocabulary Science Handbook/eBook: Electrical Energy Science Handbook/eBook: Magnets Video: Exploring Magnets <i>(LAB)</i> Be a Scientist Notebook, p. 229: Distance and the Pull of Magnet Science Handbook/eBook: Magnetic Fields</p> <p><u>Elaborate</u> TE, pp. 227 <i>(LAB)</i> Be a Scientist Notebook, p. 233: Earth’s Magnetic Pull</p> <p><u>Evaluate</u> TE, pp, 228-229 <i>(LAB)</i> Be a Scientist Notebook, p. 235, Performance Task: Become a Levitation Magician eAssessment</p> <p>Additional Resources</p>  <p>Lesson: Magnets</p> <p>ESL Supports and Scaffolds WIDA Standard 4 The Language of Science</p>
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So, if a magnet can change the motion of an object by exerting a force, but without actually touching the other object, we have evidence that magnets must be transferring energy without making contact.

Students must have an understanding that when something is moving, that moving thing possesses energy of motion (called kinetic energy in later grades). A foundation for this idea is set in second grade when students observed that objects moving faster prior to a collision experience greater changes in shape during a collision.

Suggested Science and Engineering Practice(s)

Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information

Suggested Crosscutting Concept(s)

Cause and Effect

Teacher Overview

Most students have played with magnetics, so they are familiar with how magnets attract and repel. Draw on this prior knowledge as you complete the lesson. Because they are invisible, magnetic fields can be difficult for students to understand. Magnetic fields are areas where an object exhibits influence, attracting or repelling other objects. A magnetic field has two poles: north and south. These are the areas on the magnet where magnetism is strongest.

To support students in speaking, refer to this resource:

[WIDA Doing and Talking Science](#)

Pre-teach vocabulary: opposite, pole, store

To support students with the scientific explanation: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing. Sentence stems for writing and discussion:**

Magnetic attraction is caused by_____.

Magnets cause change by_____.

When I placed the magnets close to one another, I observed_____.

[Question Starters](#)

What's the connection between....?

What link do you see between...

Why do you think...?

What is our evidence that...

Do we have enough evidence to make that claim?

But what about this other evidence that shows...?

But does your claim account for...(evidence)

[Response Starters](#)



<p>Misconceptions Students may have the misconception that magnetic force is the same at all points on a magnet, however, the two poles, r ends, of the magnet are where the magnetic force is strongest. Students might confuse the + and – signs they have seen on batteries. Clarify that the poles of magnets are called <i>north</i> (positive) and <i>south</i> (negative).</p>		<p>I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning) This evidence shows that... Your explanation makes me think about</p>
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UNIT 2: Magnetic Forces (3 weeks)

Overarching Question(s)

How can one explain and predict interactions between objects and within systems of objects?

Unit 2: Magnetic Forces, Lesson 2	Lesson Length	Essential Question	Vocabulary
Using Magnets	1.5 weeks	How can you use a magnet to solve a problem?	iron, electromagnet
Standards and Related Background Information	Instructional Focus	Instructional Resources	
<p>DCI(s) 3.PS2 Motion and Stability 3.ETS1 Engineering Design 3.ETS2 Links Among Engineering, Technology, Science, and Society</p> <p>Standard(s) 3.PS2.2 Solve a problem by applying the use of the interactions between two magnets.</p> <p>3.ETS1.1 Design a solution to a real-world problem that includes specified criteria for constraints.</p>	<p>Learning Outcomes Students will be able to apply their knowledge of magnets to solve a problem.</p> <p>Suggested Phenomena Click on the phenomenon picture to view the video.</p> <p style="text-align: center;">Phenomenon #1</p> 	<p>Curricular Resources</p> <p><u>Engage</u> TE, pp. 231-232 TE, p. 239, Science in My World, Phenomenon TE, p. 232 Essential Questions TE, p. 232 Science and Engineering Practices</p> <p><u>Explore</u> TE, pp. 233 (LAB) Be a Scientist Notebook, p. 241 Inquiry Activity: Sort with Magnets</p> <p><u>Explain</u> TE, pp. 234-238</p>	



<p>3.ETS1.2 Apply evidence or research to support a design solution.</p> <p>3.ETS2.1 Identify and demonstrate how technology can be used for different purposes.</p> <p>Explanation(s)</p> <p>3.PS2.2 Possible problems may include creating a latch mechanism, utilizing two magnets to keep surfaces from touching, separating a mixture of different materials, or sorting metals for recycling based on magnetic properties.</p> <p>3.ETS1.1 Design problems defined to address a change opportunity should include observations about the situation or environment. The insights gained when making preliminary observations of a situation to be improved should be used to define specific criteria for successful solutions and constraints which might limit possible design solutions. Criteria are the required specifications/performances must meet to be deemed successful.</p> <p>Constraints are the limitations placed on potential designs due to real-world factors that cannot be changed. Constraints might include limited availability of either materials or non-material resources (e.g., time, access).</p>	<p>Phenomenon #1 Explanation: Magnets are used to transfer metal at a scrap metal business.</p> <p><i>Click on the phenomenon picture to view the video.</i></p> <p>Phenomenon #2</p>  <p>Phenomenon #2 Explanation: Magnetism - Magnets operate a maglev train</p>	<p>Be a Scientist Notebook, p. 243: Vocabulary Science Handbook/eBook: Using Magnets <i>(LAB)</i> Be a Scientist Notebook, p. 235, Inquiry Activity: Make an Electromagnet Digital Interactive: Using Magnets</p> <p><u>Elaborate</u> TE, pp. 239-240 <i>(LAB)</i> Be a Scientist Notebook, p.248: Make an Electromagnet Stronger</p> <p><u>Evaluate</u> TE, pp. 240-241 <i>(LAB)</i> Be a Scientist Notebook, p. 250, Performance Task: Using an Electromagnet eAssessment</p> <p>Additional Resources</p> <p>Videos: Shanghai's Trans rapid Maglev Guideway video (6:11)</p> <p>Lessons: Magnet Play Magnetism</p> <p>Project: Build a Maglev Train Model</p> 
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<p>Understanding these constraints, students can now undertake the task of comparing design solutions and then consider how well the proposals meet criteria for success and work within the constraints.</p> <p>3.ETS1.2 Engineers research a problem before they begin working on a design solution. Examples of the potential research types could include internet searches, market research (to gauge potential interest in the solution), or field observations.</p> <p>3.ETS2.1 As scientific understanding of the natural world increases, these understandings can lead to improvements in engineered objects. In turn, improvements the tools produced by engineers can enable further discovery by scientists. Scientists utilize devices produced by engineers in innovative ways that may have never been considered initially. Examples of this concept might include using a cell phone as an interactive map of the night sky or apps such as eBird (Cornell University) which can be used to track and catalog sightings of birds using the user's GPS location.</p> <p>Suggested Science and Engineering Practice(s) Constructing Explanations and Designing Solutions Developing and Using Models</p> <p>Suggested Crosscutting Concept(s)</p>	<p style="text-align: center; opacity: 0.5; font-size: 48px; font-weight: bold;">DRAFT</p>	<p>ESL Supports and Scaffolds WIDA Standard 4 The Language of Science To support students in speaking, refer to this resource: WIDA Doing and Talking Science</p> <p>Pre-teach the vocabulary: (Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs) Transfer</p> <p>To support students with the scientific explanation: Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.</p> <p><u>Question Starters</u> What's the connection between....? What link do you see between... Why do you think...? What is our evidence that.... Do we have enough evidence to make that claim? But what about this other evidence that shows...? But does your claim account for...(evidence)</p>
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<p>Cause and Effect</p> <p>Teacher Overview Magnetic forces and electric forces are closely linked. Wherever there is electric current, there is a magnetic field, and magnetic fields have the ability to induce electric current. *The strength of an electromagnets can be made stronger by wrapping the iron core in wire and passing an electric current through the wire.</p> <p>Misconceptions Students may have the misconception that all metals are attracted to magnets. As students will find out in the sorting activity, only certain metals such as iron, are attracted to magnets. Students will be familiar with magnetism and with electricity, but are probably unaware of the close connection between the two.</p>		<p><u>Response Starters</u> I agree with you because of (evidence or reasoning) I don't agree with your claim because of (evidence or reasoning) This evidence shows that... Your explanation makes me think about</p>
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