



Title: The Push-Pull, Sleek Slime STEM Challenge

Estimated Time: 1-2 periods

Core Ideas (GSE Standard and elements):

S2P1. Obtain, evaluate, and communicate information about the properties of matter and changes that occur in objects.

a. Ask questions to describe and classify different objects according to their physical properties.

S2P2. Obtain, evaluate, and communicate information to explain the effect of a force (a push or a pull) in the movement of an object (changes in speed and direction).

a. Plan and carry out an investigation to demonstrate how pushing and pulling on an object affects the motion of the object.

S4P3. Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces.

a. Plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results.

b. Construct an argument to support the claim that gravitational force affects the motion of an object.

S8P1. Obtain, evaluate, and communicate information about the structure and properties of matter.

b. Develop and use models to describe the movement of particles in solids, liquids, gases, and plasma states when thermal energy is added or removed.

c. Plan and carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter.

S8P3. Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects.

b. Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.

Literacy Connections: Books

Bartholomew and the Oobleck, Dr. Seuss
All About Matter, Mari Schuh

Literacy Connections: Close Reads

Sleek Slime Close Read

Science and Engineering Practices:

Planning and Carrying Out Investigations:

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.

Analyzing and Interpreting Data:

Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.

Crosscutting Concepts:

Structure and Function:

The way an object is structured/designed determines many of its properties and functions.

Stability and Change:

For designed systems, conditions that affect stability and factors that control rates of change are critical to consider and understand.

STEM Challenge

In this STEM Challenge, your first task is to make, observe, and test, a batch of slime using a mixture of materials. Your second task is to use forces – pushes and pulls- to change your slime in a variety of ways. As you change your slime by applying forces in different ways, you should measure the changes that occur and consider ways in which your slime could be improved. .

Ask	Ask your students if they know what slime is made of. Discuss their ideas. Ask them to consider how they could change their slime by pushing and pulling on it in different ways.
Imagine/Brainstorm	Students brainstorm ideas for how they could test their slime to determine the attributes (properties) that help to describe it. Have them think of different ways that they could test their slime once it is created.
Plan/Design	In order to learn more about the topic, have them read (or read to them) the <i>Super Thick Slime</i> article and discuss mixture, materials, liquid, slime, and forces . Use the vocabulary cards if helpful. Next, have students plan and design how they will test the quality of their slime. As needed, discuss some of the physical properties (characteristics) of that might be important for them to test.
Create/Test	Students should create a sample of slime by adding the parts of the mixture in the correct order. Students should then test the characteristics of their slime as planned.
Improve	After discussing and evaluating their results, students should consider ways to improve the quality of their slime. If time permits, let them choose and test one idea that may improve the slime.

Teacher Notes:

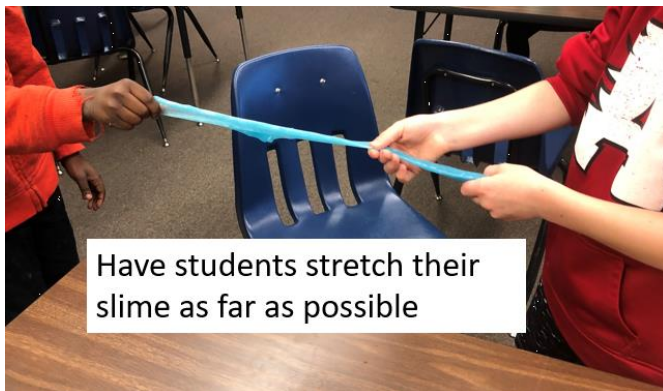
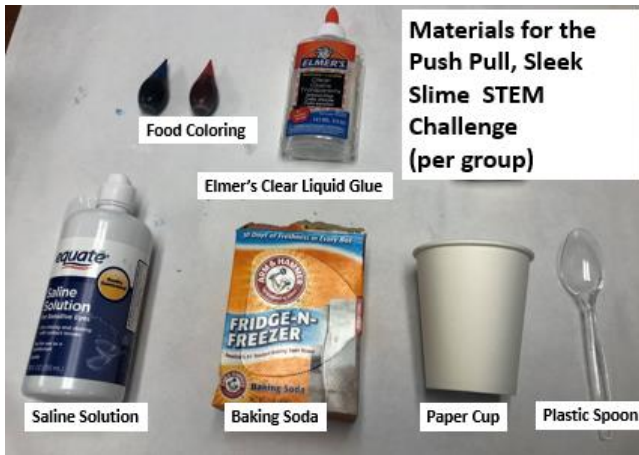
This is a super fun STEM Challenge that kids of all ages really love. Slime is very popular right now so why not give your students a chance to explore its awesomeness. This challenge is relatively easy to set up the slime is super fun and inexpensive. **Slime** is an interesting **mixture of materials (substances)** that, when blended, makes a super thick liquid that sticks together. Like most mixtures, the slime turns out well if you thoroughly mix each of the parts.

While the creation of slime fits perfectly into a discussion of matter and mixtures, it also works well to integrate a discussion of **forces** as actions needed to move and change the concentrated slime. When mixing the parts together, students can feel the push needed to blend each ingredient. By pushing on their slime, they exert **force** on it that helps it to move and change. We often use **pushes** and **pulls** as a force to move or change things. For example, to walk down a path outside I have to push off the ground with my feet. Similarly, if I want to catch a baseball in my glove, I have to exert a force to stop it.

The students' first task in this STEM Challenge is to make a super a batch of slime. They should start by adding 60 ml (2 oz) of Elmer's Clear Liquid School glue to each cup (you can measure it out closely the first time and then just eyeball after that to the same height on each cup). Pass these cups out to each group and have them observe. Next, they add a small ½ teaspoon of baking soda to each cup and students mix this thoroughly as the second material in the mixture. The baking soda contains a cross-linker that causes the mixture to thicken. Third, they add 1-2 drops of food coloring to the mixture and again mix well. Finally, add 1 small teaspoon of saline solution as the final material and mix well. The

saline reduces the stickiness of the slime and makes it easy to handle. It's sort of the magic ingredient. If the slime is still sticky after this, add another squirt of saline.

After making their slime, students should observe it and test its properties. Let them stretch, roll, and gently bounce their slime. They should describe their slime, measure how far it stretches, and pull into a slime window that covers as much space (area) as possible. Finally, we always encourage them to make at least one possible improvement to whatever they create – in this case their slime. As needed, you can provide some suggestions like adding something (glitter, sand, etc.), mixing it longer, or using different kinds of forces to change it.



Vocabulary Cards:

mixture

a blend of materials



material

the stuff things are made of



force

a push or pull on an object



property

a feature of a material
or substance



liquid

a material that can flow



slime

a very thick liquid

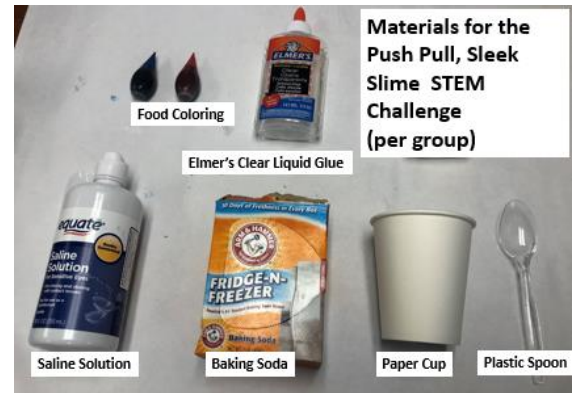


The Push Pull Sleek Slime STEM Challenge:

In this STEM Challenge, your first task is to make, observe, and test, a batch of slime using a mixture of materials. Your second task is to use forces – pushes and pulls- to change your slime in a variety of ways.

Task One: Making Your Slime

1. **Add** 60 ml (2 ounces) of glue to your cup.
2. **Add** ½ teaspoon of baking soda and **mix** well.
3. **Add** 1 drop of food coloring if you want it colored.
4. **Add** 1 small teaspoon of saline and **mix** it very well.
5. **Remove** the slime from the cup. If needed, add another squirt of saline to reduce stickiness.



Task Two: Using Pushes and Pulls

1. **Describe** the properties of your slime.
2. **Test** your slime and **measure** the maximum length that you can stretch it.
3. **Pull** your slime up and down and across until you make transparent slime window that takes up as much space as possible. Measure the width and length of your window.
4. Brainstorm ways you can **improve** your slime and try at least one of these improvements.

