

SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

[Planning Guide User Information](#)

Unit 3: Matter and Energy Part 1: States of Matter	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 1 1 lesson (45-minutes each)
Unit Overview		
<p>Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.</p> <ul style="list-style-type: none"> • Part 1, students explore matter and differentiate its physical properties. • Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes. • Part 3: Relative Density, students justify why some objects float and some objects sink. • Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations. • Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures. • Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance. • Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature. • Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used. <p>Part 1: States of Matter starts here.</p>		
TEKS/SEs (<i>district clarifications/elaborations in italics</i>)		
<p>PS SCI.5.3C Draw or develop a model that represents how something works or looks including systems and processes that cannot be seen.</p> <p>R SCI.5.5A Classify matter based on physical properties, including mass, magnetism, physical state solid, liquid, and gas, relative density sinking and floating, solubility in water, and the ability to conduct or insulate thermal energy or electric energy.</p> <p>Scientific investigation and reasoning standards SCI.5.2F, 5.2G, 5.3D</p>		
English Language Proficiency Standards		
<ul style="list-style-type: none"> • ELPS C.3g Express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics • ELPS C.4g Demonstrate comprehension of increasingly complex English by participating in shared reading, retelling or summarizing material, responding to questions, and taking notes commensurate with content area and grade level needs. 		
College and Career Readiness Standards		
<ul style="list-style-type: none"> • CCRS 5.A2 Understand the typical states of matter (solid, liquid, gas) and phase changes among these. • CCRS 7.I1 Understand the behavior of matter in its various states: solid, liquid, and gas. • CCRS 8.A2 Understand states of matter and their characteristics. 		
Key Concepts		
<ul style="list-style-type: none"> • matter • heating/cooling • physical properties • states of matter (solid, liquid, gas) 		



Key Skills

- collecting data
- analyzing data
- measuring using metric units

Academic Vocabulary

- heat
- temperature

Content-Specific Vocabulary

- states of matter
- substance
- properties

Essential Understandings / Guiding Questions

- Most substances can exist as a solid, liquid, or gas depending on their temperature.
 1. How do we identify the state of matter of an object?
 2. How does heat change the state of matter?

Assessment Connections

- [Performance Expectation](#) – Given a list of objects or substances, students will classify them based on their physical state.
- [Formative Assessment – States of Matter English](#)
- [Formative Assessment – States of Matter Spanish](#)

[Texas English Language Proficiency Assessment System \(TELPAS\)](#): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.5A, 3.5A, 2.5C: Prior to this grade level students gathered information about physical characteristics of various objects.

Background Knowledge for Students

Students have had multiple opportunities to investigate and classify the states of matter. Areas that may challenge students are with terminology. The term “relative density” is new for students to comprehend. Ensure that examples that students can relate to are given. Also, students will need to apply their knowledge of solutions and mixtures to understand the term “solubility.” Furthermore, the physical properties of objects that conduct or insulate thermal and electrical energy serve as a precursor for students when exploring the uses of energy.

Background Knowledge for Teacher

Spend time revisiting classroom management and form collaborative groups.

Common Misconception:

Students may possess the following misconception about the states of matter. Materials can only exhibit properties of one state of matter highlights a misconception that students may believe. Using ice (solid, liquid, and gas) to dispel this type of thinking will assist students to realize that materials do contain properties that can exist in more than one state of matter.

Teacher Professional Development Resources: Information pertaining to [physical properties and changes](#) can be referenced for background information.

[Physical Science: Session 1](#) grants the opportunity to build an understanding regarding matter and its properties as well identifying those physical properties that differentiate between a solid, liquid, and a gas. [Physical Science: Session 2](#) observes the Particle Nature of Matter in solids, liquids, and gases.

[Houston ISD Science Resources](#): Useful websites, usernames, and passwords



Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).

Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

All students like to feel physically comfortable when learning new information and all have different preferences. A majority of students enjoy a bright, quiet, warm, and informal environment. When they are allowed, students normally migrate toward the areas that naturally accommodated their preferences. The typical school chairs are the last to be used, most students like padded chairs. Although most schools provide plastic or wooden chairs, research indicates that students learn better when they are allowed to use casual furniture, padded seats, or carpeted floors. From *Creating as Culture for Success*, NSTA 2001

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.
- [Differentiated Instruction Strategies for Reading in the Content Areas](#) by Chapman & King (2003)

Instructional Strategies / Activities

Student Activity:

◆ Collaborative Learning

It is best to build collaborative groups of 3 to 5 students. Clearly articulate the roles and expectations for all students' participation in jobs such as: recorder, reporter, illustrator, and materials manager.

Introduce the concept of matter and states of matter using critical competitors in different states (for example water, liquid soap, rocks, a piece of wood, a balloon filled with air, a balloon filled with helium). As students observe one liquid (water) they point out its characteristics. The addition of another liquid (liquid soap) as critical competitor causes the students to fine tune their observations. It takes two similar objects or specimens for students to notice fine details.

The comparison of two liquids will ease the development of a conceptual generalization of the concept of liquid. Students should note the following characteristics:

- A **solid** is matter that keeps its shape and volume when placed in a different container.
- A **liquid** keeps its volume but takes the shape of the container that it is in.
- A **gas** takes the volume and the shape of the container that it is in.

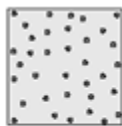
Have students compare objects in different states of matter using diagrams. (SCI.5.5A, 5.3C)

Use diagrams to facilitate understanding

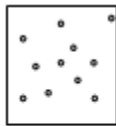
Particle arrangements in different states of matter.



Solid



Liquid

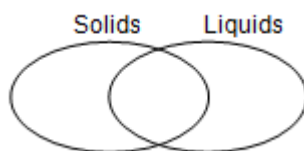


Gas

Take students to an open area and have them act out the particles kinesthetically to serve as a model for each state of matter since the particles are too small to see. For example, they will move all about the room to act out gas particles while they would remain still and close together to act out solid particles. Have students record all observations using graphic organizers such as a Venn diagram in their science notebooks.

Compare and Contrast

“Compare and Contrast” is the process of identifying how things are alike and different. Comparison refers to how two things are alike; contrast refers to how they are different. This is one of the most difficult structures for students to understand because it requires evaluating and synthesizing. Using “Compare and Contrast” graphic organizers such as Venn diagrams reinforce learning as students explore ideas while they reflect on their understanding. (SCI.5.5A, 5.3C)



Use one of the Unitedstreaming.com videos to create interest in the concept of physical states of matter. (SCI.5.5A, 5.3C)

- [Changes in the Properties of Matter: Physical and Chemical](#)
- [Common Properties of Matter](#)
- [Real World Science: Matter: Solids, Liquids, and Gases](#)
- [Matter and Its Properties: Changes in Matter](#)
- [Matter and Its Properties: Observing The Properties of Matter](#)

Brainpop.com videos can be utilized to reinforce student understanding. (SCI.5.5A, 5.3C)

- [Matter changing states](#)
- [States of Matter](#)
- [Property Changes](#)

Houghton Mifflin Harcourt resources assists students with further inquiry into states of matter: (SCI.5.5A, 5.3C)

- Physical Properties (Hands-on Activity: [English](#), [Spanish](#), [TEKS Teaching Notes](#))
- Which Solids Will Dissolve? ([Activity Video](#), [English](#), [Spanish](#), [TEKS Teaching Notes](#))
- [Vocabulary cards](#): solid (RS 221), liquid (RS 190), gas (RS 176), matter (RS 193), physical property (RS 201).

The following lessons give students further information pertaining to the difference between solids, liquids, and gases. (SCI.5.5A, 5.3C)

- [Properties of Matter](#)
- [Gases Matter](#)
- [What Makes Water Special?](#)
- [Solid, Liquid or Gas?](#)
- [Goo Yuck](#)

Use the following literature resource to extend student understanding of states of matter: (SCI.5.5A, 5.3C)

- [Bartholomew and the Oobleck, Dr. Seuss](#)



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Resources

Adopted Instructional Materials

Houghton Mifflin Harcourt:

- Physical Properties (Hands-on Activity: [English](#), [Spanish](#), [TEKS Teaching Notes](#))
- Which Solids Will Dissolve? ([Activity Video](#), [English](#), [Spanish](#), [TEKS Teaching Notes](#))
- [Vocabulary cards](#)

Supporting Resources

Superstaar.org:

- [Properties of Matter](#)
- [Gases Matter](#)
- [What Makes Water Special?](#)
- [Solid, Liquid or Gas?](#)
- [Goo Yuck](#)
- [Houston ISD Science Resources](#)
- [Renzulli Learning](#)
- [HISD Cyber Safety website](#)
- [Special Education](#)
- [Scholars and Knowledge framework](#)

Professional Texts

- Teacher Professional Development Resources: [Physical properties and changes](#)
- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [Differentiated Instruction Strategies for Reading in the Content Areas](#) by Chapman & King (2003)
- [Bartholomew and the Oobleck, Dr. Seuss](#)
- [Council for Exceptional Children](#)

Online Resources

Unitedstreaming.com

- [Changes in the Properties of Matter: Physical and Chemical](#)
- [Common Properties of Matter](#)
- [Real World Science: Matter: Solids, Liquids, and Gases](#)
- [Matter and Its Properties: Changes in Matter](#)
- [Matter and Its Properties: Observing The Properties of Matter](#)

Brainpop.com:

- [Matter changing states](#)
- [States of Matter](#)
- [Property Changes](#)
- [Physical Science: Session 1](#)
- [Physical Science: Session 2](#)

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Unit 3: Matter and Energy Part 2: How Temperature Changes Affect Matter	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 2 2 lessons (45-minutes each)
Unit Overview		
<p>Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.</p> <ul style="list-style-type: none"> • Part 1, students explore matter and differentiate its physical properties. • Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes. • Part 3: Relative Density, students justify why some objects float and some objects sink. • Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations. • Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures. • Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance. • Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature. • Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used. <p>Part 2: How Temperature Changes Affect Matter starts here.</p>		
TEKS/SEs (<i>district clarifications/elaborations in italics</i>)		
<p>Ⓟ SCI.5.2D Analyze and interpret information to construct reasonable explanations from direct observable and indirect inferred evidence.</p> <p>Ⓢ SCI.5.5B Identify the boiling and freezing/melting points of water on the Celsius scale.</p> <p>ⓅⓈ SCI.3.5C Predict, observe, and record changes in the state of matter caused by heating or cooling.</p> <p>Scientific investigation and reasoning standards SCI.5.2D, 5.4A</p>		
English Language Proficiency Standards		
<ul style="list-style-type: none"> • ELPS C.3e Share information in cooperative learning interactions. 	<ul style="list-style-type: none"> • ELPS C.2h Understand implicit ideas and information in increasingly complex spoken language commensurate with grade-level learning expectations. 	<ul style="list-style-type: none"> • ELPS C.1c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.
College and Career Readiness Standards		
<ul style="list-style-type: none"> • CCRS 7.A1 Know that physical and chemical properties can be used to describe and classify matter. 		
Key Concepts		
<ul style="list-style-type: none"> • boiling point/ freezing point 	<ul style="list-style-type: none"> • temperature 	<ul style="list-style-type: none"> • melting point
Key Skills		
<ul style="list-style-type: none"> • collecting data 	<ul style="list-style-type: none"> • analyzing data 	<ul style="list-style-type: none"> • measuring using metric units
Academic Vocabulary		
<ul style="list-style-type: none"> • steam 	<ul style="list-style-type: none"> • vapor 	



Content-Specific Vocabulary

- boiling point
- freezing point
- melting point

Essential Understandings / Guiding Questions

- Heating and cooling can cause changes in the properties of materials, but not all materials respond the same way to being heated and cooled.
- A substance exhibits characteristic properties such as a boiling point which are independent of the amount of the substance.
 1. How does the volume of a substance affect its boiling and freezing/melting point?
 2. Why are boiling and freezing/melting points used to identify substances?

Assessment Connections

- Performance Expectation – Given a list of the boiling, freezing, or melting points of different substances, students will identify the data that corresponds to the properties of water.
- [Formative Assessment – How Temperature Changes Affect Matter English](#)
- [Formative Assessment – How Temperature Changes Affect Matter Spanish](#)
- [STAAR Sample Grade 5 Science: Item 2](#)

Performance Expectation – Students apply their knowledge of boiling and freezing/melting points in both constructed and selected response inquiries.

- [Houghton Mifflin Harcourt Assessment -TEKS Assessment 5.5B English](#)
- [Houghton Mifflin Harcourt Assessment -TEKS Assessment 5.5B Spanish](#)
- [Houghton Mifflin Harcourt Assessment – Answer Key](#)

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Instructional Considerations

Prerequisites

SCI.4.5B, 3.5C, 2.5B, 1.5B, K.5B: In previous grade levels students explored properties of different substances including water. In 5th grade students investigate the boiling and melting point of water.

Background Knowledge for Students

Students have a difficulty in understanding the concept of boiling and freezing/melting point. Expose students to a variety of investigations via hands-on or virtual for them to comprehend the differences and or similarities between the terms. Obtain a hot plate and demonstrate for students how liquid temperature changes when heated and justify the action with a thermometer reading.

Background Knowledge for Teacher

When water is a solid (ice), its particles are closely locked in position. When water is liquid, its particles have higher energy, are more loosely connected, and can slide past one another; some particles may get enough energy to escape into a gas. When water is a gas (water vapor) its particles have still more energy and are free of one another. Increasing the temperature of water increases the energy and the movement of its particles.

Water particles remain the same through the different states of matter (solid, liquid and gas) but changing the temperature of water causes it to progress through states that will ultimately reach either a boiling or freezing point.



The state of matter changes in water occur at:

0 °C - Melting point of ice (As temperature increases ice turns into liquid water)

0 °C - Freezing point of liquid water (As temperature decreases liquid water turns into ice.)

100°C- Boiling point of water (As temperature increases liquid water turns into water vapor and as temperature decreases water vapor turns into liquid water)

Common Misconceptions:

Children's ideas about freezing may exhibit the thinking that water can be frozen and melt back to water however this process cannot apply to other substances. Students find it hard to appreciate the reversibility of the state changes, thinking of each process as a separate event. Thus, melting and freezing may not necessarily involve the same substance. Students need to experience state changes for more than one substance. Encourage investigation of state changes of everyday substances, for example, butter, margarine, chocolate, tomato soup. These examples may help students learn that freezing points are not necessarily "cold" and that boiling points are not always "hot". ([Vanessa Kind, 2004](#))

[Physical Science: Session 7](#) focuses on the concepts of heat and temperature while [Physical Science: Session 3](#) gives a detailed perspective of how students learn and what they inquire about when studying physical changes and conservation of matter. Further background information can be found in [Freezing and Melting/ Research and Encyclopedia Information](#).

Explanations and information about the melting, freezing and boiling points of water and other substances can be found using the following resource: [Melting, Freezing, and Boiling Point](#).

[Houston ISD Science Resources](#): Useful websites, usernames, and passwords

Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).

Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

Preferences for bright light, quiet, warm temperatures, and informal designs

All students like to feel physically comfortable when learning new information and all have different preferences. A majority of students enjoy a bright, quiet, warm, and informal environment. When they are allowed, students normally migrate toward the areas that naturally accommodated their preferences. Ensure that students' learning styles are met in order to maintain a successful environment.

From *Creating as Culture for Success*, NSTA 2001

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
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- [Differentiated Instruction Strategies for Reading in the Content Areas](#) by Chapman & King (2003)
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.



Instructional Strategies / Activities

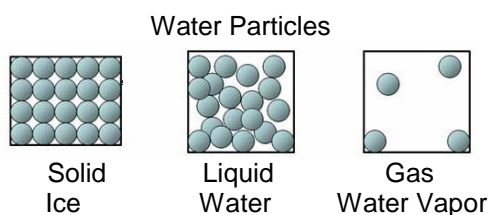
Student Activity:

Provide students with opportunities to measure water at different temperatures (1°C - 55 °C) using a thermometer to find out the temperature in which water turns from a liquid to a solid. Students should understand that water particles remain the same through the different states of matter (solid, liquid and gas) but that an increase in temperature increases the movement of the water particles. (SCI.5.5B, 3.5C)

Direct students to illustrate the particle movement during the freezing, melting and boiling of water in their science notebooks.

◆ Nonlinguistic Representations

Use Diagrams to Facilitate Understanding



Houghton Mifflin Harcourt resources may be used to reinforce the concept of boiling and freezing/melting points. (SCI.5.2D, 5.5B, 3.5C)

- How Can the State of Matter Change? (Virtual Lab: [English](#), [Spanish](#), [TEKS Teaching Notes](#))
- Heat Makes the Difference ([Animation: Student Instructions and Recording Page-English](#), [TEKS Teaching Notes](#))
- Graphic Organizer: Water Changes State ([English](#), [Spanish](#), [Answer Key](#))
- [Vocabulary cards](#): heat (RS 199)

Choose two investigations below for students to conduct regarding boiling and freezing/melting points. (SCI.5.2D, 5.5B, 3.5C)

- [What's the Point?](#)
- [The Ups and Downs of Thermometers](#) (easiest to implement)
- [Water 1: Water and Ice](#)
- [Water 3: Melting and Freezing](#)
- [Deep Freeze](#)

Use the Unitedstreaming.com videos and science online readers to expand student understanding of this concept. (SCI.5.2D, 5.5B, 3.5C)

- [Three Types of Matter](#)
- [Introduction](#)
- [Identifying Properties of Matter](#)
- [Solids, Liquids, and Gases](#)
- [Water Cycle](#)

- [NASA States of Matter diagrams](#)





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Pearson Success Online Readers (SCI. 5.5B, 3.5C)

- [Matter and Its Properties](#)

- [Teacher guide](#)

- [Student Page](#)

- [Properties of Matter](#)

- [Teacher guide](#)

- [Student Page](#)

- [Matter](#)

- [Teacher guide](#)

- [Student Page](#)

- [Properties of Matter](#)

- [Teacher Guide](#)

- [Student Page](#)

Pearson Success Online Readers may require a log-in. To obtain a username and password:

- Go to: www.pearsonsuccessnet.com

- Click on the "Register" box.

- Use the code: SFMADP09TXENG5B

Use the following literature resource to extend student understanding on how temperature changes water:
(SCI. 5.5B, 3.5C)

- [Melting, Freezing, and Boiling: Science Projects with Matter, Gardner, R.](#)



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Resources

Adopted Instructional Materials

Houghton Mifflin Harcourt:

- How Can the State of Matter Change? (Virtual Lab: [English](#), [Spanish](#), [TEKS Teaching Notes](#))
- Heat Makes the Difference (Animation: [Student Instructions and Recording Page-English](#), [TEKS Teaching Notes](#))
- Graphic Organizer: Water Changes State ([English](#), [Spanish](#), [Answer Key](#))

Pearson Success Online Readers

- [Matter and Its Properties](#)
 - [Teacher guide](#)
 - [Student Page](#)
- [Properties of Matter](#)
 - [Teacher guide](#)
 - [Student Page](#)
- [Matter](#)
 - [Teacher guide](#)
 - [Student Page](#)
- [Properties of Matter](#)
 - [Teacher Guide](#)
 - [Student Page](#)

Supporting Resources

Superstaar.org:

- [What's the Point?](#)
- [The Ups and Downs of Thermometers](#)
- [Water 1: Water and Ice](#)
- [Water 3: Melting and Freezing](#)
- [Deep Freeze](#)

- [Houston ISD Science Resources](#)
- [Renzulli Learning](#)
- [HISD Cyber Safety website](#)
- [Special Education](#)
- [Scholars and Knowledge framework](#)

Professional Texts

- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [Differentiated Instruction Strategies for Reading in the Content Areas](#) by Chapman & King (2003)
- *Creating a Culture for Success*, NSTA 2001
- [Freezing and Melting/ Research and Encyclopedia Information.](#)
- [Melting, Freezing, and Boiling Point](#)
- [Council for Exceptional Children](#)
- *Vanessa Kind, 2004*
- [Melting, Freezing, and Boiling: Science Projects with Matter, Gardner, R.](#)
- *Vanessa Kind, 2004*)

Online Resources

- [Physical Science: Session 3](#)
- [Physical Science: Session 7](#)

- Unitedstreaming.com
 - [Three Types of Matter Introduction](#)
 - [Identifying Properties of Matter Solids, Liquids, and Gases](#)
 - [Water Cycle](#)
- [NASA States of Matter diagrams](#)



SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

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Unit 3: Matter and Energy Part 3: Relative Density	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 3 2 lessons (45-minutes each)

Unit Overview

Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.

- Part 1, students explore matter and differentiate its physical properties.
- Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes.
- Part 3: Relative Density, students justify why some objects float and some objects sink.
- Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations.
- Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures.
- Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance.
- Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature.
- Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used.

Part 3: Relative Density starts here.

TEKS/SEs *(district clarifications/elaborations in italics)*

ⓇSCI.5.5A Classify matter based on physical properties, including mass, magnetism, physical state solid, liquid, and gas, relative density sinking and floating, solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

ⓇSCI.5.3D Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

[Scientific investigation and reasoning standards](#) SCI.5.2F, 5.2G, 5.4A, 5.3A

📍 English Language Proficiency Standards

- ELPS C.1c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.

College and Career Readiness Standards

- CCRS 7.A1 Know that physical and chemical properties can be used to describe and classify matter.
- CCRS 8.A4 Understand the concept of density.

Key Concepts

- relative density
- sinking
- floating

Key Skills

- collecting data
- analyzing data
- measuring using metric units

Academic Vocabulary

- relative
- float
- sink

Content-Specific Vocabulary

- relative density
- substance



Essential Understandings / Guiding Questions

- The density of a substance is independent of the amount of the substance and can be used to identify it.
 1. Which common materials are denser than water?
 2. Which common materials are less dense than water?
 3. How can we know if an object has a lower or higher density than water?
 4. Why does oil float on water?

Assessment Connections

- Performance Expectation – Given common objects or substances, students will design an investigation to determine whether the object or substance has a higher or lower density than water.
- [Formative Assessment Relative Density English](#)
- [Formative Assessment Relative Density Spanish](#)
- [STAAR Sample Grade 5 Science: Item 1](#)

Texas English Language Proficiency Assessment System (TELPAS): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.5A, 3.5A, 2.5C: Prior to this grade level students gathered information about physical characteristics of various objects.

Background Knowledge for Students

Students are not familiar with the term “relative density.” Explain to students that this term is the relationship of an object’s density compared to another. For example, oil and water as found in Italian salad dressing demonstrates that oil floats on top because it is less dense than the water (the oil is relatively less dense than the water). Gives students opportunities to further explore this comparison with a variety of items.

Background Knowledge for Teacher

To extend the understanding of density view [Physical Science: Session 5](#) which further explores the concept. Additionally [Density and Floating](#) is explained through the perspective of a scientist with exemplars given.

Common Misconceptions:

Many students experience the inability to explain density especially when having to discuss volume without referring to weight. When children are asked to explain why a larger item displaces more water than a smaller item, they often persist that it is due to the item’s weight, not volume. It seems that after much exploration, most students have a firm grasp of the ideas of weight and volume independently. However, when asked to address the question of what makes things float, they often attribute the cause only to weight and fail to integrate volume into the equation. Students need to be given many opportunities to investigate both, volume independent of mass and mass independent of volume to gain a thorough understanding of the effects of each variable on floating. [What Makes Things Float?, E. Dabagyan](#)

Use the principles of [How Student Learn Science](#) to guide your instruction.

[Houston ISD Science Resources](#): Useful websites, usernames, and passwords

Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).



Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

Use Exciting and Challenging Hands-On Activities

Instructional methodology can no longer be limited to using the science textbook supplemented with a few hands-on activities. Textbook science can turn off large numbers of students if it is the only way science is presented to them. Students learn better with inquiry based science instruction. Students further benefit from conducting investigations in the natural environment and in higher education or business laboratories.

From *Capitalizing on Diversity: Strategies for customizing your curriculum to meet the needs of all students*, NSTA 2001

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.
- [Handbook of Classroom Instruction that Works](#) by Marzano, Norford, Paynter, Pickering & Gaddy (2001).

Instructional Strategies / Activities

Student Activity:

Note: Since this activity includes the use of water, it can be conducted outside to facilitate an easy cleanup.

In this activity students will explore the relative density of various materials and test whether mass and volume affect the relative density of an object.






- Arrange your students in collaborative groups with four students in each group.
- Provide students with a plastic tub filled with a variety of materials: wood of different sizes and shapes, a pencil, a marble, a Styrofoam ball, a cork, a plastic spoon, a rubber band, a penny, a toothpick, a paper clip, and whatever else is available.
- Ask students to use a graphic organizer to record predictions about which objects would float and which will sink when placed under the level of the water and let go. (5.5A)
- Students should perform the investigation and record the result in their notebooks.
- Explain that objects that float have a lower density than water and that objects that sink have a higher density than water.
- Ask students to write whether the objects they tested have a higher or lower density than water. Have students compare the results to their predictions.
- Conduct a discussion about why they thought certain objects would sink/float. (SCI.5.5A)



Cues, Questions, and Advance Organizers

 [Graphic Organizers](#)

 Use tables to collect and organize data

Object	Prediction	Density Observation
 Large piece of wood	sink	
 Small piece of wood	float	
 Penny	sink	
 Marble		
 Styrofoam ball		
 Cork		
 Plastic Spoon		
 Rubber Band		
 Pencil		
 Toothpick		





Ask each group to brainstorm a list of properties of the different objects that may affect whether the object floats or sinks. Ask students to use the objects they already have to do simple tests in order to rule out some of the properties (such as color, shape, etc). Guide a discussion to recognize that the properties of mass and volume may be related to the property of sinking and floating. Have students complete a graphic organizer to summarize the investigation. (SCI.5.5A)

Cues, Questions, and Advance Organizers

 [Graphic Organizers](#)

Use tables to collect and organize data

Relative Density Investigation

Object	Prediction	Density Observation
 Large piece of wood	sink	It floats: its density is lower than water
 Small piece of wood	float	It floats: its density is lower than water
 Penny	sink	It sinks: its density higher than water
 Marble	float	It sinks: its density is higher than water



Provide students with the following materials: (SCI.5.5A)

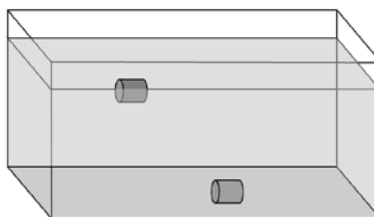
5 vials or film canisters, 50 pennies, and a triple-beam balance, with which to test the effect of changing the mass of an object on whether the object sinks or floats. (Vials and film canisters can be purchased online at the following vendors: [Delta-education](#) or [Nasco](#))

Have students measure and record the initial mass and volume of the canister. The volume of the canister should be measured by [water displacement](#). (SCI.5.5A)

Ask students to design and perform an experiment that tests how the mass of the object affects whether the object sinks or floats.

- Ask students to make a prediction and record why they think their prediction is correct before starting their experiment.
- Have students perform their experiment recording their data and their observations in their science notebooks.
- Ask students to compare their results to their prediction.

Relative Density Investigation



Sample Data Table

Number of Pennies	Volume of the canister	Mass of the canister	Prediction	Sink/Float
0	19 ml	9 g	Float	Float
6	19 ml	12 g	Float	Float
12	19 ml	15 g	Sink	Float
18	19 ml	18 g	Sink	Float

Direct students to design another investigation to test how the volume affects whether the object sinks or floats. The question to investigate can be: What is the smallest amount of canisters needed to float 40 pennies?

Ask students to record predictions in their science notebooks. (SCI.5.5A)

- Have students perform the investigation, making observations, and then compare their results to their prediction.
- Ask students to share their results with the other groups.



Relative Density Investigation
 Sample Data Table

Number of Canisters	Total Volume of the canister	Total Mass of the pennies	Prediction	Sink/ Float
2	38 ml	120 g	sink	
3	57 ml	120 g	sink	
4	76 ml	120 g	float	

Further Exploration may be used with the following inquiry: (SCI.5.5A)

Ask students if they think the clay will float or sink. Record student responses. Have a student take a ball of clay and put it in a tub of water. The class records and communicates their observations. Next, ask the students what would happen to the clay if it was flattened and placed in the tub of water. Have the students predict and record their response. Have a student place the flattened piece of clay in the tub and make observations. Debrief with students the difference in each investigation result

Choose one investigation below for students to conduct regarding relative density. (SCI.5.5A)

- [Sink It](#) (easiest to implement)
- [Does Soap Float?](#)
- [Sink, Float, Hover; Design a Submarine](#)

Houghton Mifflin Harcourt resource may be used to reinforce the concept of relative density. (SCI.5.5A)

- Lighter Than Water Heavier Than Air Science Reader ([English](#), [Spanish](#))
- [Vocabulary card](#): density (RS 178),

Use the video clips to expand student understanding of this concept. (SCI.5.5A)

Brainpop.com

- [Density](#)

Unitedstreaming.com (SCI.5.5A)

- [Floating and Sinking: Density and Displacement](#)

Use the Pearson Success Online Science Reader to give support to student understanding. (SCI.5.5A)

- [Magnetism](#)
- [Teacher Guide](#)
- [Student Page](#)

History of Science, Science Careers, and/or Contribution of Scientists (SCI.5.3D, 5.5A)

Introduce students to how scientists conduct different types of investigations and the various career roles available. Utilize the [Sally Ride](#) Science materials to assist students in becoming aware of scientists in their particular field. Also have students review the life of [Archimedes](#) and [Henry Cavendish](#) and their scientific achievement with density. Additional information pertaining to Archimedes may be viewed at [Science Kids: Archimedes Principle](#).

Use the following literature resource to extend student understanding on relative density: (SCI.5.5A)

- [What Floats? What Sinks? A Look at Density](#) by J. Boothroyd



SCIENCE GRADE 5

HOUSTON ISD PLANNING GUIDE

1ST NINE WEEKS

Resources		
<p><u>Adopted Instructional Materials</u> Houghton Mifflin Harcourt:</p> <ul style="list-style-type: none"> • Lighter Than Water Heavier Than Air Science Reader (English, Spanish) • Vocabulary card <p>Pearson Success Online Science Reader:</p> <ul style="list-style-type: none"> • Magnetism - Teacher Guide - Student Page 	<p><u>Supporting Resources</u> Superstaar.org:</p> <ul style="list-style-type: none"> • Sink It • Does Soap Float? • Sink, Float, Hover: Design a Submarine <ul style="list-style-type: none"> • Houston ISD Science Resources • Renzulli Learning • HISD Cyber Safety website • Sally Ride • Special Education • Scholars and Knowledge framework 	<p><u>Professional Texts</u></p> <ul style="list-style-type: none"> • Science for English Language Learners by Fathman & Crowther (2005) • Handbook of Classroom Instruction that Works by Marzano, Norford, Paynter, Pickering & Gaddy (2001). • How Student Learn Science • What Floats? What Sinks? A Look at Density by J. Boothroyd Archimedes • Science Kids: Archimedes Principle • Henry Cavendish • Council for Exceptional Children • What Makes Things Float?, E. Dabagyan <p><u>Online Resources</u></p> <ul style="list-style-type: none"> • Physical Science: Session 5 • Density and Floating • Delta-education • Nasco • Water displacement <p>Unitedstreaming.com</p> <ul style="list-style-type: none"> • Floating and Sinking: Density and Displacement <p>Brainpop.com</p> <ul style="list-style-type: none"> • Density



SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

[Planning Guide User Information](#)

Unit 3: Matter and Energy Part 4: Magnetism	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 4 2 lessons (45-minutes each)
Unit Overview		
<p>Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.</p> <ul style="list-style-type: none"> • Part 1, students explore matter and differentiate its physical properties. • Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes. • Part 3: Relative Density, students justify why some objects float and some objects sink. • Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations. • Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures. • Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance. • Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature. • Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used. <p>Part 4: Magnetism starts here.</p>		
TEKS/SEs (<i>district clarifications/elaborations in italics</i>)		
<p>Ⓢ SCI.5.5C Classify matter based on physical properties, including mass, magnetism, physical state solid, liquid, and gas, relative density sinking and floating, solubility in water, and the ability to conduct or insulate thermal energy or electric energy.</p> <p>Scientific investigation and reasoning standards SCI.5.4A and 5.3D</p>		
English Language Proficiency Standards		
<ul style="list-style-type: none"> • ELPS C.1c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary. • ELPS C.1e Internalize new basic and academic language by using and reusing it in meaningful ways in speaking and writing activities that build concept and language attainment 		
College and Career Readiness Standards		
<ul style="list-style-type: none"> • CCRS 7.17 Understand magnetic fields and their relationship to electricity. 		
Key Concepts		
<ul style="list-style-type: none"> • magnetic force 	<ul style="list-style-type: none"> • magnetic attraction 	<ul style="list-style-type: none"> • magnetic repulsion
Key Skills		
<ul style="list-style-type: none"> • collecting data 	<ul style="list-style-type: none"> • analyzing data 	<ul style="list-style-type: none"> • measuring using metric units
Academic Vocabulary		
<ul style="list-style-type: none"> • repel 	<ul style="list-style-type: none"> • attract 	
Content-Specific Vocabulary		
<ul style="list-style-type: none"> • magnetism 		



Essential Understandings / Guiding Questions

- A magnet attracts (pulls) things made of iron, and either attracts (pulls) or repels (pushes) other magnets.
 1. What kind of objects do magnets attract or repel?
 2. What magnetism applications do you see at home or school?

Assessment Connections

- Performance Expectation – Given a list of objects or substances, students will classify them based on whether or not they would be attracted to a magnet.

- [Formative Assessment Magnetism English](#)
- [Formative Assessment Magnetism Spanish](#)

Texas English Language Proficiency Assessment System (TELPAS): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.5A, 3.5A, 2.5C: Prior to this grade level students gathered information about physical characteristics of various objects.

Background Knowledge for Students

Students have intensely explored magnetism and identified objects that may or may not be attracted to objects. Identify if students have strong background knowledge about this concept and if so then use this section as a review. Students may not have had experience with investigating the concept using a compass.

Background Knowledge for Teacher

Although many substances are attracted to magnets, an elementary student is expected to have a clear understanding that iron is attracted to magnets unlike other common substances including plastics, paper, wood and metals such as aluminum and copper. Steel is another example of a metal that is attracted to magnets. This is because it is a combination of iron and other materials. Ensure that when investigating with magnets to give appropriate safety procedures such as not having magnets placed near computers. No Magnetic signs may be created and placed as a reminder to students. Visit [Magnetic Basics](#) for additional information on magnetic safety.

Further extend background knowledge by reviewing [Windows to the Universe: Magnetism](#) and [Teaching About Magnetism](#).

Common Misconceptions:

Student misconceptions may be viewed as the following:

1. All metals are attracted to a magnet
2. All silver colored items are attracted to a magnet.
3. All magnets are made of iron.
4. Larger magnets are stronger than smaller magnets.
5. Only magnets produce magnetic fields.
6. A magnetic field is a pattern of lines (not a field of force) that surrounds a magnet.
7. In a magnet, the magnetic field lines exist only outside the magnet.

To dispel these misconceptions encourage students to explore with magnets and offer discourse demonstrations to have students reflect on what they think they believe to be correct thinking in regards to the alignment of actual events that are valid.

Use the principles of [How Student Learn Science](#) to guide your instruction. (Book to purchase)



[Houston ISD Science Resources](#): Useful websites, usernames, and passwords

Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).

Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.
- [Handbook of Classroom Instruction that Works](#) by Marzano, Norford, Paynter, Pickering & Gaddy (2001).

Instructional Strategies / Activities

Student Activity:

Provide students with magnets and samples of different materials including objects made of iron or steel. Give students multiple opportunities to sort and compare and contrast the objects that are magnetic and ones that are not. (SCI.5.5C)

Choose two investigations below for students to conduct: (SCI.5.5C)

- [Magnets](#)
- [What is Attracted to a Magnet?](#)
- [How Strong is Your Magnet?](#) (easiest to implement)
- [Magnetic Pick-ups](#)
- [Magnetic Hangman](#)
- [Magnets in a bag](#)
- [Finding Magnetic Fields of Earth](#)

Houghton Mifflin Harcourt resource may be used to reinforce student understanding. (SCI.5.5C)

- [Mystery Boxes LM 144](#) (Science Lab Manual) (Note: Place miscellaneous items in a box that a magnet may or may not be attracted to and then seal the box so that students are unable to open it.)
- [Vocabulary cards](#): magnetic and magnetic force (RS 213)

Use the video clips to expand student understanding of this concept. (SCI.5.5C)

Brainpop.com

- [Magnetism](#)

Unitedstreaming.com (SCI.5.5C)

- [Physical Science: Magnetism](#)
- [Magnetism](#)

History of Science, Science Careers, and/or Contribution of Scientists (SCI.5.3D, 5.5C)

Introduce students to how scientists conduct different types of investigations and the various career roles available. Have students review the life of [William Gilbert](#) and [André-Marie Ampère](#) and their scientific achievement with magnetism. Students can use Two Column notes to record their findings.



Summarizing and Note-Taking

✦ [Two-Column Notes](#)

This strategy helps students develop the ability to summarize effectively, a skill that involves both evaluation and synthesis. To help students develop this skill, teachers must begin to teach students methods for effective note-taking in the early grades. The two-column note organizer helps students focus on what is important in a reading passage, presentation or video and provides stems that can be used to craft topic sentences. Both steps are important to developing well-written summaries.

Scientist's Name, Topic and Date	
Questions	Responses
Summary:	

Use the following literature resource to extend student understanding on magnetism. (SCI.5.5C)

- [Magnetism: A Question and Answer Book by A. Richardson](#)

Resources

Adopted Instructional Materials

- Houghton Mifflin Harcourt:
- [Mystery Boxes LM 144](#) (Science Lab Manual)
 - [Vocabulary cards](#)

Supporting Resources

- Superstaar.org:
- [Magnets](#)
 - [What is Attracted to a Magnet?](#)
 - [How Strong is Your Magnet?](#)
-
- [Houston ISD Science Resources](#)
 - [Renzulli Learning](#)
 - [HISD Cyber Safety website](#)
 - [Special Education](#)
- Brainpop.com
- [Magnetism](#)

Professional Texts

- [Scholars and Knowledge framework](#)
- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [Council for Exceptional Children](#)
- [Handbook of Classroom Instruction that Works](#) by Marzano, Norford, Paynter, Pickering & Gaddy (2001).
- [How Student Learn Science](#) (Book to purchase)
- [Magnetism: A Question and Answer Book by A. Richardson](#)

Online Resources

- [Magnetic Basics](#)
 - [Windows to the Universe: Magnetism](#)
 - [Teaching About Magnetism.](#)
 - [Magnetic Pick-ups](#)
 - [Magnetic Hangman](#)
 - [Magnets in a bag](#)
 - [Finding Magnetic Fields of Earth](#)
 - [William Gilbert](#)
 - [André- Marie Ampère](#)
- Unitedstreaming.com
- [Physical Science: Magnetism](#)
 - [Magnetism](#)

SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

[Planning Guide User Information](#)

Unit 3: Matter and Energy Part 5: Mixtures	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 5 2 lessons (45-minutes each)

Unit Overview

Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.

- Part 1, students explore matter and differentiate its physical properties.
- Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes.
- Part 3: Relative Density, students justify why some objects float and some objects sink.
- Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations.
- Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures.
- Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance.
- Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature.
- Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used.

Part 5: Mixtures starts here.

TEKS/SEs *(district clarifications/elaborations in italics)*

Ⓢ **SCI.5.5C** Demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand.

[Scientific investigation and reasoning standards](#) SCI.5.2A, 5.2B

◇ English Language Proficiency Standards

- ELPS C.1c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.
- ELPS C.1e Internalize new basic and academic language by using and reusing it in meaningful ways in speaking and writing activities that build concept and language attainment

College and Career Readiness Standards

- CCRS 7.17 Understand magnetic fields and their relationship to electricity.

Key Concepts

- mixtures
- separations of mixtures

Key Skills

- collecting data
- analyzing data
- measuring using metric units

Academic Vocabulary

- separation

Content-Specific Vocabulary

- mixtures



Essential Understandings / Guiding Questions

- A mixture may exhibit properties of their individual ingredients.
 1. How can mixtures be separated into their ingredients?
 2. Which physical properties change after mixing two ingredients?

Assessment Connections

- Performance Expectation – Given common substances, students will create a mixture and construct a table that shows the physical properties of the individual ingredients and whether these properties changed after being mixed or not.
- [Formative Assessment Mixtures English](#)
- [Formative Assessment Mixtures Spanish](#)
- [STAAR Sample Grade 5 Science: Item 3](#)

Texas English Language Proficiency Assessment System (TELPAS): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.5C,3.5C

In previous grade levels students explored properties of different substances, in 5th grade students investigate how substances interact to form mixtures.

Background Knowledge for Students

Students have had opportunities to experience mixtures, however, additional investigations with more variety of items will give students a better understanding about the concept. Students need to have hands-on minds-on labs with this concept to ensure long term comprehension.

Background Knowledge for Teacher

A mixture is considered to be two or more items combined together where their physical properties are maintained and can be easily extracted. A solution is a mixture of two or more items (liquid or solid) where the physical properties of each item cannot be easily extracted and maintained.

Common Misconceptions:

Some of children's misconceptions of science terminology are brought into the class with them. Words such as 'pure' have connotations of being 'clean' or 'untainted'. Students see substances such as yogurt as pure because it is seen as 'purely yogurt'. Students must relearn some terminology from a science perspective, to understand that words can have different meanings in everyday life and in a science context. "Most of the materials children encounter in everyday life are mixtures and therefore, from a science viewpoint, cannot be regarded as 'pure'. However, some materials (such as air, water, honey, yogurt, and other foods) are frequently labeled 'pure', although they are really mixtures of substances" (Driver, 74). (Curriculum Topic Study, P. Keeley)

Conduct a Materials Inventory before starting to investigate mixtures to access prior knowledge and develop vocabulary. Reference the [NSTA Science Materials Inventory Article](#) for additional information.

Classroom instructional support can be obtained by accessing the following resources:

- [Collecting Data and Drawing Upon Resources](#)
- [Processing for Meaning During Inquiry](#)

[Separating Mixtures](#) is an easy to read chart that identifies different ways to separate mixtures from magnets to filtration.



[Houston ISD Science Resources](#): Useful websites, usernames, and passwords

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Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

Talk to Students About Their Learning Styles

Encourage students to take more control of their learning and capitalize on opportunities for success. A survey such as [The Barsch Learning Style Inventory](#) differentiates students into visual, auditory, and kinesthetic learners.

From *Capitalizing on Diversity: Strategies for customizing your curriculum to meet the needs of all students*, NSTA 2001

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.

Instructional Strategies / Activities

Student Activity:

Give students different substances (liquids such as water or liquid soap and solids such as salt, sand, or plastic beads) and ask them to make different mixtures. Let students explore freely while recording all observations in a science notebook. Ask students to identify common, everyday mixtures such as salads, sandwiches, soil, sea water, household garbage, jelly beans, tacos, etc. Provide pictures of mixtures and have the students discuss how they would be separated. (SCI.5.5C)

Have students separate mixtures. For example, have them separate a set of rocks or a bag of teacher-made trash and group the components in groups with similar properties such as color, texture, state of matter, hardness, and luster. (SCI.5.5C)

Provide opportunities for students to observe and separate various mixtures using substances such as salt, sand, iron filings, seeds, etc. Have students observe, identify and record the components, their physical properties and create a plan to separate the mixtures. (SCI.5.5C)

Sample Mixture Separation Labs: Choose a lab below to conduct with the students. (SCI.5.5C)

- [Separation Anxiety](#) (easiest to implement)
- [Mix It Up](#)
- [The Mixtures Lab](#)
- [Eat Iron?!!](#)

Have students create a table that compares the physical properties of the mixture to the properties of each component using the activity: [Salt: Up Close and Personal](#). Students record their plans and all observations in science notebooks.



Cues, Questions, and Advance Organizers

✦ [Graphic Organizers](#)

Use data tables to organize data

Properties	Mixture	Component #1	Component #2
Color			
Particle Size			
Texture			
Smell			

Houghton Mifflin Harcourt resource may be used to reinforce student understanding. (SCI.5.5C)

- [Mix and Unmix](#) (Video, [English](#), [Spanish](#))
- Properties of Mixtures ([English](#), [Spanish](#))

Use the Unitedstreaming.com video clips to expand student understanding of this concept. (SCI.5.5C)

- [Physical Science Series: Mixtures and Solutions](#)
- [Mixtures: Together but Separate](#)
- [Mixtures](#)
- [Mixtures](#)
- [Mixtures: Mixing Matter](#)
- [Heterogeneous and Homogeneous Mixtures](#)
- [Heterogeneous Mixtures](#)
- [Separating Mixtures](#)
- [Vocabulary card: mixture](#) (RS 217)

Use the following literature resource to extend student understanding on mixtures. (SCI.5.5C)

- [Mixtures and Solutions: Why Chemistry Matters](#) by Molly Aloian
- [Mixtures and Solutions: Reading Essentials in Science](#) by J. Karpelenia

SCIENCE GRADE 5

HOUSTON ISD PLANNING GUIDE

1ST NINE WEEKS

Resources

Adopted Instructional Materials

Houghton Mifflin Harcourt:

- [Mix and Unmix](#) (Video, [English](#), [Spanish](#))
- Properties of Mixtures ([English](#), [Spanish](#))
- [Vocabulary card](#):

Supporting Resources

- [Houston ISD Science Resources](#)
- [Renzulli Learning](#)
- [HISD Cyber Safety website](#)
- [Special Education](#)
- [Scholars and Knowledge framework](#)

Unitedstreaming.com

- [Physical Science Series: Mixtures and Solutions](#)
- [Mixtures: Together but Separate](#)
- [Mixtures](#)
- [Mixtures](#)
- [Mixtures: Mixing Matter](#)
- [Heterogeneous and Homogeneous Mixtures](#)
- [Heterogeneous Mixtures](#)

Professional Texts

- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [Handbook of Classroom Instruction that Works](#) by Marzano, Norford, Paynter, Pickering & Gaddy (2001).
- [NSTA Science Materials Inventory Article](#)
- [Mixtures and Solutions: Why Chemistry Matters](#) by Molly Aloian
- [Mixtures and Solutions: Reading Essentials in Science](#) by J. Karpelenia
- [Council for Exceptional Children](#)

Online Resources

- [Separation Anxiety](#)
- [Mix It Up](#)
- [The Mixtures Lab](#)
- [Eat Iron?!!](#)
- [Salt: Up Close and Personal](#)
- [Collecting Data and Drawing Upon Resources](#)
- [Processing for Meaning During Inquiry](#)
- [The Barsch Learning Style Inventory](#)
- [Separating Mixtures](#)

SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

[Planning Guide User Information](#)

Unit 3: Matter and Energy Part 6: Solubility	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 6 2 lessons (45-minutes each)

Unit Overview

Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.

- Part 1, students explore matter and differentiate its physical properties.
- Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes.
- Part 3: Relative Density, students justify why some objects float and some objects sink.
- Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations.
- Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures.
- Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance.
- Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature.
- Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used.

Part 6: Solubility starts here.

TEKS/SEs (*district clarifications/elaborations in italics*)

ⓇSCI.5.5A Classify matter based on physical properties, including mass, magnetism, physical state solid, liquid, and gas, relative density sinking and floating, solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

ⓈSCI.5.5D Identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water.

[Scientific investigation and reasoning standards](#) SCI.5.2C, 5.2D, 5.4A

◆ English Language Proficiency Standards

- ELPS C.5f Write using a variety of grade-appropriate sentence lengths, patterns, and connecting words to combine phrases, clauses, and sentences in increasingly accurate ways as more English is acquired.
- ELPS C.5b Write using newly acquired basic vocabulary and content-based grade-level vocabulary.

College and Career Readiness Standards

- CCRS 7.12 Understand properties of solutions.

Key Concepts

- solutions

Key Skills

- collecting data
- analyzing data
- measuring using metric units

Academic Vocabulary

- dissolve

Content-Specific Vocabulary

- solutions
- evaporation
- solvent



- solute

Essential Understandings / Guiding Questions

- Substances may move from place to place during processes such as evaporation or dissolving, but they do not appear out of nowhere or disappear.
 1. Which substances easily dissolve in water?
 2. Which physical changes are observed when a substance dissolves in water?
 3. How can we prove that salt does not disappear when it is mixed with water?
 4. How can we separate salt from a salt solution?
 5. How can we increase the speed in which sugar or salt dissolves in water?

Assessment Connections

- Performance Expectation – Given common substances, students will create solutions and investigate whether the physical properties of the individual ingredients changed or not.
- [Formative Assessment Solubility English](#)
- [Formative Assessment Solubility Spanish](#)

Texas English Language Proficiency Assessment System (TELPAS): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.6D, 3.6C, 2.6B, 1.6B, K.6B: In previous grade levels students explore properties of different substances. In 5th grade students investigate how substances interact to form solutions.

Background Knowledge for Students

Students' exposure to solutions is present starting in 4th grade thus this concept needs to be well covered with the utilization of investigations that are related to real world connections. Students may have difficulty identifying the terms "mixture" and "solution" since a solution is a mixture. Make clear the distinction between by identifying what happens to the physical properties of each item.

Background Knowledge for Teacher

A solution is type of mixture made when one or more substances (**solutes**) are **dissolved** in another substance (**solvent**). Solutions can be made of solids, liquids or gases.

Reference [What Are Mixtures and Solutions](#) to obtain clarifying information about this concept. Additionally obtain basic information about solution and mixtures with clear illustrations and descriptions that aid in understanding basic chemistry in [Solutions and Mixtures](#). [Acids and Bases](#) focuses on how lemon juice tastes sour and how acids dissolve in water.

Common Misconceptions:

When conducting experiments with solutions students may have preconceived ideas that cause them to have difficulty in understanding the concept. Some of these misconceptions about solutions are below:

- *Sugar, salt, kool-aid... in water it disappears. It gets smaller and smaller until it is gone (molecules or atoms shrink or disappear). The dissolved substance doesn't take up any space.*
- *It melts, turns into a liquid*
- *It goes from water to another kind of liquid*
- *The water is absorbing the powder*

To ensure that students obtain conceptual understanding engage students with many opportunities to explore with solutions and give evidence to appropriate thinking.



[Houston ISD Science Resources](#): Useful websites, usernames, and passwords

Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).

Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.
- [ELPS TOOLKIT](#) provides fast information of student's English abilities through the Proficiency Level Descriptors (PDL) and strategies to teach content with language objectives.

Instructional Strategies / Activities

Student Activity:

Ask students to discuss what they know about mixtures with a shoulder partner. Ask students to provide you with examples of mixtures. Give students the necessary materials to make some of the mixtures they mentioned.

Conduct a discussion of how mixtures can be different. Specifically, discuss how mixtures made of water and salt or water and sugar, look different from those made with salt and sand, or oil and water. Ask students to record the similarities and differences between the two kinds of mixtures in their science notebooks.

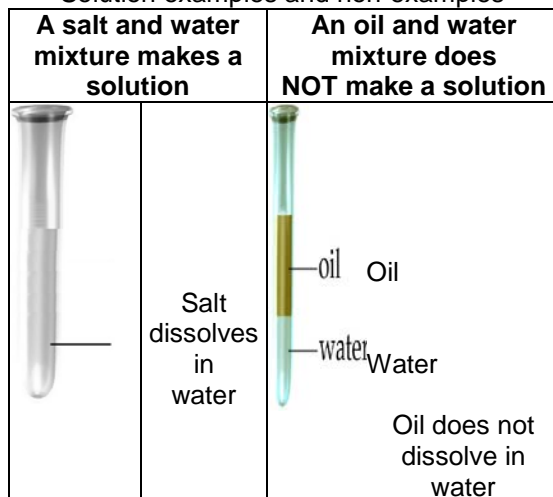
Inform the students that they will be investigating a kind of mixture called a solution. A solution is made when one or more substances are dissolved in another substance. The most common kind of solution is a solid dissolved in a liquid. The substance that is dissolved is the solute. In a solution of salt and water, salt is the solute. The substance that takes in the other substance is the solvent. In the salt and water solution, the water is the solvent.

Have students write a plan to form solutions with various substances. Provide students with solvents such as water, oil, liquid soap, etc. and solutes such as Epsom Salt, sugar, sugar substitutes, powder drink crystals, etc. Additionally, give students substances such as sand, iron filings, or pebbles that would not dissolve so that they observe that not all substances dissolve. Epsom salt can be purchased at pharmacies or grocery stores and [petri dishes](#) can be used during this investigation.

Allow students to follow their plan. Students should measure and record the mass of the substances and the volume of water before making the solution. Ask students to record the details of their solutions in their science notebooks using a data table. (SCI.5.5A, 5.5D)

◆ **Nonlinguistic Representations**
Use Diagrams to Facilitate Understanding

Solution examples and non-examples



Cues, Questions, and Advance Organizers

✦ [Graphic Organizers](#)

Use data tables to organize data

Solution	Solvent	Solute
Kool-Aid Drink	100 ml of water	10 g of Kool-Aid crystals
Salt water	200ml of water	5 g of salt
Liquid soap (Dawn) and oil solution	20ml of liquid soap	5 ml of vegetable oil

Use video clips from Unitedstreaming.com to expand student understanding of this concept. (SCI.5.5A, 5.5D)

- [Solubility](#)
- [Solubility](#)
- [Solutions](#)
- [Physical Science Series: Mixtures and Solutions](#)

Choose a lab below to conduct with the students: (SCI.5.5A, 5.5D)

Houghton Mifflin Harcourt resource may be used to reinforce student understanding.

- A Solution to the Problem ([Video](#), [English instructions](#), [Spanish instructions](#), [TEKS Teaching Notes](#))
- What Affects the Speed of Dissolving? Virtual Lab ([English](#), [Spanish](#), [TEKS Teaching Notes](#))
- Boil, Burn, Break Down: How Matter Changes Science Levelled Reader: ([English](#), [Spanish](#), [Teacher Guide](#), [TEKS Teaching Notes](#))
- Physical Properties to Solutions ([English](#), [Spanish](#), [TEKS Teaching Notes](#))
- [Vocabulary card](#): solution (RS 247)



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Additional labs may be utilized to further extend student understanding: (SCI.5.5A, 5.5D)

- [Superballs](#)
- [A Tasty Solution](#) (easiest to implement)

Use the following literature resource to extend student understanding on solubility: (SCI.5.5A, 5.5D)

- [Mixtures and Solutions: Why Chemistry Matters](#) by Molly Aloian
- [Mixtures and Solutions: Building Blocks of Matter](#) by Richard Spilsbury

Resources

Adopted Instructional Materials

Houghton Mifflin Harcourt:

- A Solution to the Problem ([Video](#), [English instructions](#), [Spanish instructions](#), [TEKS Teaching Notes](#))
- What Affects the Speed of Dissolving? Virtual Lab ([English](#), [Spanish](#), [TEKS Teaching Notes](#))
- Boil, Burn, Break Down: How Matter Changes Science Leveled Reader: ([English](#), [Spanish](#), [Teacher Guide](#), [TEKS Teaching Notes](#))
- Physical Properties to Solutions ([English](#), [Spanish](#), [TEKS Teaching Notes](#))
- [Vocabulary card](#)

Supporting Resources

- [Houston ISD Science Resources](#)
- [Renzulli Learning](#)
- [HISD Cyber Safety website](#)
- [Special Education](#)
- [Scholars and Knowledge framework](#)

Professional Texts

- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [ELPS TOOLKIT](#)
- [Highly Gifted Children in Full Inclusion Classrooms](#)
- [Mixtures and Solutions: Why Chemistry Matters](#) by Molly Aloian
- [Mixtures and Solutions: Building Blocks of Matter](#) by Richard Spilsbury
- [What Are Mixtures and Solutions](#)
- [Solutions and Mixtures.](#)
- [Acids and Bases](#)
- [Council for Exceptional Children](#)

Online Resources

- [petri dishes](#)
- [Superballs](#)
- [A Tasty Solution](#)

Unitedstreaming.com

- [Solubility](#)
- [Solubility](#)
- [Solutions](#)
- [Physical Science Series: Mixtures and Solutions](#)



SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

Planning Guide User Information

Unit 3: Matter Energy Part 7: Materials That Best Conduct and Insulate Thermal Energy	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 7 2 lessons (45-minutes each)

Unit Overview

Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.

- Part 1, students explore matter and differentiate its physical properties.
- Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes.
- Part 3: Relative Density, students justify why some objects float and some objects sink.
- Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations.
- Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures.
- Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance.
- Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature.
- Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used.

Part 7: Materials That Best Conduct and Insulate Thermal Energy starts here.

TEKS/SEs *(district clarifications/elaborations in italics)*

ⓇSCI.5.5A Classify matter based on physical properties, including mass, magnetism, physical state solid, liquid, and gas, relative density sinking and floating, solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

ⓇSCI.5.6A Explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy.

[Scientific investigation and reasoning standards](#) SCI.5.2F, 5.4A

📍 English Language Proficiency Standards

- ELPS C.1c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.

College and Career Readiness Standards

- CCRS 7.H1 Understand the Law of Conservation of Energy and processes of heat transfer.

Key Concepts

- temperature
- heating/cooling

Key Skills

- collecting data
- analyzing data
- measuring using metric units

Academic Vocabulary

- heating
- cooling

Content-Specific Vocabulary

- heat conduction
- heat insulator
- thermal energy
- insulation/conduction



Essential Understandings / Guiding Questions

- Heating and cooling can cause various changes in the properties of materials, but not all materials respond the same way to a change in temperature.
 1. Why is data on heat conduction of a material useful?
 2. Which materials are good conductors of heat?

Assessment Connections

- Performance Expectation – Given common objects and substances, the students will identify and classify the objects and substances based on their ability to conduct or insulate thermal energy.
- [Formative Assessment Materials that Best Conduct And Insulate Thermal Energy English](#)
- [Formative Assessment Materials that Best Conduct And Insulate Thermal Energy Spanish](#)

Texas English Language Proficiency Assessment System (TELPAS): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.5A, 3.5A, 2.5C: Prior to this grade level students gathered information about physical characteristics of various objects.

Background Knowledge for Students

Student background understanding of thermal energy has been instructed since third grade. Students need to relate that the term “thermal” means heat and be able to identify various items that can conduct heat. Conducting investigations will assist students in understanding the concept as well as making the knowledge applicable to other related areas.

Background Knowledge for Teacher

[Thermal Energy Physics](#) provides an explanation of thermal energy and how it relates to heat, absolute, zero, temperature scale, etc. Additionally, [Heat Transfer with Coffee](#) also gives further information pertaining to heat transfer and insulation with an everyday item.

Common Misconceptions:

Students may hold a variety of misconceptions about heat, temperature, and energy. A few common misconceptions include the idea that some objects (such as blankets) produce their own heat. Students may believe this because they have experienced feeling warmer after covering themselves with a blanket or putting on a sweater. Another area of misconception deals with the words “hot” and “cold.” Students often believe that heat and cold are different, and that they are substances rather than energy. Students may also believe that “cold” is transferred from one object to another – their experience with coolers and refrigerators seems to confirm this misconception. Furthermore, students may possess the perception that heat is a substance, not energy. Students need to explore and investigate with thermal energy and products so they can rectify any perceptions that have that are misaligned with scientific thinking.

[Beyond Penguins and Polar Bears](#)

[Houston ISD Science Resources:](#) Useful websites, usernames, and passwords

Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).

Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD’s Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.



- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.
- [ELPS TOOLKIT](#) provides fast information of student's English abilities through the Proficiency Level Descriptors (PDL) and strategies to teach content with language objectives.

Instructional Strategies / Activities

Student Activity:

Engage students with the following question: How does a spoon get hot when placed in hot water? Record student responses and then ask if the spoon is a conductor or insulator. To further identify students' prior knowledge develop a KWL with the class. Have student revisit their K-W-L chart to add what they have learned during the lesson.

Summarizing and Note-Taking

* [KWL](#)

A KWL strategy can be used before and after introducing a concept to set a purpose for the activity, activate prior knowledge, assess prior concept development, generate questions for inquiry, make a connection to the new concept, or recall and summarize important information learned.

Heat Conductors and Insulators

What do you know or think you know? K	What do you want to know or expect to learn? W	What did you learn? L
Conductors get hot faster than insulators	What are some examples of conductors?	
Insulators are used to keep things hot	Is Styrofoam an insulator?	

- Distribute the following materials to your students: A wooden stick (a chopstick for example), a metal spoon, a plastic spoon, and various kinds of metal rods or bars if available, a thermometer, masking tape, and a clock or stopwatch.
- Heat water to 50°C - 60°C and distribute it in beakers (200 ml to each group).
- Remind students of safety procedures when working with liquids that are heated.
- For a quick test, have students place three items in the hot water, such as the plastic spoon, the metal spoon and the wood stick. The objects in the water are conducting heat.
- Ask students to feel the change in temperature of the parts that are sticking out of the water.
- Then have students record their observations in their notebooks and share their results.
- For a more detailed investigation, have students fasten a thermometer to one end of the spoon, bar, or stick with masking tape.
- Ask students to place the object with the thermometer in the hot water and record the time and temperature every 15 seconds.
- Students follow this procedure with the three different materials and organize-and graph the temperatures as they change over time. (SCI.5.5A, 5.6A)



Cues, Questions, and Advance Organizers

✦ [Graphic Organizers](#)

Use data tables to organize data

	Wood Stick	Plastic Spoon	Metal Spoon
0 seconds			
15 seconds			
30 seconds			
45 seconds			
1 minute			

Have students rank materials in order from the one that conducts heat the best to the one that conducts heat the least. Explain to your students that materials that do not conduct heat or **thermal energy** well are called **heat insulators**. Ask your students to think about their experiences with different materials and to write examples of other materials are good conductors or insulators of heat. Ask students to organize their ideas using a T-chart. (SCI.5.5A, 5.6A)

Good Heat Conductors	Good Heat Insulators
Steel	Wood
Aluminum	Styrofoam

Use the textbook and videos to expand student understanding of this concept. (SCI.5.5A, 5.6A)

Brainpop.com

- [Heat](#)

Use video clips from Unitedstreaming.com to expand student understanding of this concept. (SCI.5.5A, 5.6A)

- [Conductors and Insulators](#)
- [Conductors, Insulators, Ohms](#)

Use the labs below to conduct with the students. (SCI.5.5A, 5.6A)

- [How Much Heat Will It Hold?](#)
- [Hot Cans and Cold Cans](#)
- [How is heat transferred through conduction?](#)
- [Ouch! That Spoon is Hot!](#) (easiest to implement)

Houghton Mifflin Harcourt resource may be used to reinforce student understanding. (SCI.5.5A, 5.6A)

- [Hot Buttered Knives: Lesson 3](#) Activity
- [Vocabulary cards](#): energy and energy transfer (RS 185), heat (RS 199), conduction and conductor (RS 171), insulator (RS 205)

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Use the following literature resource to extend student understanding on how materials conduct and insulate thermal energy:
(SCI.5.5A, 5.6A)

- [Energy Heat, Light, and Fuel \(Amazing Science\)](#), by D. Stille

Resources

Adopted Instructional Materials

Houghton Mifflin Harcourt:

- [Hot Buttered Knives: Lesson 3](#)
Activity
- [Vocabulary cards](#)

Supporting Resources

- [Houston ISD Science Resources](#)
- [Renzulli Learning](#)
- [HISD Cyber Safety website](#)
- [Special Education](#)
- [Scholars and Knowledge framework](#)

Professional Texts

- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [Council for Exceptional Children](#)
- [ELPS TOOLKIT](#)
- [Highly Gifted Children in Full Inclusion Classrooms.](#)
- [Energy Heat, Light, and Fuel \(Amazing Science\)](#), by D. Stille

Online Resources

- [How Much Heat Will It Hold?](#)
- [Hot Cans and Cold Cans](#)
- [How is heat transferred through conduction?](#)
- [Ouch! That Spoon is Hot!](#)
- [Thermal Energy Physics](#)
- [Heat Transfer with Coffee](#)
- [Beyond Penguins and Polar Bears](#)

Unitedstreaming.com

- [Conductors and Insulators](#)
- [Conductors, Insulators, Ohms](#)

Brainpop.com

- [Heat](#)

SCIENCE GRADE 5 HOUSTON ISD PLANNING GUIDE 1ST NINE WEEKS

[Planning Guide User Information](#)

Unit 3: Matter and Energy Part 8: Materials That Best Conduct and Insulate Electrical Energy	Time Allocations	
	Unit 3 15 lessons (45-minutes each)	Part 8 2 lessons (45-minutes each)
Unit Overview		
<p>Matter and Energy - In this unit, students review and classify the states of matter according to the type of physical properties objects possess. This unit contains 8 parts.</p> <ul style="list-style-type: none"> • Part 1, students explore matter and differentiate its physical properties. • Part 2: How Temperature Changes Affect Matter, students learn the point at which water boils and freezes. • Part 3: Relative Density, students justify why some objects float and some objects sink. • Part 4: Magnetism, students compare and contrast objects that are magnetic and ones that are not through various investigations. • Part 5: Mixtures, students conduct investigations to identify what happens to the physical properties in a mixture and determine the best method of separating items within mixtures. • Part 6: Solubility, students investigate solutions and identify how different substances may or may not dissolve in another substance. • Part 7: Materials That Best Conduct and Insulate Thermal Energy, students experiment to identify objects that have the ability to conduct or insulate heat and the effect of temperature. • Part 8: Materials that Best Conduct and Insulate Electrical Energy, students investigate materials that are conductors and insulators of electrical energy and locate where those materials can be found in their environmental setting as well as how they are used. <p>Part 8: Materials that Best Conduct and Insulate Thermal Energy starts here.</p>		
TEKS/SEs (<i>district clarifications/elaborations in italics</i>)		
<p>Ⓡ SCI.5.5A Classify matter based on physical properties, including mass, magnetism, physical state solid, liquid, and gas, relative density sinking and floating, solubility in water, and the ability to conduct or insulate thermal energy or electric energy.</p> <p>Ⓡ SCI.5.6A Explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy.</p> <p>Scientific investigation and reasoning standards SCI.5.2B, 5.3B</p>		
English Language Proficiency Standards		
<ul style="list-style-type: none"> • ELPS C.1c Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary. 		
College and Career Readiness Standards		
<ul style="list-style-type: none"> • CCRS 9.F2 Give examples of effects of energy transfer within and among systems. 		
Key Concepts		
<ul style="list-style-type: none"> • energy • electricity 		
Key Skills		
<ul style="list-style-type: none"> • communicating conclusions • making predictions 		
Academic Vocabulary		
<ul style="list-style-type: none"> • current 		
Content-Specific Vocabulary		
<ul style="list-style-type: none"> • circuit 		



Essential Understandings / Guiding Questions

- Materials that conduct electricity can make complete loop through which an electrical current can pass.
 1. How do we stop the flow of electricity in a circuit?
 2. Which materials conduct and insulate electrical energy best?

Assessment Connections

- Performance Expectation – Given common substances, students will create solutions and investigate whether the physical properties of the individual ingredients changed or not.
- [Formative Assessment Materials that Best Conduct And Insulate Electrical Energy English](#)
- [Formative Assessment Materials that Best Conduct And Insulate Electrical Energy Spanish](#)

Texas English Language Proficiency Assessment System (TELPAS): End-of-year assessment in listening, speaking, reading, and writing for all students coded as LEP (ELL) and for students who are LEP but have parental denials for Language Support Programming (coded WH). For the Writing TELPAS, teachers provide five writing samples – one narrative about a past event, two academic (from science, social studies, or mathematics), and two others.

Instructional Considerations

Prerequisites

SCI.4.5A, 3.5A, 2.5C: Prior to this grade level students gathered information about physical characteristics of various objects.

Background Knowledge for Students

Student comprehension regarding this concept is more concrete than that of thermal energy. Students have had multiple experiences with electricity and thus have less difficulty with identifying objects that are conductors and insulators.

Background Knowledge for Teacher

Elicit a prediction in which students focus on what they think will happen as a result of conducting an investigation. Students must be guided to state what they think will happen and also to state a reason or explanation for what will happen. The prediction must be clear and reasonable and relate to the question. Predictions will often provide the teacher with insight into student thinking, prior knowledge, and existing misconceptions. An effective way to encourage this is with summary frames, such as If... then ...and I think ... because...:

- If two wires are connected to the light bulb and the battery, then the flashbulb will turn on because the battery, the wires, and the light bulb will form a closed circuit.
- I think that the strength of the magnet will become stronger with more magnets added to the stack because more is better and stronger.
- If more washers are added to the bottom of the string, then the pendulum will swing more cycles because of its weight.
- I think we can use evaporation to separate the salt from the water because I saw water dry on my dad's car and it left a spot.

Common Misconceptions:

Electrical energy can prove to be a difficult concept to attain for students especially when they carry misconception about energy. Students may carry the mistaken belief that power is a substance-like entity which can flow. Power is actually a FLOW of a substance. "Power" means energy-current. Also, that energy can flow, and its rate of flow is called power. Plus students may believe that energy flows up one wire, through the appliance, then back down the other wire. Energy actually flows up both wires, dives into the appliance, and is converted to other types of energy (heat, motion, etc.). To eliminate these misconceptions investigations must be conducted for students to sift through their thinking and determine factual beliefs versus those that are erroneous. [Why is Electricity so Hard to Understand](#)

[Houston ISD Science Resources:](#) Useful websites, usernames, and passwords.



Teachers should consistently teach and model exemplary internet skills with special emphasis on ethical behavior and safe practices. Resources for teaching these important topics can be found on the [HISD Cyber Safety website](#) (requires login).

Instructional Accommodations for Diverse Learners:

The following instructional accommodations align with HISD's Teacher Appraisal and Development System Instructional Practice I-3, I-4, and I-7.

- [Scholars and Knowledge framework](#). This framework is a K-12 resource for Gifted and Talented (G/T) instruction which allows for differentiation.
- [Renzulli Learning](#) super starter projects and unit supplements are aligned to grade level HISD curriculum and to the Texas Performance Standards Project.
- [Special Education](#) and [Council for Exceptional Children](#) are resources that support differentiated instruction and accommodations.
- Reference [Science for English Language Learners](#) authored by Fathman & Crowther (2005) to integrate English into the science classroom and utilize strategies for teaching science to ELLs.
- [ELPS TOOLKIT](#) provides fast information of student's English abilities through the Proficiency Level Descriptors (PDL) and strategies to teach content with language objectives.

Instructional Strategies / Activities

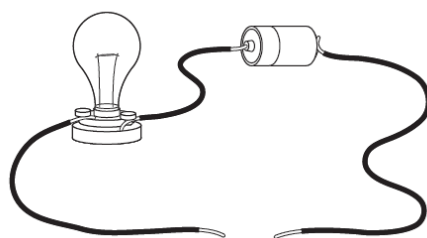
Student Activity:

Have students build a tester to identify the electrical conductivity of different common materials such as iron nail, copper pennies, plastic combs, metal clips, rubber easers, paper etc. Instruct students to collect their data on a chart. (SCI.5.5A, 5.6A)

◆ Nonlinguistic Representations

Use Diagrams to Facilitate Understanding

A Basic Electrical Conductivity Tester



Material	Electrical Conductor	Electrical Insulator

Use Pearson Success Online Readers to expand student understanding of this concept. (SCI.5.5A, 5.6A)

- [Electricity](#)
 - [Teacher Guide](#)
 - [Student Page](#)
- [Electricity and Its Uses](#)
 - [Teacher Guide](#)
 - [Student Page](#)

Use the videos to expand student understanding of this concept. (SCI.5.5A, 5.6A)

Brainpop.com

- [Electricity](#)

Use video clips from Unitedstreaming.com to expand student understanding of this concept. (SCI.5.5A, 5.6A)

- [Conductors and Insulators](#)
- [Real World Science: Electricity](#)
- [Hot Line: All About Electricity](#)

Use the labs below to conduct with the students. (SCI.5.5A, 5.6A)

- [Insulators and Conductors](#)
- [Solid Conductors](#)
- [Conductivity](#)
- [Applied Science-Physics Lab: Insulators and conductors of Electricity](#)

Houghton Mifflin Harcourt resource may be used to reinforce student understanding. (SCI.5.5A, 5.6A)

- [Build an Electric Circuit Video Investigation](#)
- [Build an Electric Circuit investigate Log in Science Manual](#) (LM171-173)
- [HSP Science Teacher Edition G5: What are Static and Current Electricity page 622](#)
- [Vocabulary cards](#): energy and energy transfer (RS 185), electric current and electric circuit (RS 181), conduction and conductor (RS 171), electric energy and electricity (RS 183), insulator (RS 205)

Use the following literature resource to extend student understanding on how materials conduct and insulate electrical energy:

(SCI.5.5A, 5.6A)

- [Energy Heat, Light, and Fuel \(Amazing Science\), by D. Stille](#)
- [My World of Science: Conductors and Insulators by Angela Royston](#)



Resources

Adopted Instructional Materials

Houghton Mifflin Harcourt:

- [Build an Electric Circuit Video Investigation](#)
- [Build an Electric Circuit investigate Log in Science Manual \(LM171-173\)](#)
- [HSP Science Teacher Edition G5: What are Static and Current Electricity page 622](#)

Pearson Success Online Readers

- [Electricity](#)
-[Teacher Guide](#)
-[Student Page](#)
- [Electricity and Its Uses](#)
-[Teacher Guide](#)
-[Student Page](#)

Supporting Resources

- [Houston ISD Science Resources](#)
- [Renzulli Learning](#)
- [HISD Cyber Safety website](#)
- [Special Education](#)
- [Scholars and Knowledge framework](#)

Professional Texts

- [Science for English Language Learners](#) by Fathman & Crowther (2005)
- [Council for Exceptional Children](#)
- [ELPS TOOLKIT](#)
- [Highly Gifted Children in Full Inclusion Classrooms.](#)
- [Energy Heat, Light, and Fuel \(Amazing Science\),](#) by D. Stille
- [My World of Science: Conductors and Insulators](#) by Angela Royston

Online Resources

- [Insulators and Conductors](#)
- [Solid Conductors](#)
- [Conductivity](#)
- [Applied Science-Physics Lab: Insulators and conductors of Electricity](#)
- [Why is Electricity so Hard to Understand](#)

Unitedstreaming.com

- [Conductors and Insulators](#)
- [Real World Science: Electricity](#)
- [Hot Line: All About Electricity](#)

Brainpop.com

- [Electricity](#)