



# Essentials

## Teacher Background

### KEY CONCEPTS AND FUNDAMENTAL QUESTIONS

The student is expected to 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.

#### Concepts:

1. Matter has physical properties that can be observed.
2. We can measure physical properties of matter including size, mass, volume, and temperature.
3. We can compare and contrast matter based on its physical properties such as state of matter, magnetism, and ability to sink or float.

#### Questions:

1. What are the physical properties of matter?
2. How can the physical properties of matter be measured?

## Key Concepts & Questions

### Classifying Matter (4.5A)



#### Teacher Background

A resource document which gives teachers relevant and essential background knowledge on the science concept being addressed.



#### Objective

The student knows that matter has measurable physical properties and patterns and those properties determine how matter is classified, changed, and used. The student is expected to 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.

#### Foundation

Regardless of which state of matter (solid, liquid, or gas) an object may be at a particular moment, it will have properties which can be described through observation and testing. A property is any identifiable feature of an object which aids in identification. An object's properties may be identified by using one or more of the five senses, sight, taste, smell, sound, or feel, or through scientific measurement. Scientific measurement may include calculation of size or volume, weight (the measurement of the Earth's gravity on the object), mass (the amount of matter the object possesses), or density (how many particles per unit size.) The properties of an object can change. Ice (solid water) can melt and become liquid water. Both are water, but their properties are different. The properties of an object should not be confused with its characteristics. Physical characteristics of an object never change. As an example, the freezing point of water is 0 degrees Celsius and never changes. If we heat an unknown metal, and it begins to melt at 1,535 degrees Celsius, we can feel certain it is iron, because that is a physical characteristic of iron.

Understanding how to observe, determine, and calculate the physical properties of different objects allows us to scientifically compare and contrast objects based upon those properties. Some objects may be easy to compare, such as an apple and an orange. There are obvious physical properties that identify each one. However, in comparing salt and sugar, we see that the visual properties appear identical, but we are able to determine the identity of each substance because we know one has a property of saltiness in taste while the other is sweet. By knowing the densities of different metals, we can identify different identically-sized blocks of metals by determining masses and sizes and calculating their densities.

#### Overview

#### Essentials

- Teacher Background
- Standards Correlations
- Materials List
- Scope Summary
- Key Concepts & Fundamental Questions
- TEKS Unwrapped

#### Engage

- Demonstration Presentation
- Teacher Instructions
- Demonstration Presentation Starters!

- Pre-Assessment
- Science Rock

#### Explore

- Teacher Guide
- Setup Video
- Student Guide
- Student Journal

## TEKS

## Unwrapped



## TEKS UNWRAPPED!

4.5A: Classifying Matter  
Matter and Energy

**TEKS 4.5A: The student is expected to 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.**

#### Key Concepts:

- Matter has physical properties that can be observed.
- We can measure physical properties of matter including size, mass, volume, and temperature.
- We can compare and contrast matter based on its physical properties such as state of matter, magnetism, and ability to sink or float.

#### Dissecting the TEKS Language:

**The Verbs:** What should students be doing?

- Measure: to use scientific tools, such as rulers and triple beam balances, to describe and quantify the properties of objects
- Compare: to describe how objects are similar
- Contrast: to describe how objects are different

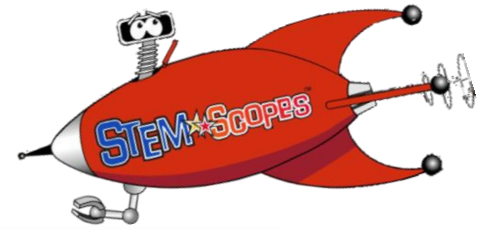
**The Nouns:** What concrete words should students know?

- Matter: anything that takes up space, the "stuff" around us
- Mass: the amount of "stuff" an object is made of
- Solid: a substance that has a definite shape; all the particles are close together
- Liquid: a substance that takes the shape of its container and can pour
- Gas: a substance that takes the shape of its container
- Temperature: a measure of the amount of heat a substance contains
- Magnet: an object that is magnetic; the object will attract other objects that contain iron
- Sink: will not be supported by water
- Float: can be supported by water

#### Implications for Instruction

- Students should be given opportunities to examine different items and use various methods of classification given observable properties.
- Make sure students take part in hands-on activities, this is a TEK that cannot be mastered with

# Engage



### Classifying Matter (4.5A)

**Pre-Assessment**

A multiple choice quiz that helps determine what students do and do not know before instruction on the topic.

Assign | En español | Print Version | Source File

1. The table shows the number of paperclips four different magnets were able to lift. According to the data, which magnet was the strongest?

**Magnet Data**

Magnet	# of Paperclips
#1	7
#2	4
#3	11
#4	9

A Magnet 1  
 B Magnet 2  
 C Magnet 3  
 D Magnet 4

Assessment Pre-

### Classifying Matter (4.5A)

**Starters!**

A set of ideas and activities that teachers can do to further get students interested in the concept.

**Orderly Orders**

Give a selection of random items to each group, such as rocks, balls, corks, or other items as available. Approximately 6 items per group works well. Each group is challenged to create an 'order' with their items that describes a certain property, such as largest to smallest, lightest to darkest, sharpest to most dull, etc.

**Who Am I?**

Place a variety of items on a table including containers, balls, cups, toothpicks, paperclips, or any other items as available. Start listing characteristics of one of the items and have students guess which you are referring to. For example, "I am smaller than the \_\_\_\_\_. Or 'I would float in water.' Once students see the pattern you can have groups play the game and take turns rotating through the group.

**Guess My Property**

Give each student group or pair a selection of items in a shoe box (or similar sized container). Give each group two or three yarn loops (as delineators for the categories). One student will begin to silently place items in two or more categories using the yarn loops to separate items visually. The other students will guess what the property used to separate the items might be each round.

Starters!

# Science Rock

**GUIDING QUESTION**

How can we remove items from the water using a magnet?

**ACTIVITY**

How can we remove items from the water using a magnet?

**Task:**  
Use the magnet to remove items from the water... but do not submerge the magnet.

**JIGSAW**

- Get in your assigned group - 1,2,3, or 4. Read the question.
- Answer the question with your group and come-up with the best answer.
- Get back with your initial group and share what you learned.

- Which property of matter did you investigate today? How else could you have separated these items?
- Which items were attracted to the magnet? What property do they share?
- Which items were NOT attracted to the magnet? What properties do they share?
- Were some items left in the container that should have been attracted to the magnet? Why?

### Classifying Matter (4.5A)

**Science Rock**

Songs designed to teach student TEKS content through music and dance.

Assign | En español

**MATTER**

**Lyrics**

**VERSE 1:**  
Some matter can be solid and has shapes all of its own  
A baseball, rock or pencil, big TV or telephone  
And two more phases that exist explain the state of matter:  
Those gases fill the air, but liquids spill and leak and splatter!  
The thing you must remember to keep these three apart:  
Solids stick together, gas and liquids move apart!

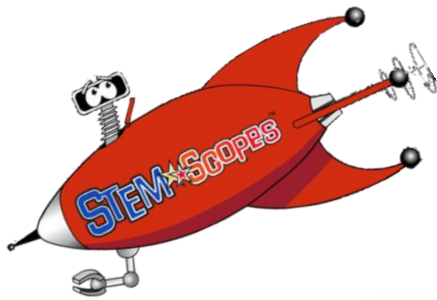
**CHORUS:**  
Matter is everywhere, it can be solid, liquid, or gas  
It's measured while we observe: Is it magnetic? What's its mass?  
Walk to walk, roof to floor, and everything between  
It's matter, what's it for? Hang on, we're gonna sing  
MATTER!

**VERSE 2:**  
Matter is described to us by all its properties:  
Is it heavy? Is it small? Pass electricity with ease?  
Does it sink or will it float? Will a magnet make it stick?  
Matter needs these properties just like a clock needs tock and tick!  
These things they can be can be measured with a balance or a scale,  
Or a ruler or a circuit or a filled-up water pail.

**CHORUS (repeat)**

**VERSE 3:**  
Conductors are the substances where energy can flow,  
While the insulators stop it or at least make it go slow.  
Conductors are the track, and electricity the train  
There's even electricity that's running through your brain  
Insulators keep the flow out, like a jacket made of cloth  
Causing energy to stop or move through slowly like a sloth.

# Demonstration presentation



# Explore

## Lab Set up Video

**Classifying Matter (4.5A)**

**Setup Video**

A live-shot video that shows the teacher exactly how to set up and carry-out the Explore hands-on activity.

**Overview**

- Essentials
  - Answer Keys
  - Teacher Background
  - Standards Correlations
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- Engage
  - Demonstration Presentation
  - Teacher Instructions
  - Demonstration Presentation **ESP**
  - Starters!
  - Pre-Assessment

**Video Content:** A person is shown using a triple beam balance to measure a yellow object. A worksheet is visible on the table.

## Student Guide

**4.5A: Classifying Matter**  
Matter and Energy

**STUDENT GUIDE**

How can matter be classified?

**PART ONE: Sink or Float?**

- You have 3 small plastic canisters (A-B-C) filled with different types of mystery matter. Gently shake each and record how they feel in your Student Journal.
- Measure and record the mass in grams (g) of each canister using a triple beam balance.
- Matter that is more dense than water will sink. Matter less dense than water will float. Predict and record what will happen to each of the three canisters if you put them in water. Now place each canister in the container of water. record your observations in your Student Journal.
- Remove the lid from each container and pour the contents into a graduated cylinder to measure the volume in milliliters (mL) of matter. Record your observations and explain the results in your Student Journal.

**PART TWO: Density Columns**

- Your teacher will show you three bottles with red, green, and blue solutions. Predict which will sink to the bottom, float in the middle, or stay on top by coloring three layers in your student journal.

**4.5A: Classifying Matter**  
Matter and Energy

**STUDENT JOURNAL**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**HOW CAN MATTER BE CLASSIFIED?**

**PART 1: Sink or Float**

Label for Each Canister	Describe What the Canister Feels Like When You Move It	Record the Mass of Each Canister in Grams (g)	Record the Volume Inside Each Canister in Milliliters (mL)
A			
B			
C			

Use the box below to sketch how the canisters float or sink in your container:

Which container was the most dense? \_\_\_\_\_  
Which container was the least dense? \_\_\_\_\_  
After your teacher reveals the mystery matter in each container, are some

**4.5A: Classifying Matter**  
Matter and Energy

**STUDENT JOURNAL**

**Part II: Density Columns**

Prediction

Show the liquids in order as they appear in your straws ONLY once you get your final three layers.

- Which liquid is below the other two layers? \_\_\_\_\_
- Which liquid is the most dense? \_\_\_\_\_
- Which liquid is above the other two layers? \_\_\_\_\_
- Which liquid is the least dense? \_\_\_\_\_
- Describe how you found out the order of the colors from most

## Student Journal / E-Portfolio

# Explain

Interactive  
vocab  
game



Picture vocabulary

## Relative Density



The ability to sink or float in a liquid, while less dense

## Liquid Volume



The amount of space a liquid fills measured by a graduated cylinder or beaker

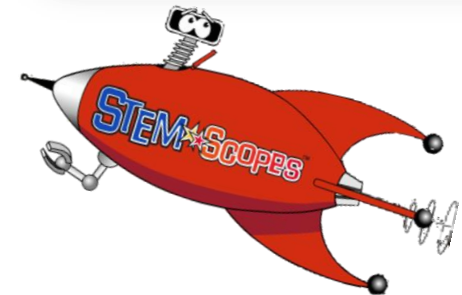
Student  
vocab  
cards

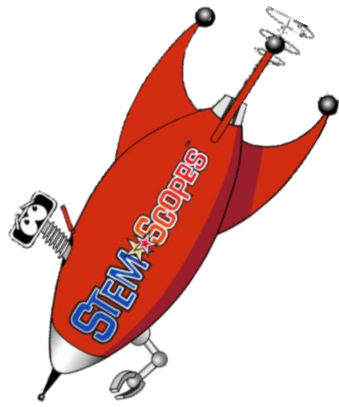
4.5A Classifying Matter		Student Vocabulary Cards	
DENSITY			
My Picture:	Example:		
	Non-Example:		

4.5A Classifying Matter		Student Vocabulary Cards	
BUOYANCY			
My Picture:	Example:		
	Non-Example:		

4.5A Classifying Matter		Student Vocabulary Cards	
FLOAT			
My Picture:	Example:		
	Non-Example:		

4.5A Classifying Matter		Student Vocabulary Cards	
SINK			
My Picture:	Example:		
	Non-Example:		





# Elaborate

## Reading Science

**Classifying Matter (4.5A)**

**Reading Science A**

An expository reading passage about the science concept with comprehension questions

Assign Print Version

Lexile 530L - A

**A Man Called Snowflake**

Wilson A. Bentley was born on a farm in Vermont on February 9, 1865. He loved the long winters in his home state and he especially loved the snow. Bentley felt that, "snowflakes were miracles of beauty." And, he thought that it was sad that some people never got to see this beauty.

Sometimes, Bentley would just watch the snow falling from the sky. Other times, he would watch the wind pushing it along the ground. On his 15th birthday his mother gave him a microscope. This let him take a closer look at the snowflakes he loved so much. He wanted to see what different snowflakes looked like so he caught them on black cloth. Then, he put them under his microscope and looked. Sometimes he even drew what he saw. In fact, he made over 300 drawings of these snow crystals, but the snowflakes often melted before he could draw them exactly as he saw them to be. Bentley thought there had to be a better way to make his drawings more precise.

Then one day Bentley had an idea. He would take his camera and connect it to his microscope. That way he would be able to take pictures of the tiny snowflakes before they melted!

## Next Step Inquiry

**MATH CONNECTIONS**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. A forest ranger counted animals that he spotted on his morning walk. He saw twice as many blue jays as raccoons. He saw 12 more squirrels than blue jays. He counted seven turtles in a pond. The number of turtles he counted was half as many as the number of squirrels he had counted. How many raccoons did the forest ranger see on his morning walk?

Understand the problem...	Make a plan to solve it...
Blue Jays = Raccoons = Squirrels = Turtles =	Solve for squirrels first.
Use the plan to solve it...	Check your work!

2. A geologist sorted his rocks into three categories: metamorphic, sedimentary, and igneous. He started out with 40 sedimentary rocks, but accidentally dropped them on the ground. Many of these rocks broke apart. He recounted the rocks and determined that half of his original sedimentary rocks had been crushed into two

**4.5A: Classifying Matter**  
Matter and Energy

**NEXT STEP HANDOUT**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Can you identify matter found in the classroom by its properties?

My Hypothesis: What do I predict will happen?

If \_\_\_\_\_

then \_\_\_\_\_

**NEXT STEP HANDOUT** 4.5A: Classifying Matter  
Matter and Energy

Create a graph or chart to organize your data.

Analysis: What do your data tell you?

## Math Connection

**Interactive Virtual Investigation**

A powerful interactive activity that allows the student to conduct virtual investigations and experiments on the topic.

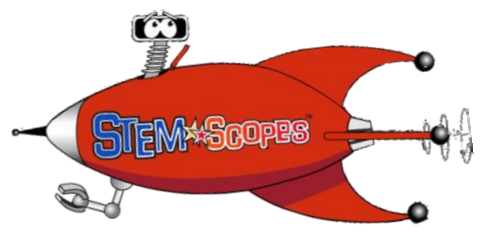
Assign

I was just thinking about matter. Have you ever seen matter? Of course you have! It's the "stuff" around us! Everything you see is matter. What we get to do today is classify it - find out more about matter with scientific tools.

## Interactive Simulation Investigation



# Intervention and Acceleration



## Problem Based Learning

## CLOZE-ing in on Science

4.5A: Classifying Matter  
Matter and Energy

P - B - L Science!  
Problem - Based Learning

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Bobbing Along**

Your class is having a homem ade model raft race.

1. Think about what materials from around your home or school that you could use to construct a raft that will stay afloat through rough water conditions.
2. Be sure your raft can hold at least 20 pennies. The pennies will represent people.

4.5A: Classifying Matter  
Matter and Energy

P - B - L Science!  
Problem - Based Learning

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Student Checklist**

Content	Organization	Presentation
<input type="checkbox"/> I included details covered in the Key Concepts as well as other important concepts I learned.	<input type="checkbox"/> I organized my final presentation with an introduction, body, and conclusion.	<input type="checkbox"/> My project has a neat appearance. My handwriting is legible and I used correct grammar.
<input type="checkbox"/> I checked my material to make sure it was accurate. I used more than one resource.	<input type="checkbox"/> The pictures or drawings I included make sense with the content of my project.	<input type="checkbox"/> I used illustrations to make my project attractive.
<input type="checkbox"/> I connected what I learned in science with the problem or issue in the prompt.	<input type="checkbox"/> I made sure to include my science vocabulary properly and in the right context.	<input type="checkbox"/> I can easily discuss my project with someone who asks me questions about it.

**Assessment Rubric**

Category	Exceeds Expectations 3 points	Meets Expectations 2 points	Below Expectations 1 point	SCORE	Teacher Comments
Content	Included detail on all components and SCOPE Key Concepts. Used multiple sources.	Included detail on most components and SCOPE Key Concepts. Used one to two sources.	Included little to no detail on components and SCOPE Key Concepts. No sources used.		

the \_\_\_\_\_ is **CLOZE-ING IN ON SCIENCE!**  
 **4.5A: Classifying Matter**  
Matter and Energy

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Key Concept 1:** Matter has physical properties that can be observed.

**Passage**

"We can use a \_\_\_\_\_ to measure how tall a soda can is," said Mr. Beetle, the science teacher. "But what if I want to find out whether this apple or orange is heavier?" asked Jake to his teacher. "Well," Mr. Beetle replied, "you could use a triple beam balance to determine the \_\_\_\_\_ of each piece of fruit." "Neat!" said Jake, "I can \_\_\_\_\_ objects based on their physical \_\_\_\_\_!"

**Word Bank**

classify ruler mass properties