

# 2<sup>nd</sup> Grade - LEARNING CENTER

## Properties and Changes in Matter

**SC Standard 2-4:** The student will demonstrate an understanding of the properties of matter and the changes that matter undergoes. (Physical Science)

### Indicators Covered in this Learning Center:

- 2-4.1 Recall the properties of solids and liquids.
- 2-4.2 Exemplify matter that changes from a solid to a liquid and from a liquid to a solid.
- 2-4.4 Recognize that different materials can be mixed together and then separated again.

The activities included are short, allowing each to be completed in minimum time while providing a fun, hands-on experience. Much of the supplies are used in more than one activity. Each activity is self-correcting, with an explanation of why the result happened (if needed). The worksheet contains an answer key for the user.

### Learning Center Includes:

1. Solid, Liquid, Gas Information Booklet
2. Goopy Goop – Solid or Liquid? (Part 1)
3. Goopy Gluep – Solid or Liquid? (Part 2)
4. Magic Potion – Exploring Gas
5. Dancing Raisins – Gettin’ Down with 7UP
6. Density of Liquids – Layered Liquids
7. Disappearing Act – Dissolving Solids
8. Solid, Liquid, Gas Worksheet
9. Reference Books
10. Properties Glossary

## **Materials Needed for All Activities:**

### **Powders:**

1. 1 Cup Cornstarch
2. 1 Cup of Borax
3. 1 Cup Baking Soda

### **Liquids:**

4. One 2 L. & 2 Pt. Bottles of Water (one pre-dyed blue)
5. 2 Pt. Bottles of Vinegar
6. Bottle of 7UP
  
7. Food Coloring
8. Vegetable Oil (pre-poured in one bottle)
9. Corn Syrup (pre-poured in one bottle)
10. Bottle of Glue

### **Solids:**

11. Variable Solids – Raisins, Pebbles, Corn, Rice, Pasta, Salt, Sugar, Flour, Sand, Coffee, Tea, Baby Powder
12. Balloons (not blown up)
13. Clear Plastic Cups
14. One Clear Jar
15. One Bowls
16. Funnel
17. Plastic Spoons
18. Measuring Utensils (1/2 c, Tb, tsp)
19. Shallow Pan

\* Variable solids and powders can be placed in individual ziplock bags and labeled beforehand.

## **SETTING UP YOUR LEARNING CENTER:**

Print out all pages in this file.

Arrange instructional pages on a tri-fold cardboard display

Using a folder (pasted to the tri-fold near the bottom), insert all activity forms for child to complete as he works his way through the science experiments.

In front of the tri-fold display, have all materials set up, labeled, and ready for use. Liquid materials can be stored in plastic water bottles with the labels ripped off. Powder & solid materials can be divided into sandwich baggies, labeled, and stored in a shoebox. Pans & utensils can be stored in a clear storage container.

Reference books on matter and properties of matter (solid, liquids, gasses) should be available beside the learning center (perhaps in a clear bin or small shelf). Libraries are great sources for these books!

Materials, color pages, flip books, clipart, etc, on matter properties can easily be downloaded and printed out online as well. Do google searches for “gas liquid solid kids” and other terms of study. This makes a great addition to your learning center.

Even though this is designed for 2<sup>nd</sup> grade level, use discretion with some of the activities as small solid items (rice, corn) are used.

Cornstarch and baby powder is used for some experiments – and while these are fairly safe, they look identical to the Borax powder used in one experiment. While some are, other children may not be developmentally ready to use the small items and borax unsupervised.

**Label your stuff well and know your child!**

# Goopy, Goopy Goop - Solid or Liquid?

## What you need:

- ✦ 1 cup cornstarch
- ✦ Bowl
- ✦ ABOUT 1/2 cup water
- ✦ Spoon
- ✦ Pan
- ✦ Food Coloring
- ✦ Goopy, Goopy Goop Activity Sheet

## Directions:

- ✦ Empty 1 cup of cornstarch into the bowl.
- ✦ Stir while you add water SLOWLY -- don't add all of it if you don't need to.
  - ▣ You need the consistency of thick pancake batter.
  - ▣ It's better to add too little water than too much.
  - ▣ Take your time!
- ✦ Add a few drops of food coloring.
- ✦ Stick your hands in the mixture.
  - ▣ Record what it feels like.
  - ▣ What happens when you try to roll some into a ball and then leave it alone?
- ✦ Empty the pie plate. Pour the cornstarch mixture into a pie plate.
  - ▣ smack it with your hand
  - ▣ record what happens
  - ▣ does it act differently than the water (a liquid) would?

## What Happened:

When we talk about "states" of matter, we usually talk about the three types: solid (like a rock), liquid (like water) and gas (like the air we breathe). A mixture of cornstarch and water make what is known as a suspension. When you squeeze a Goopy Goop it really feels like a solid because its molecules line up. But it looks like a liquid and acts like a liquid when no one is pressing on it because the molecules relax. This is another state of matter, called a suspension (It can act like a liquid, or, when pressed like a solid.).

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

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

## Gooney, Gooney Goop – Solid or Liquid? Part 1



Draw a picture of your observations.

What did I do? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What did I see? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**ACTION FACT:** Molecules (one of the basic units of matter) are the smallest particles into which a substance can be divided and still have the chemical identity of the original substance. In the substance you've created, the molecules are very large compared to, for instance, molecules of water. When slapped quickly, they tangle themselves up preventing any splattering. In this way the mixture behaves more like a solid. When you slowly poke your finger into the mixture it easily slides right through. In this way the mixture behaves more like a liquid!

# Goopy Gleup - Solid or Liquid? (Part 2)

Plastics are all around us. There are many different kinds, with a wide range of properties. Some are hard like a full solid, others are soft, like a semi-solid. Some are transparent, others are opaque. Most plastics are made in factories, but here's one you can make at home.

## What you need:

- 1 teaspoon borax
- 1 tablespoon white glue
- food coloring
- two cups
- measuring & plastic spoons
- water

## Directions:

1. In one cup, dissolve **1 teaspoon** of borax in **5 tablespoons** of water. You will need to stir this for a while to get it to dissolve. (If a tiny bit does not dissolve, that is OK.)
2. In the other cup, combine **1 tablespoon** of water and **1 tablespoon** of white glue. If you wish, you may color the mixture with a couple drops of food coloring. With a clean spoon, stir the mixture thoroughly until it is uniform.
3. Put **2 teaspoons** of the borax solution from the first cup into the glue mixture in the second cup. Stir the mixture.
4. As you stir the mixture, it will stiffen into a soft lump. After the lump has formed, take it from the cup and knead it in your hand for a couple minutes.

The material you have made has a real name - Gluep!

- Roll the Gluep into a ball, then let it rest. Does the ball maintain its shape?
- Drop a Gluep ball onto a table top. What does the ball do?
- Flatten the Gluep into a thin strip. Hold up the strip by one end. What happens?
- Roll the Gluep into a cylinder and pull the ends slowly. What happens?
- Roll the Gluep into a cylinder and pull the ends quickly. What happens now?

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

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

## Goopy *Gluep* – Solid or Liquid? Part 2



Draw a picture of your observations.

What did I do? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What did I see? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Magic Potion - Exploring Gas

## What you need:

- ✦ Cup and Bottle
- ✦ 2 Tbsp vinegar
- ✦ 1 Tbsp baking soda
- ✦ Balloon and Magic Potion Activity Sheet

## Directions:

- ✦ Put 2 Tbsp vinegar in the cup
- ✦ Add 1 Tbsp baking soda (all at once)
- ✦ Record what happens

## What Happened:

The bubbles that form are carbon dioxide gas. A chemical reaction occurs between the vinegar (an acid) and the baking soda (a base).

This process is also what helps your mom and grandma make those yummy cakes and quick breads (the no yeast kind) nice and fluffy.

## FUN: BLOW UP A BALLOON!

Pour 4 Tbsp vinegar into the bottle.

Pour 2 Tbsp baking soda to the balloon that isn't blown up (use a cone of paper to make a quick funnel!)

Without getting any baking soda in the bottle, stretch the balloon opening over the top of the container. Use your hand or a rubber band to hold the seal.

Jiggle the balloon so the baking soda is dumped into the bottle.

The balloon will magically blow itself up. (This is the carbon dioxide gas at work!)

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

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

## Magic Potion – Exploring Gas



Draw a picture of your observations.

What did I do? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What did I see? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Dancing Raisins - Gettin' Down with 7UP

**Carbon dioxide gas** dissolved in soft drinks gives them their fizz. In this experiment you will observe solids, liquids, and gasses reacting together for a fun surprise!

## What you need:

- Cup
- Bottle of 7-UP (for your liquid and gas)
- Raisins (for your solid)
- Optional: Variable Solids - Corn, Rice, Pasta, Pebbles

## Directions:

Pour the can of liquid 7-UP into the tall glass. Notice the bubbles coming up from the bottom of the glass? The bubbles are carbon dioxide gas released from the liquid.

Drop 6 or 7 raisins into the glass. Watch the raisins for a few seconds. Describe what is happening to the raisins. Do they sink or float? Keep watching; what happens in the next several minutes?

## What Happened:

Raisins (a solid) are *denser* than the liquid soda, so they first sink to the bottom. The carbonated 7-UP then releases **carbon dioxide gas bubbles**. When these bubbles stick to the rough surface of a raisin, the raisin is lifted with the bubble. When the raisin reaches the top, the bubbles pop, and the carbon dioxide gas escapes into the air. This causes the raisin to sink back down. This rising and sinking continues until most of the carbon dioxide has escaped or the raisin gets too soggy.

## Additional Fun:

\* What other objects will dance in the 7UP? Try adding some other solids such as corn, rice, pasta, and pebbles to see what will happen!

\* When you open a can of soda, the noise you hear is produced by the carbon dioxide gas as it rushes out of the can. When the can is opened, the decreased pressure allows some of the carbon dioxide gas dissolved in the liquid to escape. This is what makes the bubbles in your soft drink.

Source: <http://littlejackscorner.mrscoles.com> – Permission to use in homeschool or classroom

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

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

## Dancing Raisins – Gettin’ Down with 7UP



Draw a picture of your observations.

What did I do? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What did I see? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Density of Liquids – Layered Liquids

## You will need

- Bottles of: Water<sub>b</sub>, Light Corn Syrup<sub>r</sub>, Vegetable oil
- Clear Jar
- Funnel
- Variable Solids - Salt, Raisins, Corn, Rice

## Here's how

1. You will find 3 different bottles of the various liquids named above, some of which have been colored to give you a better view.
2. Using your best judgment, arrange the liquid bottles in order from highest density to lowest density. You will also need to guess which liquid form each bottle is (syrup, oil, or water?). *Hint: Bottles are numbered on the bottom if you absolutely must peek!*
3. Start with your first liquid (what you think is the densest) and, using the funnel, pour it slowly into the clear container. Repeat with your second and third liquids. If you chose your liquids carefully you will notice that each layer poured stays on top of each other!
4. If you misjudged your liquid density order, you will see the layers mix. Give the mixture a few minutes to settle into their correct layers, and you'll be able to tell where you made the mistake!



## Why?

Each liquid has its own unique *density*. You added liquids in order from highest to lowest density. The oil stays on top because it is least dense, while the syrup remains on bottom as it's the densest.

## Additional Fun:

How does liquid density affect solid flotation? Drop in some of the various solids given and see what you discover! (Salt, Raisins, Corn, Rice)

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

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

## Density of Liquids – Liquid Layers



Draw a picture of your observations.

What did I do? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What did I see? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Disappearing Act - Dissolving Solids!

## You will need

- Bottle of Water
- Bottle of Vinegar
- Variable Solids  
Sand, Sugar, Salt, Coffee, Tea, Flour, Baby Powder
- Small Cups & Spoons to Stir

## Here's how

1. Using 2 cups, pour water into one and vinegar into the other.
2. Select one or two solids from one of the clear baggies. Do you think these solids will dissolve in water? In vinegar? Formulate your hypothesis now!
3. Starting with your water cup, pour one teaspoon of solid in. Using the same solid or either your second solid, pour one teaspoon into the vinegar cup. Do not stir! Observe for a few moments what the solid is doing in the cup. Has it started to dissolve?
4. Using a spoon, stir the solid into the liquid. Vary your speed to see which works best!

**Did the mixtures you chose dissolve? Halfway? Completely?  
Does your stirring affect the rate at which they dissolve?  
Would a hotter temperature affect the dissolve time?**

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

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

## Disappearing Act – Dissolving Solids



Draw a picture of your observations.

What did I do? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

What did I see? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

# Solid, Liquid, Gas Learning Center

STUDENT ACTIVITY PAGES  
Take One!

Name:

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# SOLID, LIQUID & GAS WORKSHEET

See how much you know!  
Answers are on the back for when you are through - but don't peek!

## QUESTION 1

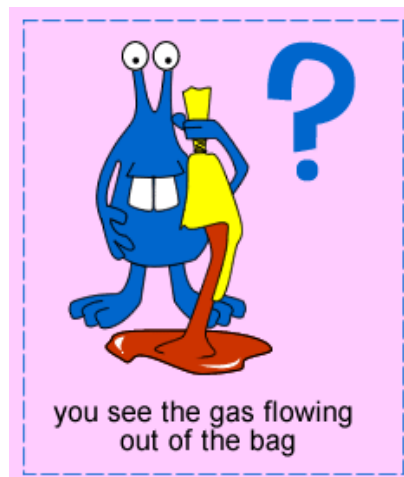
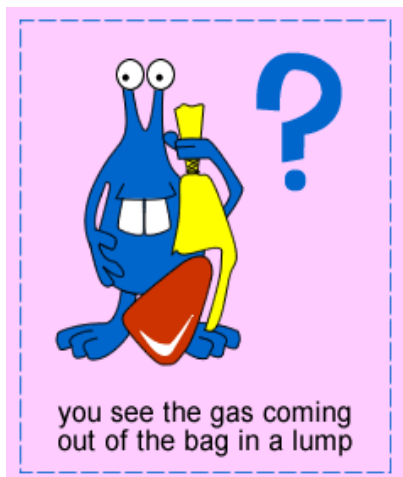
Fill in the correct blank using the 3 different properties:

**LIQUID**   **SOLID**   **GAS**

- A \_\_\_\_\_ keeps its shape unless a force changes it
- A \_\_\_\_\_ takes the shape of the container it is in
- A \_\_\_\_\_ has no fixed shape or volume


## QUESTION 2

What happens to a bag containing gas? Circle the correct answer from pictures below.

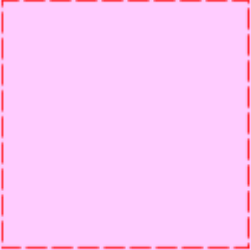


### QUESTION 3


Draw lines from the dotted boxes to the correct answers from above and below.



if you add salt to water and stir it will look like this:




this is called:



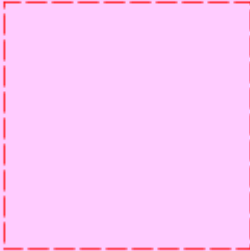
**EVAPORATION**

**A SUSPENSION**


**A SOLUTION**



if you add corn flour to water and stir it, it will look like this:



this is called:



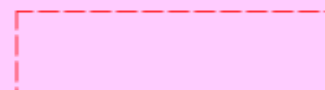
(QUESTION 3 Continued)



if you heat the mixture until the water disappears, it will look like this:



this is called:



EVAPORATION

A SUSPENSION

A SOLUTION

### QUESTION 4

When a solid dissolves, what happens to the particles of the solid? Circle the correct answer from pictures below.

<p>they disappear</p>	<p>they change colour</p>	<p>they are still there but are too small to see</p>
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