

**CRM 2 Science Matters**

**Pacing**

- 20 days
- Sept.17-Oct. 12
- Week 4-7

**DESIRED RESULTS**

**Making Meaning**

The study of matter and energy can be used to explain and predict a large variety of phenomena. These concepts build a foundation for various strands of secondary science including: Atoms and Molecules, Conservation of Matter, States of Matter, and Chemical Reactions. In addition, understanding physical properties of matter helps students understand concepts in Earth, space, and life science.

The following make meaning valuable for learners and are investigated in this unit:

- Matter may be described by its physical properties (color, size, shape, mass, texture, flexibility, etc.) and the materials it is made of.
- Most objects are made of parts that work together and operate differently than the parts themselves.
- Some materials have similar properties, but also have distinct properties.
- Materials are made of particles that are too small to be seen without magnification.
- Heating and cooling cause changes to the properties of materials.
- Most substances can exist as a solid, liquid, or gas depending on the amount of heat energy.

**Transfer:** Students will use inquiry to investigate physical properties of matter and use these properties to describe and communicate their thinking. Students will be able to identify and categorize the typical states of matter (solid and liquid) according to similarities and differences. They will predict how heating and cooling can cause changes to matter. Students will use critical thinking skills and problem solving while working cooperatively to investigate mixtures and solutions.

**Enduring Understandings:**

- All matter can be measured, classified, and changed.
- Energy causes changes in the properties of matter.

**Essential Questions:**

- How do we describe, and compare matter?
- What causes the properties of matter to change?

**Essential Vocabulary**

- change of state/ cambio de estado
- combine/combiner
- condensation / condensación
- dimension/dimensión
- float/ flotar
- function/ función
- intervals/ intervalos
- magnetism / magnetismo
- matter/material
- measure/medida
- melt / derretir
- mixture/mezcla
- particle/partícula
- physical change/cambio físico

- physical properties / propiedades físicas
- screen/tamiz
- separate/separar
- shape of their container / forma de su recipiente
- sift/tamizar
- sink/ sumidero
- solution/solución
- states of matter/estados de la materia
- temperature/temperatura
- test /prueba
- texture/textura
- volume/volumen
- water vapor/vapor de agua

**Supporting Vocabulary Link**

- [Elementary School Supporting Vocabulary](#)

**Student Prerequisite Knowledge**

*Students should know:*

- matter is something that takes up space and has mass.
- matter is classified, changed and used because of its properties.
- physical properties include mass, volume, magnetism, physical state, density and solubility in water.
- matter can be in a solid state, a liquid state, or a gaseous state.
- changes in heat energy can cause matter to change state.
- adding enough heat energy to a solid so that it changes to a liquid is a process called melting.
- adding enough heat energy to a liquid so that it changes to a gas is called evaporation.
- evaporation of liquid water goes on constantly, even in cold places.
- water vapor returning to a liquid state is called condensation.
- different types of matter can be mixed together.
- in some mixtures we can still observe the ingredients, and their physical properties do not change.
- the volumes of ingredients might not add up when they make a mixture because there may be more space between particles of some ingredients.
- the mass of each ingredient does add up when they make a mixture because there is not more or less stuff.
- we use the properties of matter and its mixtures to make decisions on how to use it.

**Resources:** AISD Module Kit, Model Lesson Portfolio, [STEMscopes](#), eBooks: Envisions Science Leveled Readers, Scott Foresman Text, [Science Notebook Resources](#), [BrainPop Jr](#), [Discovery Education](#)

**ELPS:** Mandated by Texas Administrative Code (19 TAC §74.4), click on the link for [English Language Proficiency Standards \(ELPS\)](#) to support English Language Learners.

TEKS Knowledge & Skills	Acquisition	
STAAR: RC = Reporting Category; DC = Dual Coded Skills; <b>Readiness Standard</b> ; <b>Supporting Standard</b> Concepts are addressed in another unit.	Students Will Know	Students Will Be Able To
4.5: Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:		
4.5A: measure, compare, and contrast physical properties of matter, including size, mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float.	<ul style="list-style-type: none"> <li>• Matter is something that takes up space and has mass.</li> <li>• Matter has properties that can be observed.</li> <li>• Magnetism is a property of some types of matter. Matter that is magnetic will be attracted to a magnet.</li> <li>• Common magnetic materials are iron and materials that contain iron, such as steel.</li> <li>• We can measure physical properties of matter using scientific tools. (Each tool has a separate lesson.)</li> <li>• We need to determine the intervals on scales in order to read them correctly.</li> <li>• How well an object floats in water depends on its mass per unit volume, or density.</li> </ul>	<ul style="list-style-type: none"> <li>• Decide and justify if examples describe “matter.”</li> <li>• Exemplify, describe, apply to classify and re-classify by properties.</li> <li>• Organize and represent information gained from testing magnetic and non-magnetic materials.</li> <li>• Determine intervals on scales.</li> <li>• Sort tools in teams to match with measurement uses.</li> <li>• Predict mass and measure objects on balances.</li> <li>• Use metric rulers and meter sticks to determine distance, length, width and height.</li> <li>• Compare example objects by one and multiple dimensions.</li> <li>• Estimate then measure water using liters and milliliters.</li> <li>• Sort equal-sized objects by perceived mass, then confirm.</li> <li>• Predict then investigate and</li> </ul>

		<p>compare objects by their floatability in water.</p> <ul style="list-style-type: none"> <li>• Measure with thermometers, then investigate and explain some objects' differences in temperature.</li> <li>• Explore and explain that materials in a room are (usually) the same temperature as the room, though they may feel cooler or warmer.</li> </ul>
<p>4.5B: predict the changes caused by heating and cooling such as ice becoming liquid water and condensation forming on the outside of a glass of ice water. RC1</p>	<ul style="list-style-type: none"> <li>• The properties of size and floating of matter can be changed by forces like squeezing or tearing, but the type of matter does not change.</li> <li>• Matter can be in a solid state, a liquid state, or a gaseous state.</li> <li>• Changes in heat energy can cause matter to change state.</li> <li>• Adding enough heat energy to a solid so that it changes to a liquid is a process called melting.</li> <li>• Adding enough heat energy to a liquid so that it changes to a gas is called evaporation.</li> <li>• Evaporation of liquid water goes on constantly, even in cold places.</li> <li>• When heat energy of 100°C is added to liquid water it begins to vaporize.</li> <li>• When air contains tiny bits of water from evaporation or vaporization we say the air is humid or moist.</li> <li>• Water particles can stay in air until enough heat energy is removed that the vapor turns back to a liquid.</li> <li>• Water vapor returning to a liquid state is called condensation.</li> <li>• Almost every type of matter changes state (phase) when adding or taking away enough heat energy.</li> <li>• The changing of solid, liquid, and gas states of water on Earth due to adding or removing heat energy is a pattern in nature that goes on continuously.</li> <li>• We call that pattern the water cycle, and it is caused by energy from the Sun.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe matter that is solid, liquid, and gas at room temperature.</li> <li>• Sort ideas to predict how solid water may change under different amounts of heat energy.</li> <li>• Plan and carry out an investigation on melting rate and explain results.</li> <li>• Apply given melting and evaporation point data.</li> </ul>

<p>4.5C: compare and contrast a variety of mixtures and solutions such as rocks in sand, sand in water, or sugar in water.</p>	<ul style="list-style-type: none"> <li>• Different types of matter can be mixed together.</li> <li>• In some mixtures we can still observe the ingredients, and their physical properties do not change.</li> <li>• The volumes of ingredients might not add up when they make a mixture because there may be more space between particles of some ingredients.</li> <li>• The mass of each ingredient does add up when they make a mixture because there is not more or less stuff.</li> <li>• Matter is made up of small particles.</li> <li>• Mixtures in which one material dissolves in another are called solutions.</li> <li>• Solutions can have a solid dissolved in a liquid, like sugar water, a liquid dissolved in a gas, like fog, or solids dissolved in a gas, like smoke.</li> <li>• We use the properties of matter and its mixtures to make decisions on how to use it.</li> </ul>	<ul style="list-style-type: none"> <li>• Observe, sort, and classify mixtures and solutions.</li> <li>• Describe classification schemes.</li> <li>• Design and evaluate some ways to test a mixture to find out more about its ingredients and properties.</li> <li>• Measure and compare volumes and masses of ingredients before and after mixing.</li> <li>• Apply experience and knowledge about properties of matter to make decisions.</li> </ul>
<p>The study of science is taught through the lens of <a href="#">Scientific Processes (TEKS 4.1-4.4)</a>; therefore, these TEKS should be taught in conjunction with content throughout the year. Suggestions for TEKS to embed in each unit are provided in the Yearly Itinerary; however, the TEKS that can be addressed within a unit depends greatly on the learning activities in which students are engaged. Therefore, teachers must be deliberate in their choice of learning activities to ensure that all Scientific Processes TEKS are appropriately embedded within the course. In 4<sup>th</sup> grade, districts are encouraged to facilitate laboratory and field investigations for at least 60% of instructional time.</p>		

ASSESSMENT EVIDENCE	
Student Work Products/Assessment Evidence	
Performance Tasks	Other Evidence (i.e. unit tests, open ended exams, quiz, essay, student work samples, observations, etc.)
<ul style="list-style-type: none"> <li>• Classification as Matter/Not Matter (probe)</li> <li>• Magnetic/non-magnetic data in notebook</li> <li>• Ice melting experiment results in notebook</li> <li>• Team use of a heat energy continuum to explain their matter's phase change</li> <li>• Classification of mixtures and explanation of criteria</li> <li>• Data table of mass and volume before and after mixing</li> <li>• Apply knowledge of properties to select best materials for certain uses</li> </ul>	<p><b>Short Cycle Assessment</b></p> <ul style="list-style-type: none"> <li>• <i>SCA Testing Window: October 15-19, 2012</i></li> <li>• <i>Tested TEKS: : 4.5A, 4.5B, 4.5C, 4.5D</i></li> </ul> <p><b>Additional Suggestions for Assessment</b></p> <ul style="list-style-type: none"> <li>• Contribution to class array on Properties of Matter</li> <li>• T-chart of properties</li> <li>• Observations of student team discussions and products</li> <li>• Responses to probes and pre-assessments of understanding</li> <li>• Explanations of team discussion on solid-liquid-gas</li> <li>• Intervals on scales labeled accurately</li> <li>• Data, diagrams, and summaries in student notebooks</li> <li>• Classification, comparison, and contrast of materials and properties</li> <li>• Proper use of measurement tools and accurate measurements</li> <li>• Valid predictions and investigations</li> <li>• Application of understanding about properties of matter in decision-making</li> <li>• Teacher observations: Use of safety rules and equipment</li> <li>• Teacher observations: management and use of tools</li> <li>• Tools foldable/web in Interactive Notebook</li> <li>• Students' use of evidence to support explanations and claim.</li> </ul>

## LESSON PLANNING TOOLS

In the course of lesson planning, it is the expectation that teachers will include whole child considerations when planning such as differentiation, special education, English language learning, dual language, gifted and talented, social emotional learning, physical activity, and wellness.

### Model Lesson- [Properties of Matter](#)

- Is It Matter?
- Properties of Matter We Can Observe
- Magnetic Matter
- Using Measurement Scales
- Measuring Matter with Tools
- Measuring Mass
- Linear Measurement
- Measuring Volume
- Exploring Density
- Measuring Temperature

Suggested Pacing: (10 days)

TEKS: 4.5A

### Model Lesson- [Heating and Cooling](#)

- Solid, Liquid or Gas
- Melting Ice
- Investigate Drying
- Everyday Condensation
- Every Matter Can Change State

Suggested Pacing: (5 days)

TEKS: 4.5B

### Model Lesson- [Mixtures and Solutions](#)

- Observing and Comparing Mixtures
- Making and Measuring Mixtures
- Explaining Shrunken Mixtures
- Exploring Solutions
- Deciding What Matters

Suggested Pacing: (5 days)

TEKS: 4.5C