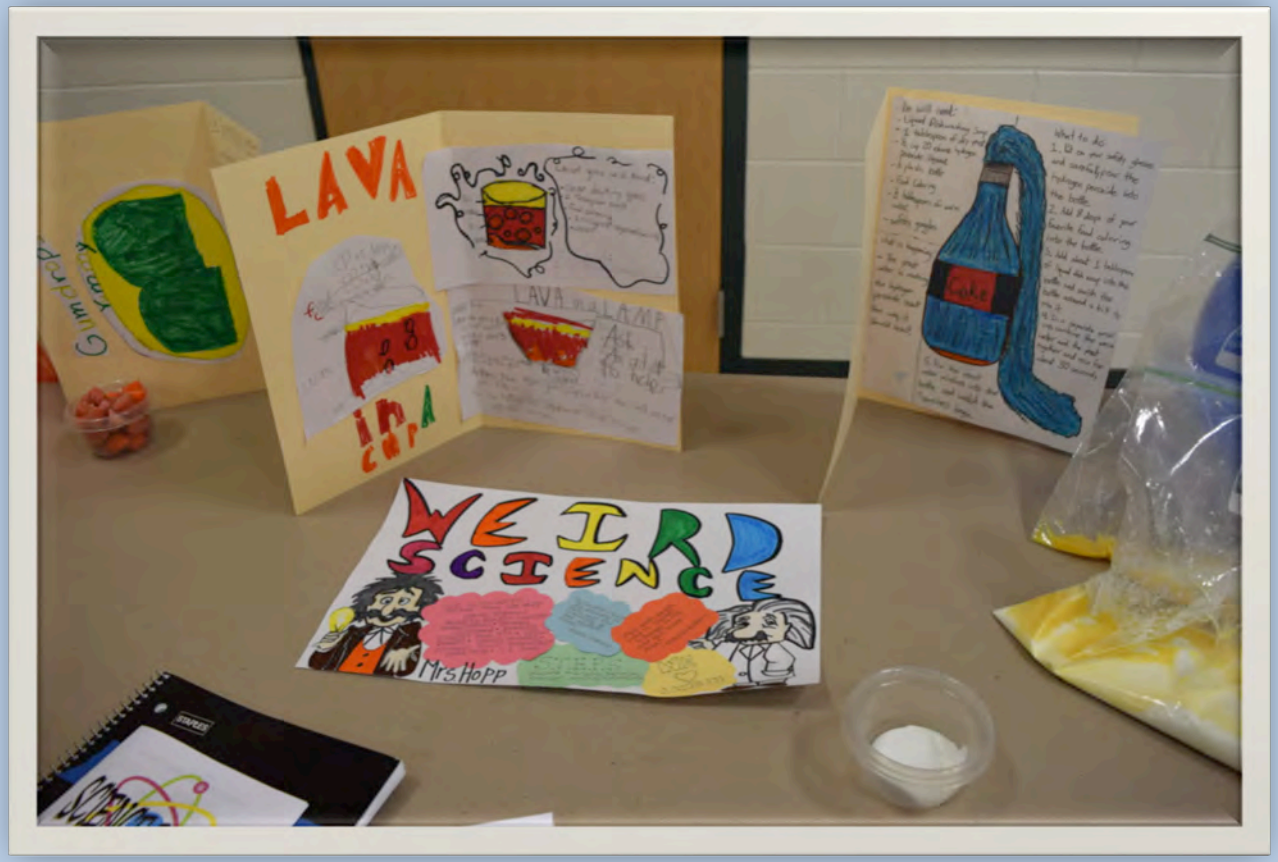
Weird Science



Mary Lee Hopp

Created for Grades 4th and 5th

July 2015

Introduction

This Weird Science Unit was created for the 2015 summer S.T.E.P.S. program for AIG students in the Winston-Salem Forsyth County School System. I wanted to create something that gives the student an opportunity to explore the scientific process through experiments that demonstrate change. With the essential question, "In what ways does change create change?" the students will explore the concept of change through the scientific process. Students will be able to explore the properties of matter, create and apply their learning to new and different situations, all while making meaning through hands on science experiments. They will draw on their background knowledge and use their insights and curiosity. I wanted the children to explore and create on their own.

The skills that are being taught are part of the North Carolina Standard Course of Study for the 4th, 5th, & 6th grade Science Curriculums on matter. The essential understanding is change for this unit. The students are able to use their curiosity and creativity to explore different properties of matter before and after change. They will have to articulate their observations, expand on the experiments while hypothesizing change, classify properties of matter, and learn upper level terminology.

The students will be working in small groups so they will need to exhibit good listening and collaboration skills. The teacher will be the source for resources while giving the students opportunities to create new and exciting changes. The students are encouraged to build upon their originality, creativity, and inquisitive natures.

Differentiation for the Gifted Learner is important to push the students' intellectual limits. In this unit, the students are encouraged to explore and expand on the experiments. They will be asked to develop ideas, theories, and questions to test out themselves, allowing them to move at their own pace. The learning environment is open ended with ample time for the students to work in small AIG groups. This will allow the students' to bounce ideas off classmates as well as the teacher. With their partners they will be able to brainstorm and coach each other, as well as rethink and discuss their ideas.

This unit is geared toward students with an interest in science. The students are able to move at a pace that suits their knowledge and interest. They are able to move forward as they grasp the concept, while those that need more time to grasp it can take more time with the hands on experiences. They will be able to build knowledge as they perform the experiments. This unit is designed to help the student acquire new knowledge through exploration, allow them to transfer their learning to new situations, and giving them opportunities to make meaning of the concept of change. The students are allowed to build upon their originality, creativity, and drive for the subject matter being taught.

Goals

Goal 1: To develop the understanding of the composition and properties of matter before and after they undergo change.

Students will know...

A. that observation, curiosity, and gathering data drives the scientist and the scientific method.
B. that background knowledge helps scientists make inferences.
C. key terms about matter and change.
D. what safety gear to use during experiments.

Goal 2: Develop reasoning skills with observation and prior knowledge.

Students will be able to...

A. apply the scientific method to perform observations and experiments.
B. collect and organize information needed to make generalizations.
C. summarize properties, as well as the new material(s) formed when two things are combined.
D. conduct experiments of change.

Goal 3: To understand how change causes change.

Students will understand...

A. the different terms pertaining to matter and change
B. how to make an informed hypothesis
C. the scientific process along with safety procedures.

Performance Task

Sci Works is looking for a new exhibit to display during the summer months that demonstrates unique physical or chemical change. They want this display to be creative while informative, kid friendly while also attracting the attention of adults. They are looking for an exhibit that shows how change causes change, and they want weird!

Who better to submit an exhibit than a weird science class. Your task is to create an exhibit on the unique changes caused by change. Produce a creative, informative display that would draw the attention of both the young and old and demonstrate change causing change to submit to the board of directors of Sci Works.

The children will be expected to work together and collaborate with their partners to create an exhibit that demonstrates their understanding of how change creates change in a creative unique way. They will create change by completing assigned experiments but will be asked to alter the experiments for different outcomes. They will observe these outcomes and changes, articulating their outcomes using the new scientific terminology, as well as creating their own questions and thoughts. Their exhibits should demonstrate their understanding of change and how scientist use the concept to develop new and inventive things. It should also show the information in a creative and appealing way.


LAVA

Teacher In A Bubble

TEACHER NAME			Lesson #
Hopp			1
MODEL	**CONTENT AREA**	**GRADE LEVEL**	
Bruner	Science	4	

CONCEPTUAL LENS	LESSON TOPIC
Knowledge	Researchers use knowledge to make inferences.

LEARNING OBJECTIVES *(from State/Local Curriculum)*

4.P.2. Understand the compositions and properties of matter before and after they undergo change
Describe, explain, and predict changes
5.SI.1.1 Use various types of resources to gather information
6 Understand the structure, classifications and physical properties of matter

THE ESSENTIAL UNDERSTANDING *(What is the overarching idea students will understand as a result of this lesson?*	THE ESSENTIAL QUESTION *(What question will be asked to lead students to "uncover" the Essential Understanding)*
Observation informs knowledge	**How does observation inform knowledge?**

CONTENT KNOWLEDGE (What factual information will students learn in this lesson?)	PROCESS SKILLS (What will students be able to do as a result of this lesson?)
• **Students will know that observation, curiosity, and gathering data are the basis for inference.** • **Students will know that questions, and curiosity drive the scientist and the scientific method.** • **Students will know that scientist are inquisitive and willing to try different ways of answering a question.** • **Students will know that background knowledge helps scientist make inferences.** • **Terms they will learn: goggles, gloves, lab coat, smock, beaker, flask, graduated cylinder, test tubes, magnifying glass, measuring cups, measuring spoons, pipe-ets (eye dropper), funnel, substances, solutions, mixtures, chemical reactions, scientist, and inventor.**	• **Apply the scientific method to perform observations.** • **Analyze observations to create generalizations** • **Collect and organize information needed to make generalizations** • **Prove or disprove inferences from knowledge and observations.**

GUIDING QUESTIONS

What questions will be asked to support instruction?

Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding

Pre-Lesson Questions:	During Lesson Questions:	Post Lesson Questions:
• What do scientists do? • Where might a scientist work? • How do scientist gather information? • What skills do scientist need? • What tools do they use? • How does curiosity drive a scientist? • What things does a scientist need to be safe? • How is observation important for scientist?	• What dangers did you observe in the video? • What things did they record and observe? • What characteristics did you see about these scientist? • What tools did the scientist use in the video? • How did the scientist use these tools? • How did observation help inform your knowledge of scientist?	• What did you learn about the characteristic of a scientist? • What strategies and methods did you observe? • What is your idea of a scientist? • How does observation inform the scientists' knowledge?

DIFFERENTIATION

(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.

Content	Process	Product	Learning Environment
The students will develop ideas and questions about the experiments.			Small group AIG students

PLANNED LEARNING EXPERIENCES

(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

As the students walk in there will be multiple pictures of scientists at each table around the room. There will be a note for the students to discuss what they know about the scientist at the table. Once every one is settled the students will be given 3 minutes to discuss at their tables what they know and what they want to know about scientist.

After the 3 minutes the students will share what they have discussed putting the information on a class chart. This can be recorded by the teacher or a student. Using the power point discuss the pictures and match the names.

The question will then be asked what the difference between a scientist and inventors is. They will discuss this at their table for 3 minutes. Record on chart paper.

We will then discuss the definitions of a scientist and inventor. The students will have five minutes to discuss the people and then put the pictures at their table into two groups; scientist or inventor.

Getting to know you: Each child will compete the statement in their booklet, "One thing you would want to invent or discover would be…. because…" They will then discuss it with their partner and then each person will introduce their partner relaying their "One thing"

Then each person will put themselves under the label inventor/ scientist.

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

https://www.youtube.com/watch?v=5AZ9ovAHpm4 "What is a scientist?"

https://www.youtube.com/watch?v=2ACkc4POpaU "Kids are Born Scientists" Neil deGrasse Tyson

Show the two videos about scientist. The students are instructed to look for characteristics, methods, and tools scientist utilize.
After the videos, at their tables the children will be asked to discuss and record characteristics, methods, and tools that the scientist used. These will be added to the preexisting list by the teacher or a student.

The children will be put into pairs to observe 9 different substances. The pairs will discuss what these substances might be and their characteristics. Using their observations and knowledge the students will record what they think the substance is and its characteristics. The students will predict what might happen when combine different substances. They will use their knowledge to infer what will happen and record their predictions.

The substances will be in containers for the students to observe.

Substances:	corn syrup	alcohol
	Corn Starch	water
	flour	Vaseline
	salt	soda water
	baking soda	vinegar

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

After the pairs have used their knowledge to figure out what each substance is there will be a class discussion about the substances with the teacher recording what the students have found. How did their knowledge help them make inferences about the substances and how will it help when combining them?

Elaborate *—Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

Each pair will predict, observe, and record what they observe when they combine different substances. They will explain how their knowledge helped their prediction. The groups will share their findings and discuss what they believe happened and why. How did their knowledge inform their predictions? How did their previous observations inform their knowledge?

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

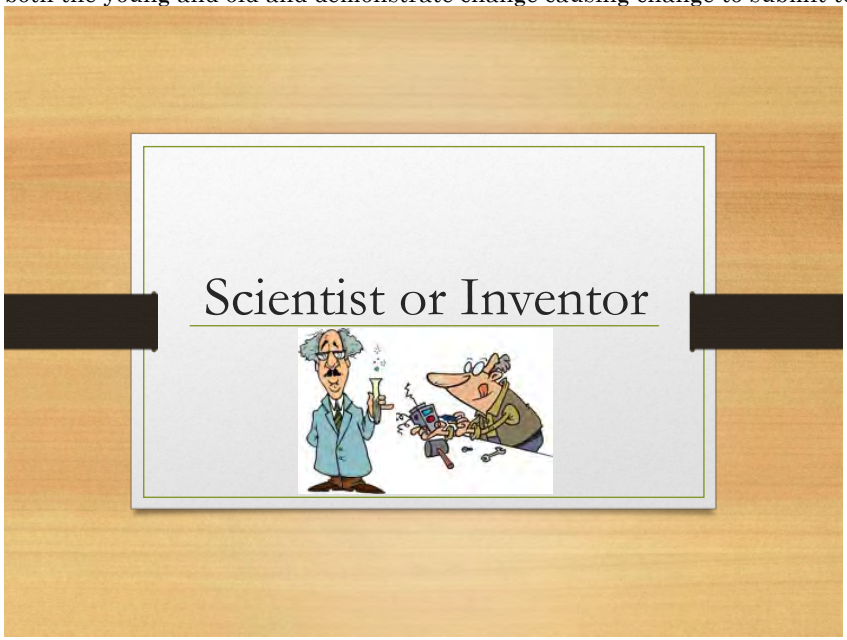
The children will explain how their knowledge and observation proved or disproved their thoughts. They will report their findings to the class as a scientists.

Teacher will introduce the Performance Task.

Performance Task:

Sci Works is looking for a new exhibit to display during the summer months that demonstrates unique physical or chemical reactions. They want this display to be creative while informative, kid friendly while also attracting the attention of adults, show how change causes change, and last but not least they want weird!

I was thinking, who better to submit an exhibit than a weird science class. Your task is to create an exhibit on the unique changes caused by change. Produce a creative, informative display that would draw the attention of both the young and old and demonstrate change causing change to submit to the board of directors of Sci Works.



Inventors focus on ways to manifest a result by developing new products. Scientists focus on answering big questions by observing nature's processes, and finding paths of thinking and experimentation that will lead to breakthroughs in the way we understand certain things. Inventors and scientists have some official differences, but share traits as well.

Inventors

An inventor brings an idea into physical manifestation as an original invention, which can then be patented. In the United States, someone who invents an original device, formula, machine or chemical compound can apply for a patent. The inventor must have contributed directly to the invention's physical creation, and have the dominant intellectual understanding of how the invention works and its purpose. Getting a patent prevents others from legally copying or using your invention. Patents can last up to 20 years, after which the invention becomes public domain. Inventors contribute to progress in nearly all industries, and to individuals' wellness and lifestyles, through their technological, medical, chemical and

material inventions.

Scientists

A scientist methodically pursues an explanation of how some aspect of the natural world works. By observing things as they happen, testing hypotheses through experiments and evaluating results, a scientist seeks to control parts of nature in ways that can be verified and replicated by other scientists. Mathematics is key to successful science.

Differences

The difference between an inventor and a scientist is mainly the results they each produce. Inventing requires patenting while making a scientific discovery does not. Scientists can contribute to research that leads to an invention, but an inventor is considered the chief creator of the concept and physical prototype of the invention. As a scientist, you can work your entire career without patenting anything, but you aren't legally considered an inventor without having your name on at least one patent at some point in your career.

Similarities

Both inventors and scientists are problem solvers working to provide solutions and improve people's lives. Research and development is important to inventors and scientists alike. Many scientists become inventors -- especially when their research on a particular subject leads to an idea for a technology that can put what is being studied into practical use. Inventors apply the scientific method as they go to the drawing board again and again, testing and re-thinking until they reach that eureka moment where an invention is complete.

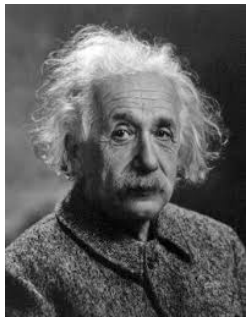
http://goanimate.com/videos/09jZok8pjTCA "What is the difference between a scientist and an inventor?"

https://www.youtube.com/watch?v=5AZ9ovAHpm4 "What is a scientist?"

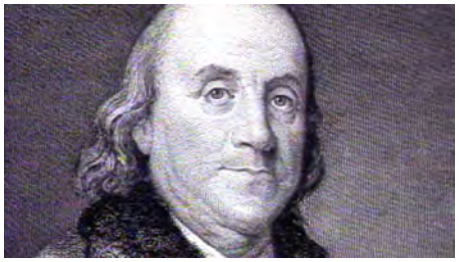
https://www.youtube.com/watch?v=VEEylsSXDlM "Top 10 dedicated scientists" some gross stuff

https://www.youtube.com/watch?v=tsAHt0FiwNM "Animated lab safety"

https://www.youtube.com/watch?v=_7uCcRfrQ0A "Bruno lab song parade



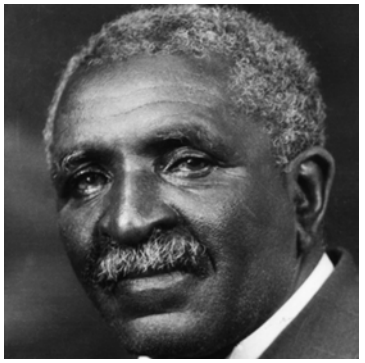
Albert Einstein



Benjamin Franklin

Bill Nye

Neil deGrasse Tyson



George Washington Carver

Marie Curie

Louis Pasteur

Sir Isaac Newton

Stephen Hawking

Jane Goodall

Sally Ride

Madame C.J. Walker

Mae Jemison

Steve Jobs

Hedy Lamarr

TEACHER NAME			Lesson #
Hopp			2
MODEL	**CONTENT AREA**	**GRADE LEVEL**	
Questioning	**Science**	**4**	

CONCEPTUAL LENS	LESSON TOPIC
Change	**Change**

LEARNING OBJECTIVES *(from State/Local Curriculum)*

4.P.2.1 Compare the physical properties of samples of matter
4.P.2.2 Understand the composition of properties of matter before and after they undergo a change or interaction.
5.P.2.3 Investigate properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred
6 Understand the structure, classifications and physical properties of matter

THE ESSENTIAL UNDERSTANDING *(What is the overarching idea students will understand as a result of this lesson?*	THE ESSENTIAL QUESTION *(What question will be asked to lead students to "uncover" the Essential Understanding)*
Change creates change	**In what ways does change create change?**

CONTENT KNOWLEDGE (What factual information will students learn in this lesson?)	PROCESS SKILLS (What will students be able to do as a result of this lesson?)
• **The students will conduct experiments of change** • **The students will question and hypothesize the changes that may occur** • **The students will learn the terms: reagents, reactants, products, catalyst, combustion, oxygen, matter, mixtures, solutions, suspensions, colloids, acid base, chemical change, physical change** • **The students will know what safety gear to use during the experiments.**	• **The student will summarize properties, as well as the new material(s) formed when combined** • **The students will use the scientific process to conduct and hypothesize their experiments**

GUIDING QUESTIONS
What questions will be asked to support instruction?
Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding

Pre-Lesson Questions:	During Lesson Questions:	Post Lesson Questions:
• **What do scientist do?** • **What do they need to be safe?** • **How do scientist gather information?** • **What tools do they use?** • **What is a substance?** • **What is a characteristic?** • **Why is your knowledge of change important while doing experiment**	• **What happened when you combined the substances?** • **What caused the change?** • **How might you be able to predict what the change may be?** • **What have you observed to make you come to this conclusion?**	• **What different products did these experiments produce?** • **In what ways did the change create change?** • **What types of change were created?** • **What did you learn about matter and change?**

DIFFERENTIATION

(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.

Content	Process	Product	Learning Environment
The students will develop ideas and questions about the experiments.			**Small group of AIG students**

PLANNED LEARNING EXPERIENCES

(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

As the students enter the classroom the teacher will be playing with a ball of silly putty and as the students get to their table the teacher will throw a ball of silly putty to each child to mess with until everyone gets there. Once everyone is in place at their tables the students will discuss the silly putty and its characteristics. A class discussion of what they have come up with. The teacher or a student may record what the students say about the silly putty. They will hold on to their silly putty to compare it to the putty that they will be creating later.

Before starting the experiments there will be a quick review of the appropriate safety equipment and the children will get their things.

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

Once everyone has their gear the teacher will introduce the experiments for the day.

Fake Snot **Putty** **Genie in a Bottle (extra)**

Quick Sand **Elephant toothpaste**

The children will be paired together and sent to their starting stations. How does change cause change? The kids are to look at and evaluate their supplies and directions. They will need to hypothesize what their knowledge about the things causes them to infer about the change that will happen when the experiment is carried out. They will also be asked to come up with 3 questions that they have about the experiment. The teacher walks around discussing with the kids their thoughts about their experiment as the teacher finishes with the group the students are conduct the experiment.

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

Once the students have conducted the experiment they are to record their method of conducting the experiment and what they discovered, was their hypothesis correct why or why not? Were their 3 questions answered? Do they have any other questions or ideas? The kids will work their way through all of the experiments doing the same things for each one.

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

When everyone is finished the teacher will pair the groups together to discuss their methods for the experiments and what their findings were, their thoughts, and what changes happened. In what way did change caused change?

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

The students will discuss which experiment they would like to make an exhibit for teacher will pair students together for them to begin working on their performance task.

The Performance task will be reviewed. Each pair will be asked to draw one of the experiments and create an exhibit for Sci-Works using the materials provided by the teacher.

- **reagents** - a substance that is used to test for the presence of another substance by causing a chemical reaction with it
- **reactants -** a substance that changes when it is combined with another substance in a chemical reaction
- **products -** something resulting from or necessarily following from a set of conditions <a *product* of his environment>
- **catalyst** - a substance that causes a chemical reaction to happen more quickly
- **oxygen** - a chemical that is found in the air, that has no color, taste, or smell, and that is necessary for life
- **matter** - something that is being done, talked about, or thought about matters : the situation or subject that is being discussed or dealt with physics : the thing that forms physical objects and occupies space
- **mixtures -** something made by combining two or more ingredients
- **solutions -** an act or the process by which a solid, liquid, or gaseous substance is homogeneously mixed with a liquid or sometimes a gas or solid
- **suspensions -** (1) **:** the state of a substance when its particles are mixed with but undissolved in a fluid or solid(2) **:** a substance in this state (3) **:** a system consisting of a solid dispersed in a solid, liquid, or gas usually in particles of larger than colloidal size
- **colloids -** a substance that consists of particles dispersed throughout another substance which are too small for resolution with an ordinary light microscope but are incapable of passing through a semipermeable membrane
- **acid base -** a sour substance; *specifically* **:** any of various typically water-soluble and sour compounds that in solution are capable of reacting with a base to form a salt, that redden litmus, that have a pH less than 7, and that are hydrogen-containing molecules or ions able to give up a proton to a base or are substances able to accept an unshared pair of electrons from a base
- **chemical change -** a usually irreversible chemical reaction involving the rearrangement of the atoms of one or more substances and a change in their chemical properties or composition, resulting in the formation of at least one new substance
- **physical change -** a usually reversible change in the physical properties of a substance, as size or shape

Experiments

Quick Sand

Quick sand is a fascinating substance, make some of your own and experiment on a safe scale. Amaze your friends by demonstrating how it works.

What you'll need:

- 1 cup of corn starch
- Half a cup of water
- A large plastic container
- A spoon

Instructions:

1. This one is simple, just mix the corn starch and water thoroughly in the container to make your own instant quick sand.
2. When showing other people how it works stir slowly and drip the quick sand to show it is a liquid.
3. Stirring it quickly will make it hard and allow you to punch or poke it quickly (this works better if you do it fast rather than hard).
4. Remember that quick sand is messy, try to play with it outside and don't forget to stir just before you use it.
5. Always stir instant quicksand just before you use it!

What's happening?

If you add just the right amount of water to corn starch it becomes very thick when you stir it quickly. This happens because the corn starch grains are mixed up and can't slid over each other due to the lack of water between them. Stirring slowly allows more water between the corn starch grains, letting them slide over each other much easier.

Poking it quickly has the same effect, making the substance very hard. If you poke it slowly it doesn't mix up the mixture in the same way, leaving it runny. It works in much the same way as real quick sand.

Science Experiment s for Kids

http://www.stevespanglerscience.com/lab/experiments/

Crazy Putty

Using some everyday household item such as borax, water, PVA glue and food coloring, make some crazy putty that you can squish in your hands, mold into shapes or even bounce on the ground.

What you'll need:

- 2 containers (1 smaller than the other preferably a film canister)
- Water
- Food coloring
- PVA glue (Elmer's glue)
- Borax solution (ration of about 1 Tbsp. of borax to a cup of water)

Instructions:

1. Fill the bottom of the larger container with glue.
2. Add a few squirts of water and stir.
3. Add 2 or 3 drops of food coloring and stir.
4. Add a squirt of borax (possibly a bit more depending on how much glue you used).
5. Stir the mixture up and put it into the smaller container. By now the mixture should be joining together, acting like putty, crazy putty!

What's happening?

The glue you use is a type polymer called polyvinyl acetate (PVA for short), while the borax is made of a chemical called sodium borate. When you combine the two in a water solution, the borax reacts with the glue molecules, joining them together into tone giant molecule. This new compound is able to absorb large amounts of water, producing a putty like substance which you can squish in your hands or even bounce.

Science Experiment s for Kids

http://www.stevespanglerscience.com/lab/experiments/

Fake Snot

As disgusting as it might sound to some people, let's make some fake snot! Snot actually serves an important purposed in our body so this experiment is not all about grossing out our friends, although that's certainly part of the fun.

What you'll need:

- Boiling water
- A cup
- Gelatin
- Corn Syrup
- A teaspoon
- A fork

Instructions:

1. Fill half a cup with boiling water.
2. Add three teaspoons of gelatin to the boiling water.
3. Let it soften before stirring with a fork.
4. Add a quarter of a cup of corn syrup.
5. Stir the mixture again with your fork and look at the long strands of gunk that have formed.
6. As the mixture cools slowly add more water, small amounts at a time.

What's happening?

Mucus is made mostly of sugars and protein. Although different than the ones found in the real thing this is exactly what you used to make your fake snot. The long, fine strings you could see inside your fake snot when you moved it around are protein strands. These protein strands make snot sticky and capable of stretching.

Elephant Toothpaste

This is a kid safe version of the popular Elephant's Toothpaste demonstration using common household materials. A child with a great adult helper can safely do this activity and the results are wonderful.

What you'll need:

- 16 oz. empty plastic soda bottle
- ½ cup 20-volume hydrogen peroxide
- Squirt of Dawn dish detergent
- 3-4 drops of food coloring
- 1 teaspoon yeast dissolved in approximately 2 Tbsp. very warm water
- Funnel
- Foil cake pan with 2 inch sides
- Safety glasses

Instructions:

1. Have students put on their safety glasses. Each student should have in front of them a cake pan, plastic bottle, Dawn in small cup, food coloring, ½ cup peroxide, and the dissolved yeast mixture.
2. Stand the bottle up in the center of the cake pan. Put the funnel in the opening. Add 3-4 drops of food coloring to the peroxide and pour the peroxide through the funnel into the bottle. Show a water molecule diagram and a peroxide molecule diagram, pointing to the extra oxygen that will be set free in the reaction.
3. Add the Dawn detergent to the peroxide in the bottle.
4. Pour the yeast mixture into the bottle and quickly remove the funnel.
5. The students can touch the bottle to feel any changes that take place.

What's happening?

Talk about the addition of the yeast as a catalyst, which makes the peroxide molecule release the oxygen atom faster. The reaction creates foam that shoots up out of the bottle and pools in the pan. After a minute or so, it begins to come out in a moving stream that looks like toothpaste being squeezed out of a tube. The students can play with the foam ass it is just soap and water with oxygen bubbles. The bottle will feel warm to the touch as this is an exothermic reaction.

Steve Spangler Science

http://www.stevespanglerscience.com/lab/experiments/elephants-toothpaste

Genie in a Bottle (EXTRA)

Be careful, 30% hydrogen peroxide is a strong oxidizing agent; contact with eyes and skin should be avoided. In case of contact, flush with water for at least 15 minutes. Get medical attention if eyes are affected. Also avoid contact of hydrogen peroxide and combustible materials. 30% hydrogen peroxide must be stored in its original container.

What you'll need:

- 2 liter soda bottle, beaker, or flask
- Goggles
- 30% hydrogen peroxide
- Manganese dioxide

Instructions:

1. Pour 50-100 mL of 30% hydrogen peroxide into 2 liter bottle (enough to cover the dimples)
2. Add a pea-sized amount of manganese dioxide to bottle or container.
3. Gaseous oxygen will be emitted from the bottle. The reaction is exothermic; the soda bottle will get hot and shrink slightly.

What's happening?

Oxygen is a colorless, odorless gas at room temperature and atmospheric pressure. The discovery of oxygen is typically attributed to Joseph Priestly. However, it was Lavoisier who first realized this gas was a unique component of air. Here oxygen is formed from the decomposition of hydrogen peroxide. Hydrogen peroxide is not a very stable compound and its decomposition can be induced by many means. Light will decompose it, which is why it is sold in brown bottles in drugstores. The surface of manganese dioxide provides a particularly favorable environment to catalyze the decomposition, though the mechanism is somewhat poorly understood. The genie in a bottle effect is finely divided water droplets propelled from the bottle by the oxygen formed via the decomposition of hydrogen peroxide.

Genie in a bottle video https://www.youtube.com/watch?v=5q5bzHckSIM

Steve Spangler Science

http://www.stevespanglerscience.com/lab/experiments/genie-in-a-bottle experiment

ACHER NAME			Lesson #
Hopp			3
MODEL	**CONTENT AREA**	**GRADE LEVEL**	
Questioning	Science	4	
CONCEPTUAL LENS		**LESSON TOPIC**	
Change		Change	

LEARNING OBJECTIVES *(from State/Local Curriculum)*

4.P.2.1 Compare the physical properties of samples of matter
4.P.2.2 Understand the composition of properties of matter before and after they undergo a change or interaction.
5.P.2.3 Investigate properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred
6 Understand the structure, classifications and physical properties of matter

THE ESSENTIAL UNDERSTANDING *(What is the overarching idea students will understand as a result of this lesson?*	**THE ESSENTIAL QUESTION** *(What question will be asked to lead students to "uncover" the Essential Understanding)*
Change creates change	In what ways does change create change?
CONTENT KNOWLEDGE (What factual information will students learn in this lesson?)	**PROCESS SKILLS** (What will students be able to do as a result of this lesson?)
• The students will show demonstrate knowledge of how to appropriately conduct experiments of change • The students will question and hypothesize the changes that may occur • The students will learn the terms: molecular clusters, exothermic reaction, evaporation, oxidation, dilute, glycerin, osmosis, and freezing point • The students will know what safety gear to use during the experiments.	• The students will summarize properties, as well as the new material(s) formed when combined • The students will use the scientific process to conduct and hypothesize their experiments

GUIDING QUESTIONS *What questions will be asked to support instruction?* *Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding*		
Pre-Lesson Questions:	**During Lesson Questions:**	**Post Lesson Questions:**
• **What do scientist need to be safe?** • **What do you predict will happen?** • **What tools do they use?** • **What is a substance?** • **What is a characteristic?** • **Why is your knowledge of change important while doing experiments?**	• **What happened when you combined the substances?** • **What caused the change?** • **How might you be able to predict what the change may be?** • **What have you observed to make you come to this conclusion? How might you create a different change with the materials that you have?** • **What would be the advantages or disadvantages?** •	• **What different products did these experiments produce?** • **In what ways did the change create change?** • **What types of change were created?** • **What did you learn about matter and change?**

DIFFERENTIATION *(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.*			
Content	**Process**	**Product**	**Learning Environment**
The students will develop ideas and questions about the experiments.			**Small group of AIG students**

PLANNED LEARNING EXPERIENCES

(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

As the students enter the classroom the teacher is acting as a mad scientist mixing different unmarked mixtures together while not wearing any safety attire.
This will spark the discussion and review of lab safety.
Before starting the experiments there will be a quick review of the appropriate safety equipment and the children will get their things.

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

Once everyone has their gear the teacher will introduce the experiments for the day.
Invisible Ink lava cup vanishing milk
Gumballs Bath Salts (extra)
The children will be paired together and sent to their starting stations. How does change cause change? The kids are to look at and evaluate their supplies and directions. They will need to hypothesize what their knowledge about the things causes them to infer about the change that will happen when the experiment is carried out. They will also be asked to come up with 3 questions that they have about the experiment. The teacher walks around discussing with the kids their thoughts about their experiment as the teacher finishes with the group the students are conduct the experiment.

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

Once the students have conducted the experiment they are to record their method of conducting the experiment and what they discovered, was their hypothesis correct why or why not? Were their 3 questions answered? Do they have any other questions or ideas? The kids will work their way through all of the experiments doing the same things for each one.

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*
When everyone is finished the teacher will pair the groups together to discuss their methods for the experiments and what their findings were, their thoughts, and what changes happened. In what way did change caused change?

The students will draw an experiment to make an exhibit for Sci Works will pair students together for them to begin working on their performance task.

- **polymers -** naturally occurring or synthetic compound,
  such as starch or Perspex,that has large molecules made up of many relatively simple repeatedunits *Compare* copolymer, oligomer

- **exothermic reaction -** chemical reaction accompanied by the evolution of heat

- **evaporation -** To convert or change into a vapor. To draw off in the form of vapor.
  To draw moisture from, as by heating, leaving only the dry solid portion. To deposit (a metal) on a substrate by vacuum sublimation.

- **oxidation -** reaction in which the atoms of an element lose
  electrons and the valence of the element is correspondingly increased.

- **dilute -** To make thinner or less concentrated by adding a liquid such
  as water. **2.** To lessen the force, strength, purity, or brilliance of, especially by admixture.
  3. To decrease the value of (shares of stock) by increasing the total number of shares.
- **glycerin -** a colorless liquid, C3H8O3, used as a sweetener and preservative, and in suppositories and skin emollients.

- **osmosis -**
  the passage of a solvent through a semipermeable membrane from a less concentrated to a more concentrated solutionuntil both solutions are of the same concentration

- **freezing point -**
  The temperature at any fixed pressure at which the liquid and solid phases of a substance of specified composition are inequilibrium.

Experiments

Invisible Ink

Making invisible ink is a lot of fun, you can pretend you are a secret agent as you keep all your secret codes and massages hidden from others. All you need is some basic household objects and the hidden power of lemon juice.

What you'll need:

- Half a lemon
- Water
- Spoon
- Bowl
- Q-tip
- White paper
- Lamp or other light bulb

Instructions:

1. Squeeze some lemon juice into the bowl and add a few drops of water.
2. Mix the water and lemon juice with the spoon.
3. Dip the cotton bud into the mixture and write a message onto the white paper.
4. Wait for the juice to dry so it becomes completely invisible.
5. When you are ready to read your secret message or show it to someone else, heat the paper by holding it close to a light bulb.

What's happening?

Lemon juice is an organic substance that oxidizes and turns brown when heated. Diluting the lemon juice in water makes it very hard to notice when you apply it to the paper, no one will be aware of its presence until it is heated and the secret message is revealed. Other substances which work in the same way include orange juice, honey, milk, onion juice, vinegar and wine. Invisible ink can also be made using chemical reactions or by viewing certain liquids under ultraviolet (UV) light.

Gum Drops

Matter is anything that has mass and takes up space. There are three kinds of matter: liquid, solid, and gas. Let's see what kind of matter we will be observing today. All matter contains tiny particles called molecules. So why isn't all matter the same? In a gas, molecules are very far apart and they move about quickly in all directions. In a liquid, the molecules are closer together. They move about in all directions, but they do not move very fast because they keep colliding. In a solid, the molecules fit together very tightly. Because of this, the molecules move together as one unit like a marching band.

What you'll need:

- Package of Jell-O
- Bowl
- Cup of water
- Paper plate
- Dropper
- Fork

Experiment:

1. Using the dropper, slowly add 1 to 3 drops of water to the bowl of gelatin. Count to five.
2. Slowly swirl the bowl in a circular motion.
3. Using your fork to gently remove your results from the bowl.
4. Repeat the process. Use different amounts of drops of water. Record your results.

What did you observe?

What happened when you added more water?

How many drops of water made the best gum drops?

What did you learn about matter?

What change caused change?

Carnegie Mellon University (experiment) **http://www.cmu.edu/gelfand/k12-teachers/polymers/polymer-and-absorption/gelatin-gumdrops.html**

extra information and ideas **http://littlebinsforlittlehands.com/melting-gumdrop-science-exploring-change-heat/**

Lava in a Cup

What you'll need:

- A clear drinking glass
- ¼ cup vegetable oil
- 1 teaspoon salt
- Water
- Food coloring

Instructions:

1. Fill the glass about ¾ full of water.
2. Add about 5 drops of food coloring.
3. Slowly pour the vegetable oil into the glass. See how the oil floats on top.
4. Sprinkle the salt on top of the oil.
5. Watch blobs of lava move up and down in your glass.
6. Add another teaspoon of salt to keep the effect going.

What's happening?

First of all, the oil floats on top of the water because it is lighter than the water. Since the salt is heavier than oil, it sinks down into the water and takes some oil with it, but then the salt dissolves and back up goes the oil.

Weird Science for Kids

http://weirdsciencekids.com/Makelavainacup.html

Vanishing Milk

What you'll need:

- Rubber gloves
- Goggles
- Disposable diaper
- Scissors
- Semi-opaque drinking glass
- 2 cups milk

Instructions:

1. Wearing gloves and goggles cut open the center of a disposable diaper with scissors.
2. Scoop out ½ teaspoon of the powder inside the diaper (known as sodium polyacrylate) and put it in the semi-opaque drinking glass.
3. Pour the milk into the cup with the powder and watch it disappear.
4. Turn the glass over. What happened to the milk?

What's happening?

Sodium polyacrylate, the active ingredient in most disposable diapers, is an especially absorbent substance. One test has shown that it can absorb 800 times its own weight in water, which makes up most of the milk. The sodium polyacrylate and milk mix to form a gel, which sticks to the base of the glass. When you turn the glass over nothing comes out.

Book:

The Book of Totally Irresponsible Science by: Sean Connolly page 70

Bath Salts (EXTRA)

What you'll need:

- Plastic mixing bowl
- 1 cup Epsom salt
- 1 cup sea salt
- ½ teaspoon glycerin
- Fragrance or essential oils
- Colorant
- Liquid soap

Instructions:

1. Mix together the Epsom salt and sea salt in the mixing bowl.
2. Add glycerin to the salt mixture and mix through. The glycerin is not necessary, but it helps the colorant and oil get dispersed evenly through the salt.
3. Add a few drops of fragrance or essential oils. Fragrance oils will smell nice, but essential oils have therapeutic properties.
4. Add a few drops of colorant. We recommend getting oil-based skin-safe colorant rom a craft store or else leaving out the colorant.
5. Wet your hands with tap water, add a drop of soap to your hands, then rub together to form a lather. Observe how much lather forms then rinse off your hands.
6. Fill a sink with water and add about 1/8 cup of salt mixture to it. Use your hands to stir the water to help the salt dissolve. With your hands still wet from the salt water, add a drop of soap to your hands and rub them together to from a lather.
7. Store the rest of your salts in a jar, keeping the lid on tight to keep moisture out. Use about ¼ cup of the salts in your bath.

http://www.dltk-kids.com/recipes/mbath_salts.htm

EACHER NAME			Lesson #
Hopp			4
MODEL	**CONTENT AREA**	**GRADE LEVEL**	
Questioning	**Science**	**4**	

CONCEPTUAL LENS	LESSON TOPIC
Change	Change

LEARNING OBJECTIVES *(from State/Local Curriculum)*

4.P.2.1. Compare the physical properties of samples of matter
4.P.2.2. Understand the composition of properties of matter before and after they undergo a change of interaction.
5.P.2.3. Investigate properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred
6 Understand the structure, classifications and physical properties of matter

THE ESSENTIAL UNDERSTANDING *(What is the overarching idea students will understand as a result of this lesson?*	THE ESSENTIAL QUESTION *(What question will be asked to lead students to "uncover" the Essential Understanding)*
Change creates change	In what ways does change create change?

CONTENT KNOWLEDGE (What factual information will students learn in this lesson?)	PROCESS SKILLS (What will students be able to do as a result of this lesson?)
• The students will demonstrate knowledge of the process of questioning and hypothesizing changes that may occur • The students will learn the terms: molecular clusters, polymers, exothermic reaction, evaporation, oxidation, dilute, glycerin, osmosis, and freezing point • The students will know and understand what safety gear to use during the experiments?	• The students will conduct experiments of change • The students will summarize properties, as well as the new material(s) formed when combined • The students will make predictions on what changes will occur in the experiments

GUIDING QUESTIONS *What questions will be asked to support instruction?* *Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding*		
Pre-Lesson Questions:	**During Lesson Questions:**	**Post Lesson Questions:**
• **What do scientist need to be safe?** • **What do predict will happen?** • **What tools do they use?** • **What is a characteristic?** • **Why is your knowledge of change causing change important while doing these experiments?**	• **What do think will happen?** • **What happened when you combined the substances?** • **What caused the change?** • **How might you be able to predict what the change may be?** • **What have you observed to make you come to this conclusion?** • **How might you create a different change with the materials that you have?** • **What would be the advantages or disadvantages?**	• **What different products did these experiments produce?** • **In what ways did the change create change?** • **What types of changes were caused?** • **What did you learn about matter and change?**

DIFFERENTIATION *(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.*			
Content	**Process**	**Product**	**Learning Environment**
The students will develop ideas and questions about the experiments.			**Small group pairings of AIG students.**

PLANNED LEARNING EXPERIENCES

(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

As the students enter the classroom the teacher will be dressed in winter gear. Which will spark the question why because it is summer and can we create a winter wonderland in the middle of summer?

Before starting the experiments there will be a quick review of the appropriate safety equipment and protocol.

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

Once everyone has their gear the teacher will introduce the experiments for the day.

Supercooling Water	**snow (extra)**	**Student in a Bubble**
Ice Cream	**7 layer column (extra)**	

The children will be paired together and sent to their starting stations. How does change cause change? The kids are to look at and evaluate their supplies and directions. During this phase the students will be making predictions based on the equipment and materials they have to use. They will need to use their knowledge about the things they are going to use, and infer what changes may happen when the experiment is carried out. They will also be asked to come up with 3 questions that they have about the experiment. The teacher walks around discussing with the kids their thoughts about their experiment as the teacher finishes with the group the students are conduct the experiment.

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

Once the students have conducted the experiment they are to record their method of conducting the experiment and what they discovered, was their hypothesis correct why or why not and how change caused change in their science journal. Were their 3 questions answered? Do they have any other questions or ideas? The kids will work their way through all of the experiments doing the same things for each one. After each experiment the students will reflect on the experiment in their lab journal.

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

When everyone is finished the teacher will pair the groups together to discuss their methods for the experiments and what their findings were, their thoughts, and how change caused change.

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

The students will create and complete all exhibits.

Supercooling Water – Method #1

What you'll need:

- Purified water
- freezer

Instructions:

Place the purified water in the freezer. Get it to about 32°F, you can monitor it with a thermometer. You can also do guess work by placing multiple water bottles and testing them out every 30 min. For us, it took about 1 hour in the freezer. Carefully take them out, or they might transform ice crystals already. Transform the water by hitting the bottle. You can also pour the water on ice or anything that's cold. You now created an instant slushy.

Science:

Water normally freezes below 32°F or 0°C forming ice crystals. Impurities in the water can activate the crystallization. The absence of these impurities in purified water keeps it in a liquid state below freezing point. Hitting it or touching the ice activates the crystallization, since it's already at freezing point, instantly turning the water into ice.

Supercooling Water - Method #2

If you don't have a couple of hours, there is a quicker way to supercool water.

1. Pour about 2 tablespoons or 20 ml of distilled or purified water into a very clean glass.
2. Place the glass in a bowl of ice such that the level of the ice is higher than the level of water in the glass. Avoid spilling any ice into the glass of water.
3. Sprinkle a couple of tablespoons of salt onto the ice. Do not get any of the salt in the glass of water.
4. Allow about 15 minutes for the water to cool below freezing. Alternatively, you can insert a thermometer into the glass of water.
5. When the temperature of the water is below freezing, the water has been supercooled.
6. You can make the water freeze by pouring it over a piece of ice or by dropping a small piece of ice into the glass.

So how does this happen? It's not witchcraft, it's science!

Everyone knows that water freezes at 0 °C - or does it? When water freezes, it needs a nucleus in order for the solid crystals to form and become ice. Water is typically full of particles and impurities which have no problem kicking off the crystallization process. However, purified water by definition doesn't have those impurities. With nothing for the water molecules to latch onto, purified water can be supercooled as far as -40°C.
For the purposes of your at-home experiment, the water doesn't need to be cooled that far. In just under 3 hours, the bottles of water have been chilled to -24 °C (-11 °F). Of course, individual settings on freezers will likely alter the time and temperature it will take to supercool the water.

The energy generated from firm hit on the side of the bottle forces the supercooled water molecules to form a crystal in a process called nucleation. That nucleus ice crystal is all that's needed to start a chain reaction of crystallization throughout the entire bottle. Shaking or jostling the bottle has the same effect, so be very careful and have a steady hand when removing the water from your freezer.

The other reactions shown in the video work for the same reason. Pouring the water onto a bowl of ice cubes forms a slushy ice. As the supercooled water hits the ice cube nuclei in the bowl, the crystallization spreads up the stream of the water as it gets poured onto the pile. The latent heat that is released during the freezing process stops it from freezing solid. Dropping an ice cube directly down into a glass or just touching an ice cube to the surface of the water provides the nucleus needed for the supercooled water to freeze completely.

http://chemistry.about.com/od/chemistryhowtoguide/a/how-to-supercool-water.htm

Video for Supercooling **https://www.youtube.com/watch?v=kqJpYwJepuo**

Ice Cream

What you'll need:

- 2 large zip lock bags
- 1 small zip lock bag
- 1 Tbsp. sugar
- ½ cup milk
- ½ tsp. vanilla extract
- 4 Tbsps. Rock salt
- 2 cups ice cubes

Instructions:

1. Put the milk, sugar, and vanilla into the small baggie with the help of a partner.
2. Seal the small baggie, making sure it is sealed completely with as little air in it as possible.
3. Place the small bag in the larger bag then cover with the ice and rock salt. Get all the air out of the bag, then put those two bags into the empty large freezer bag.
4. Shake the bag within a bag for 8 minutes or until the milk mixture is a solid.
5. Remove the small bag and enjoy!

Book:

Stem to Story By: 826 National Edited by: Jennifer Traig page 27

Student in a Bubble

What you'll need:

- 2 cups dishwashing liquid
- 3 cups tap water
- ½ cup glycerin
- 2 gallon bucket
- Small wading pool
- Plastic hula hoop
- Swimming goggles
- Small stool

Instructions:

1. Mix the dishwashing liquid, water, and glycerin in the bucket to make the bubble mixture. (This mixture can keep and even improves over time – but you must cover it.)
2. Pour the bubble mixture into the pool.
3. Place the hula hoop in the pool so it's immersed in the solution.
4. Taking care not to puncture the base of the pool, place the stool inside the hula hoop.
5. Ask a friend to put on the goggles and stand on the stool.
6. Lift the hula hoop up and over your friend; A giant bubble will engulf them.

What's happening?

The dishwashing liquid is the prime ingredient for any blown bubble. Each soap molecule has two halves – one hydrophilic (attracted to water) and one hydrophobic (repelled by water). The bubble is actually a "sandwich": a layer of water molecules squeezed between two layers of soap molecules. The two enemies of bubbles are water tension and evaporation. The interaction with the soap molecules stretches the water molecules apart, weakening the tension. The other ingredient, glycerin, forms weak hydrogen bonds with the water, slowing or even preventing evaporation.

Book:

The Book of Totally Irresponsible Science by: Sean Connolly pg.184

Insta – Snowball (extra)

What you'll need:

- Insta-snow powder (Amazon)
- Small plastic cup
- Water

Instructions:

1. Place three scoops of Insta-Snow powder into one of the cups.
2. Fill a second sup with warm water.
3. Quickly pour the water from its cup into the cup containing Insta-Snow powder.
4. Pour the freshly made Insta-Snow in a pile on a flat surface.
5. Pour a small amount of water in a plastic cup and slowly pour it into the center of the snow pile.
6. Scoop Insta-Snow to cover the hole made by the poured water.
7. Gently slide your hand underneath the pile of snow and lift your Insta-Snowball out.

What's happening?

Insta-Snow was an accidental discovery and is made by linking together molecules of sodium polyacrylate polymer. Sodium polyacrylate is the same powder in super absorbent diapers. When water is added, the individual molecular clusters hydrate internally and expand independently, forming small, fluffy clusters that do not cling to surrounding clusters.

Insta Snow

Where to get the Insta Snow
http://www.discountschoolsupply.com/Product/ProductDetail.aspx?product=3159&es=237530000ESC&kpid=SNO-500&kpid=3159&gclid=CjwKEAjwocKtBRCf9d_Q5ovcyHASJAAHhJYOAgTiwoJ81BB9QZtI8OZ0-AvIgv3okiDheD9DtwL1UBoCrb7w_wcB

Seven Layer Density Column (extra)

What you'll need:

- Light Karo syrup
- Water
- Vegetable oil
- Dawn dish soap
- Rubbing alcohol
- Lamp oil
- Honey
- Graduated cylinder
- Food coloring
- Food baster
- 9 oz. cup

Instructions:

1. Measure 8 ounces of each type of liquid into the 9 oz cups. You may want to color each of the liquids to make a more dramatic effect in your column. Light Karo syrup is easier to color than dark syrup. The only liquids that you may not be able to color are the vegetable oil and the honey.
2. Start your column by pouring the honey into the cylinder. Now, you will pour each liquid SLOWLY into the container, one at a time.it is very important to pour the liquids slowly and into the center of the cylinder. Make sure that the liquids do not touch the ides of the cylinder while you are pouring. The layers will always even themselves out because of the varying densities. Make sure to pour the liquids in the following order.
    a. Honey
    b. Karo syrup
    c. Dish soap
    d. Water
    e. vegetable oil
    f. rubbing alcohol
    g. lamp oil
3. As you pour, the liquids will layer on top of one another.

http://www.stevespanglerscience.com/lab/experiments/seven-layer-density-column

SCIENCE ROCKS!

Name: _____

Getting To Know Your Fellow Partners

Ask your partner their name.

Then ask your partner:

"One thing you would want to invent or discover would be_____

_____

_____ because _____

_____

_____

_____."

You will be presenting your partner later in class so be prepared to share.

Trial #_____ What happened? Did you observe anything that was interesting or different or unexpected? How did change cause change?_____

_____

_____

_____

_____

_____

_____

_____

Trial #_____ What happened? How did you vary the recipe? Did you observe anything that was interesting or different or unexpected? How did change cause change?_

_____

_____

_____

_____

_____

_____

Ice Cream

What you need:

small zip lock baggie

2 large zip lock baggie

1/2 cup milk

1 Tbsp sugar

1/2 tsp. vanilla extract

4 Tbsp rock salt

2 cups ice cubes

What to do:

1. Put the milk, sugar, and vanilla extract into the small baggie with the help of your partner.

2. Seal the small baggie, make sure it is sealed completely with as little air in it as possible.

3. Place the small bag in the large bag then cover the small bag with ice and rock salt. Get all the extra air out of the baggie, then put the bags into another large baggie.

5. Shake the bag within a bag for 8 minutes total. Make sure the ice continues to cover the milk mixture bag as you shake.

7. When removing the ice cream be careful not to let the salt water contaminate your product.

Substance	Characteristics

Wet Substances

Substance	Characteristics

Combinations

Substance 1	Substance 2	Change

How did change create change?

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

How we may modify and why:

Supercooling Water #1

What you need:

Purified water freezer

What to do:

1. Place the purified water in the freezer. Get it to about 32 °F. Time varies with freezers, around 2 hours is a good start.

2. Carefully take them out, or they might transform ice crystals already. Transform the bottle by hitting it.

Supercooling Water Method #2

If you don't have a couple of hours, there is a quicker way to supercool water.

1. Pour about 2 tablespoons of distilled or purified water into a very clean glass.

2. Place the glass in a bowl of ice such that the level of the ice is higher than the level of water in the glass. Avoid spilling any ice into the glass of water.

3. Sprinkle a couple of tablespoons of salt onto the ice. Do not get any of the salt in the glass of water.

4. Allow about 15 minutes for the water to cool below freezing. Alternatively, you can insert a thermometer into the glass of water. When the temperature is below freezing, the water has been supercooled.

5. You can make the water freeze by pouring it over a piece of ice or by dropping a small piece of ice into the glass.

Bubbles

What you need:

2 cups dishwashing liquid

3cups tap water

½ cup glycerin

Bucket

Mix the dishwashing liquid, water and glycerin in the bucket to make bubble mixture. This mixture can keep and even improves over time – but you must cover the mixture.

Instant Quick Sand

What you'll need:

1 cup cornstarch A plastic cup

1/2 cup water

What to do:

1. This one is simple, just mix the cornstarch and water thoroughly in the container to make your own instant quick sand.

2. When showing the other people how it works, stir slowly and drip the quick sand to show it is a liquid.

3. Stirring it quickly will make it hard and allow you to punch or poke it quickly (this works better if you do it fast rather than hard).

4. Remember that quick sand is massy, try to play with it outside and don't forget to stir just before you use it.

What did you observe?_____

What happened when you added more water?_____

How many drops of water made the best gum drops?__

What did you learn about matter?_____

What change caused change? _____

Gum Drops

What you need:

package of Jell-O	bowl
cup of water	paper plate
dropper	fork

What you do:

1. Using the dropper, slowly add 1 to 3 drops of water to the bowl of gelatin. Count to 5.
2. Slowly swirl the bowl in a circular motion.
3. Use your fork to gently remove your results from the bowl.
4. Repeat the process. Use different amounts of drops of water. Record your results.
5. Write on the index card the ingredients and steps to make the best gum drops.

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Crazy Putty

What you'll need:

2 containers
Water
Food coloring
PVA glue (white glue)
Borax solution (1 Tbsp of borax to a cup of water)

What to do:

1. Fill the bottom of the larger container with PVA glue.
2. Add a few squirts of water and stir.
3. Add 2 or 3 drops of food coloring and stir.
4. Add a squirt of borax (possibly a bit more depending on how much PVA glue you used).
5. Stir the mixture up and put it into the smaller container. By now the mixture should be joining together, acting like putty, crazy putty!

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Lava in a Cup

What you need:

clear drinking glass

1 teaspoon salt

food coloring

1/4 cup vegetable oil

water

What to do:

1. Fill the glass about 3/4 full of water.
2. Add about 5 drops of food coloring
3. Slowly pour the vegetable oil into the glass. See how the oil floats on top?
4. Now the fun part: Sprinkle the salt on top of the oil.
5. Watch blobs of lava move up and down in your glass!
6. If you like that, add another teaspoon of salt to keep the effect going.

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Snot

What you will need:

Boiling water

Cup

fork

Corn Syrup

Gelatin

What to do:

1. Fill half a cup with boiling water.
2. Add three teaspoons of gelatin to the boiling water.
3. Let it soften before stirring with a fork.
4. Add a quarter of a cup of corn syrup.
5. Stir the mixture again with your fork and look at the long strands of gunk that have formed.

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Vanishing Milk

What you need:

rubber gloves	goggles
disposable diaper	scissors
clear glass	2 cups milk

What to do:

1. Wearing gloves and goggles, cut open the center of a disposable diaper with the scissors.

2. Scoop out the powder inside the diaper (known as sodium polyacrylate) and put it in the clear glass.

3. Pour the milk into the glass and watch what happens.

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Fantastic Foamy Fountain

You will need:

Liquid dish washing soap

1/2 cup 20 volume hydrogen peroxide liquid

Food coloring

1 Tablespoon of dry yeast

small cup

3 Tablespoons of warm water

safety goggles

Plastic bottle

What to do:

Be sure to do this experiment on a washable surface, or place the bottle on a tray.

1. Hydrogen peroxide can irritate skin and eyes, so put on those safety goggles and ask an adult to carefully pour the hydrogen peroxide into the bottle.
2. Add 8 drops of your favorite food coloring into the bottle.
3. Add about 1 tablespoon of liquid dish soap into the bottle and swish the bottle around a bit to mix it.
4. In a separate small cup, combine the warm water and the yeast together and mix for about 30 seconds.
5. Now the adventure starts! Pour the yeast water mixture into the bottle (a funnel helps here) and watch the foaminess begin!

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Invisible Ink

What you need:

half a lemon	spoon
Water	Q-Tip
bowl	lamp
white paper	

What to do:

1. Squeeze some lemon juice into the bowl and add a few drops of water.
2. Mix the water and lemon juice with the spoon.
3. Dip the cotton bud into the mixture and write a massage onto the white paper
4. Wait for the juice to dry so it becomes completely invisible.
5. When you are ready to read your secret message or show it to someone else, heat the paper by holding it close to the light bulb.

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Genie In A Bottle

What you need:

2 liter soda bottle
Goggles
30% hydrogen peroxide
manganese oxide

What to do:

1. Pour 100mL of 30% hydrogen peroxide into 2 liter bottle or container.
2. Add a pea-sized amount of manganese dioxide to the bottle or container.
3. Gaseous oxygen will be emitted from the bottle. The reaction is exothermic, the soda bottle will get hot and shrink slightly.

What I think will happen:

Our Procedure:

What happened?

In what way did change cause change?

What we learned.

How we may modify and why:

Resources

Lesson 1

Videos	Web Sites	Books	Materials
https://www.youtube.com/watch?v=2ACkc4POpaU Kids are Born Scientist Neil deGrasse Tyson http://goanimate.com/videos/09jZok8pjTCA "What is the difference between a scientist and an inventor?" https://www.youtube.com/watch?v=5AZ9ovAHpm4 "What is a scientist?" https://www.youtube.com/watch?v=VEEylsSXDlM "Top 10 dedicated scientists" some gross stuff https://www.youtube.com/watch?v=tsAHt0FiwNM "Animated lab safety" https://www.youtube.com/watch?v=_7uCcRfrQ0A "Bruno lab song parade	Google images		Containers of: corn syrup alcohol Corn Starch Water Flour Vaseline Salt soda water baking soda vinegar Science Rocks Booklet Pencil

Lesson 2

Videos	Web Sites	Books	Materials
Genie in a bottle video **https://www.youtube.com/watch?v=5q5bzHckSIM**	Science Experiments for Kids: **http://www.stevespanglerscience.com/lab/experiments/** **http://www.stevespanglerscience.com/lab/experiments/elephanttoothpaste**		Containers Hot water Food coloring Corn starch Cups, spoons, forks Gelatin Borax Corn syrup Plastic soda bottle 20% volume hydrogen peroxide Dawn dishwashing soap Yeast Funnel Foil cake pan Goggles Rubber gloves EXTRA 2 liter soda bottle 30% volume hydrogen peroxide Manganese dioxide

Lesson 3

Videos	Web Sites	Books	Materials
	Science Experiment s for Kids **http://www.stevespanglerscience.com/lab/experiments/invisibleink** **Carnegie Mellon University (experiment)** **http://www.cmu.edu/gelfand/k12-teachers/polymers/polymer-and-absorption/gelatin-gumdrops.html** **extra information and ideas for gum drops** **http://littlebinsforlittlehands.com/melting-gumdrop-science-exploring-change-heat/** **Weird Science for Kids** **http://weirdsciencekids.com/Makelavainacup.html** **Bath Salts** **http://www.dltkkids.com/recipes/mbath_salts.htm**		Lemon Water Spoons Small cups, semi opaque cups, clear cups, paper plates, spoons, forks lamp Q-tips White paper Jell-O Bowl Eye dropper Scissors Diaper Milk Vegetable oil Salt Food coloring EXTRA Plastic mixing bowl Epsom salt Sea salt Glycerin Fragrances or essential oils Colorant Liquid soap

Lesson 4

Videos	Web Sites	Book	Materials
Video for Supercooling **https://www.youtube.com/watch?v=kqJpYwJepuo**	**How to supercool water** **http://chemistry.about.com/od/chemistryhowtoguide/a/how-to-supercool-water.htm** **Where to get the Insta Snow** **http://www.discountschoolsupply.com/Product/ProductDetail.aspx?product=3159&es=237530000ESC&kpid=SNO-500&kpid=3159&gclid=CjwKEAjwocKtBRCf9d_Q5ovcyHASJAAHhJYOAgTiwoJ81BB9QZtI8OZ0-AvIgv3okiDheD9DtwL1UBoCrb7w** **Seven layer density** **http://www.stevespanglerscience.com/lab/experiments/seven-layer-density-column**	**The Book of Totally Irresponsible Science by: Sean Connolly page 184** **Stem to Story By: 826 National Edited by: Jennifer Traig page 27**	Purified water Freezer Large zip lock bags Small zip lock bags Sugar Milk Vanilla extract Rock salt/Ice Cups dishwashing liquid water glycerin 2 gallon bucket Small wading pool Plastic hula hoop Swimming goggles Small stool EXTRA Insta Snow Powder Small cup Water Light Karo syrup Water Vegetable oil Dawn dish soap Rubbing alcohol Lamp oil Honey Graduated cylinder Food coloring Food baster 9 oz. cups

Resources

Web Sites:

Chemistry for Kids. (n.d.). Retrieved July 24, 2015.
Dltkkids.com. (n.d.). Retrieved July 24, 2015.
Gelatin Gum Drops-Gelfand - Carnegie Mellon University. (n.d.).
Google Images. (n.d.).
Helmenstine, P. (n.d.). How to Supercool Water - Two Methods. Retrieved July 24, 2015.
Insta-Snow®. (n.d.). Retrieved July 24, 2015.
Make Lava In A Cup. (n.d.). Retrieved July 24, 2015.
Melting Gumdrop Science Exploring Change. (2014, December 9).
Steve Spangler Science. (n.d.).

Books:

Connolly, S. (2008). *The book of totally irresponsible science*. New York: Workman Pub.
Traig, J. (n.d.). *STEM to story: Enthralling and effective lesson plans for grades 5-8*.

Videos:

https://www.youtube.com/watch?v=2ACkc4POpaU Kids are Born Scientist Neil deGrasse Tyson
http://goanimate.com/videos/09jZok8pjTCA "What is the difference between a scientist and an inventor?"
https://www.youtube.com/watch?v=5AZ9ovAHpm4 "What is a scientist?"
https://www.youtube.com/watch?v=VEEylsSXDlM "Top 10 dedicated scientists" some gross stuff
https://www.youtube.com/watch?v=tsAHt0FiwNM "Animated lab safety"
https://www.youtube.com/watch?v=_7uCcRfrQ0A "Bruno lab song parade
https://www.youtube.com/watch?v=5q5bzHckSIM "Genie in a Bottle"
https://www.youtube.com/watch?v=kqJpYwJepuo Supercooling water