Hidden Science in Colonial Living

Standard I:
Students will understand that chemical and physical changes occur in matter.

Objective 2:
Evaluate evidence that indicates a physical change has occurred.

Objective 3:
Investigate evidence for changes in matter that occur during a chemical reaction.

Intended Learning Outcomes:
4. Communicate effectively using science language and reasoning.

Content Connections:
Social Studies II-2; United States motivating expansion.
Language Arts Vll-3; Apply strategies to comprehend text.

Science Standard I

Objectives 2&3

Connections

Background Information

When settlements were first established in the colonial period and eventually during the western expansion, they all began by growing their own food and making the things they used everyday. Children grew up helping grow the food and making the necessary items for survival and passed these skills onto their own children.

Many of the things that these early settlers made were science related. One could say that they were scientists in their own rights. All of the items they needed were made from matter. Some items went through a physical change and some went through a chemical change. Things such as candles, bricks, soap, butter, bread and woolen items that they made daily, weekly, or monthly fall into the categories of physical or chemical changes.

Research Basis

Black, R. (2005). Why demonstrate matter? *Science and Children,* Vol. 44 (Number 1), page 56.

It is still a good practice to have teacher-centered demonstrations in the classroom. Children get excited when they see unfamiliar objects in front of them that they know are going to part of a science experiment. Careful planning and questions techniques give the teacher more control for the students to understand the results.

Enfield, M. (2007). Discussion maps make sense. *Science and Children,* Vol. 44, No. 5, pp. 46-49.

Discussion can be useful for teachers in evaluating students' ideas. Discussion offers windows for teachers to help understand student thinking. Through discussions, students can express their ideas. Some

students feel more comfortable during a discussion than during any other school task. The "discussion map" lets a teacher gain insight into the students' level of participation and helps the teacher get an idea if the student understands the concept taught.

Materials

- ❑ Bar of soap and/or picture
- ❑ Candle and/or picture
- ❑ Something made of wool and/or picture
- ❑ Bread and/or picture
- ❑ Butter and/or picture
- ❑ Brick and/or picture
- ❑ *The Story of Soap*
- ❑ *The Story of Candles*
- ❑ *The Story of Wool*
- ❑ *The Story of Bread*
- ❑ *The Story of Butter*
- ❑ *The Story of Bricks*
- ❑ Graphic organizers
- ❑ Journals
- ❑ *Physical Change or Chemical Change*

Invitation to Learn

Show the students a bar of soap, candle, loaf of bread (uncut if possible) bar of butter, brick, and something made of wool. (You could use pictures, too, if the items are not available.)

- Ask the students, "If you wanted any of these items, where would they get them?" (From a store.)
- Ask them, "What if there were no stores around, what would you do then?" (They would have to make them themselves.)
- Ask, "Where would you get the materials to make them?" (Some may know the answers that candles come from tallow or wax, bread comes from wheat, butter comes from cream, bricks are made of clay, wool comes from the hair of sheep, and soap is made from lard and lye.)
- Ask, "How would you know how to make them and where to get the materials? (Their parents told them. These learned the survival skills they needed and passed them down from generation to generation.)
- Ask, "How is making these things part of science?" (They needed to figure out how to make these items by experimenting with them. They put ingredients together to make a new substance. They made these items look different from their beginning sources.)

Tell them that for the next couple of days they are going to read about each item to know the history of each and how they were made. They will find out where the materials were found and the process used to make them.They will record some findings in their journals and other findings on graphic organizers. When they are done reading and writing about the items, have the students write how the making of these items relates to science and the changing of matter to a different form by way of physical change and chemical change.

Instructional Procedures

1. Divide the students into six groups.
2. Put each of the listed items at a different station with the product and/or picture with the related reading.

3. Appoint each group to a station. Have the students read about the item and discuss the item.
4. Have the students use a graphic organizer to write down their findings of the history of the item and how it was made. Have them note at the bottom of each sheet how making it relates to changing matter. They can also write things that were interesting to them in their journals.
5. Have them rotate to the next station and do the same thing until they are done with all six stations. (This activity may take two or three days to study each product and write about it.)
6. When the rotations are done, have the students share what they learned.
7. Ask them to also share how each of these items not only has to do with social studies but how science is involved in making each of these items.
8. Have them write in their journals whether each product is made by a physical change or chemical change.

Assessment Suggestions

- Review the graphic organizers to make sure students have written down the important topics and explanations while at each center.
- When the students are done with the centers, have a discussion looking for proper answers and minimizing misconceptions.
- Show the pictures of the items and have the students write the process that is used to make each item (informal assessment).
- Have a discussion about how making these items have to do with changing matter in the form of a physical or chemical change.
- Have the students complete the *Physical Change* or *Chemical Change* worksheet.

Curriculum Extensions/Adaptations/ Integration

- All learners can do more research on the daily living in colonial days and what the colonists did each day for survival. They can present what they have learned with displays and reports.
- Advanced learners can learn about inventions from various times in history to make the work easier.

- Learners with special needs can work with others when researching the daily life of the colonists.
- Learners with special needs can look and touch the products in the centers to understand their uses in the home.
- Have the students read the book *If You Lived in Colonial Times* by Ann McGovern. Have them list the things that the colonists made. Have them speculate whether the final product was a physical or chemical change.

Family Connections

- Send pictures and the graphic organizers home of the items that were in the centers and have the students explain to their families what each of them is and how the colonists made them.
- Have the students talk to their families about how science is very important in our world and that just about everything that we make or purchase has to do with a scientific process of discovery. Have them come back with a list of items found in their homes that we use each day that are a product of science.

Additional Resources

Books

Colonial Living, by Edwin Tunis; ISBN 9780801862274 (Paperback)

If You Lived in Colonial Times, by Ann McGovern; ISBN 059045160X (Paperback)

If You Lived *In Williamsburg in Colonial Days,* by Barbara Brenner;0590929224 (Paperback)

Web sites

http ://brebru.com/webauests/colonialtimes/!ict/lict_html_

http://www.lodi.kl2.wi.us/schools/es!lmc/gr5Colonial.htm

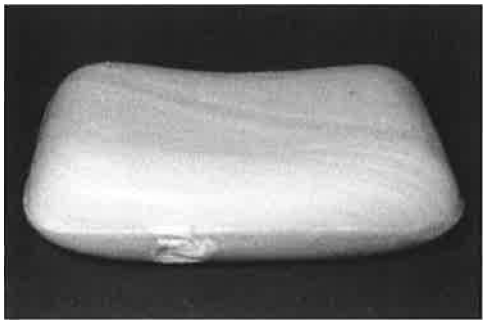
http://ri.essortment.com/coloniallifeco_mdd.htm

http:/ag.al15c.purdue edu/sheep/ansc442/SemproJs/2003/sweaterr/front.btrn

Organizations

Williamsburg, http://en.wikipedia org/wikVColonial_Williamsburg

The Story of Soap



Making soap in colonial days was a hard job. Soap was made from grease and lye. All kinds of fats were saved for soap making. The ends of tallow candles, deer and bear oil, and other fats went into the grease barrel. Salt was taken out of the grease by washing it in hot water and letting it stand until the clean grease came to the top, leaving the salt in the water at the bottom.

Lye for the soap was also made at home. Ashes from hardwoods such as oak and hickory were saved in a barrel that had clean straw on the bottom. When water was poured in at the top of the barrel and allowed to trickle through the ashes, an alkaline solution called lye was formed. The lye dripped through a small hole at the bottom of the barrel and was collected in a bucket or barrel placed beneath the ash barrel. Putting an egg into it tested the lye. If the egg floated, the lye was just strong enough to use. This way of making lye was called leaching.

Soap was made in the spring with the grease and ashes saved during the winter. It took about 24 pounds of grease and the lye from six barrels of wood ashes to make a barrel of soft soap. Lye was put in the soap kettle on an open fire out of doors. The grease was slowly added until no more would mix with the lye. The soap was cooked until it was jellylike. The mixture had to be stirred for a long time. The children helped with this. Colonial women were very good at soap making and could tell just how much grease to use and how long to cook the mixture. When the cooking was finished, the soap was cooled and stored in barrels. Sometimes hard soap was also made. To make hard soap, a brine or salt solution was added to the grease and lye. The soap rose to the top of the kettle. When it had cooled, it could be made into bars. A year's supply of soap was usually made at one time.

The Story of Bricks

Bricks are the oldest manufactured building material. The first types of bricks were sundried bricks. Sundried bricks, similar to adobe brick, were used in ancient Babylonia, Assyria, and Egypt as early as 4,000 B.C. The chief occupation of the Israelites during their captivity in Egypt was making sun-dried bricks from clay taken from the Nile River. Later, it was discovered that if the dried bricks were put into an oven it gave them greater strength and endured the harshness of the weather. Colonial sundried bricks were first made in Virginia as early as 1612. For the next 300 years, bricks were used to pave streets and sidewalks, and to build chimneys.

Sundried bricks were usually made from clay. After the clay was dug out, it was crushed into a fine granular substance. Enough water was mixed with the clay to make a soft paste to be able to shape the mud. Straw was added to the mud and mixed in to give the brick strength. After the straw was added and the soft paste mud was wet throughout, the mud was ready to be put into a mold. Molds were dipped in water and then sprinkled with sand. The sand acted as a lubricant so the brick-shaped mud could be easily pushed out of the mold. The mud was packed into the mold. IL was then pushed out of the mold as the-shape of a brick. The mud brick was put in the sun and allowed to dry in the sun. The hotter the sun, the stronger the brick would be.

The same process made oven-baked bricks. When the bricks were dried throughout, they were stacked in ovens called kilns, which were heated by fire. The temperature in the kiln was increased slowly until it reached 1600 degrees to 2000 degrees or higher, depending on the kind of clay used. The clay particles became partly melted and fused together, making the brick hard and strong.

The Story of Candles

At first some families had only the light from their fireplaces. A few people burned pine knots or candlewood. Pine knots were the part of the pine tree where branches grew out of the trunks. They were full of pitch and burned brightly. They were usually burned in the fireplaces or over a flat stone so that the sticky pitch would not drip on the floor. The inside of the trunk of the pine tree was called candlewood. It was cut into little sticks that were burned for light. Pine knots and candlewood makes a smoky, dripping light because of the pitch in them, but they gave brighter light than other kinds of burning wood. The inside (or pitch) of plants called rushes was sometimes soaked in grease and burned. Such a light was a rushlight.

As soon as they could, people tried to make lamps. Getting a wick and twisting it around a stick in an open dish or saucer filled with some sort of grease or oil made an early lamp. This was called a saucer lamp. If there was no dish that could be used for a lamp, a vegetable lamp was made by hollowing out a turnip, beet, or potato and putting in a wick. The hole was filled with grease and the wick was lit. Some lamps were made of metal or clay. Some had spouts in which to put the wick and chain hooks so that they could be hung. The hooks could be stuck in the log wall of the cabin. Some of these samples were called Betty lamps.

People found that the best type of candles were those made from tallow or beeswax. They were shaped with a wick down the center. Tallow came from the fat of sheep, cows, or deer. Sometimes beeswax was added to tallow to make the candle harder. One method was to dip a piece of string called the wick into hot tallow. It was dipped again and again. Each time it was dipped, a little more tallow stuck to the wick until the candle was the desired size. These candles were not made one at a time. Wicks were doubled, twisted, and hung on smooth wooden sticks called candle rods. Six or eight wicks were put on each rod. Two straight back chairs were set with the backs facing each other. Two long poles were placed parallel to each other across the backs of the chairs. The candle rods were laid across the poles like the rungs of a ladder. Boards were laid on the floor underneath to catch any wax that dripped down.

Most of the candles were used in the winter. In summer, people got up very early in the morning and went to bed when it was too dark to see without light. Even in winter, candles might not have been used expect for very special occasions. Candles were sometimes placed in lanterns that could be carried from place to place. Some lanterns had glass sides. Other lanterns were made of tin with little holes through which the light was emitted.

The Story of Butter

Butter is the fat of milk in its solid form, principally, from the milk of cows, sheep, and goats. When or where man first learned to concentrate this small portion of milk and utilize it as a semi-storable and high-energy food is unknown. One of the earliest methods of butter making was to fill skin pouches with milk and throw the pouches over the backs of horses. When the horses were made to trot, the milk was agitated and formed butter. Later, as butter became a staple food, various types of churns were devised. These consisted of swinging, rocking rotating barrels, boxes, or cylindrical vessels that had dashers or plungers. The Hindus used butter as a food as early as 2000 B.C. The Scythians and the Greeks used it in the 5th Century B.C. In Europe the making of butter for food was probably introduced very early through Scandinavia. Certainly, it has long been used and relished by man as a spread, in tea, and as a cooking fat.

The Jamestown colonists, who brought the first dairy cows, introduced butter making into America in 1607. The first step in producing butter is to separate the cream from the milk. This was done by placing the milk in pans to let the cream rise to the top. Separated milk is the product from which nearly all the cream has been removed. At this point, the cream that had been collected was allowed to sour by being kept it at room temperature for about a day. This allows the lactic acid bacteria to grow and ripen the cream. The cream was then put in the butter churn and mixed as fast as a person could pull and push on the handle. This continued until the butter formed in the churn where the cream had turned into a solid and a thin liquid.

This thin looking liquid that was left in the churn was buttermilk, the non-fatty part of the cream. It was drained off, and cold water was added to the butter in the churn. The water flushed out any remaining buttermilk. If excess buttermilk was not removed, the butter would spoil. After the water was drained away, salt was added to preserve the butter.

The Story of Bread

Bread is the oldest of all the foods manufactured by man. It also ranks as the most widely eaten, and is often called the staff of life. For thousands of years, people throughout the world have eaten bread in its many different forms. The earliest breads were hard and flat. They were made from a mixture of ground grain and water, and baked in the sun or on hot rocks. Most bread today are leavened, or raised with yeast, baking powder or baking soda.

The bread most widely eaten in the United States is white enriched, sliced and wrapped loaf. But bakeries in most parts of the country also make a wide variety of other breads. These include whole wheat, cracked wheat, light and dark ryes, pumpernickel, and Swedish, French and Italian loaves. Corn bread or corn pone is especially popular in the South. Special breads contain nuts, raisins, dates or cinnamon.

Farmers in the United States grow many different kinds of wheat and other grains to make the flours necessary for the various kinds of breads.

People of other countries prefer different kinds of bread. In the Orient millions of people eat bread made from rice. In Scotland, oatcakes and bannocks made of barley meal are popular. The peoples of Central America enjoy tortillas, or flat cakes of cornmeal dough baked on a non-greased griddle. West Indians make bread flour from the roots of the cassava plant.

Seeds from various wild grasses were long used as foods. Many grains, including oats, corn, barley, rye and rice have been made into breads. Each gives the bread a distinctive taste, color, and texture, but wheat and its ancestors made the most popular breads.

Man found that he could plant seeds that grew and multiplied. He settled in regions where grains grew well, such as the valleys of the Tigris and Euphrates rivers in the Near East.

The Egyptians are usually credited for making the first leavened bread. Leavening changed the character of bread completely. From a hard flat loaf, it became soft, light, and filled with air. Spores from the yeast plants floating in the air may have settled on some of the baker's dough. The yeast fed on the sugars in the mixture and grew. They could not escape from the thick dough, so the multiplying cells expanded the mass into a larger, lighter, more porous substance. The Egyptians also built the first ovens. The lighter bread needed a heated, enclosed area so that the larger mass of dough would bake through. The principles used in making breads are still followed today.

The Story of Wool

The first settlers that came to the United States eastern region brought sheep with them. Even Captain John Smith and his follower brought sheep with them when they settled in Virginia. Soon the number of sheep in the United States eastern region began to grow. From the wool of the thick coats of their sheep, the colonial women wove their blankets and clothing and made the long warm stockings worn by men and women.

As more and more people came to the United States region, more and more woolen cloth was needed. Luckily there were great spaces of land where more sheep could be pastured.

The first step of the colonists in making woolen cloth was shearing the sheep. They were sheared at least once a year with something that looked like large scissors called shears. The whole woolly coat was cut off. If it were cut evenly the fleece would hang together in one piece. Next it needed to be washed since the wool is very greasy and full of sand and dirt. The wool was usually washed in a nearby stream. When it was washed it left the fibers all kinky and tightly matted together. The next step was to straighten out the wool so it would be fluffy and easy to spin. A pair of hand carders straightened it out. Hand carders are small tools with Wire-teeth on o-ne side. The wool was placed between the two carders and drawn back and forth through the teeth until it became a soft, fluffy roll (bunch) of wool ready to be spun into yarn.

There were two ways of spinning yarn. It could either be done by spinning by hand or by a spinning wheel. The colonists spinning by hand tied their "bunch" of carded wool to the thick stick. Then, pulling out tiny tufts of fibers from the wool with the stick, they twisted the wool into thread between their thumbs and fingers. They took the twisted wool off the stick and fastened it to a weight. When the weight was dropped, it dropped slowly towards the ground as the strands of fibers were slowly let out of the "bunch" of wool. As it dropped closer to the ground it also spun. This spinning twisted the strand of wool and drew it out into yarn. When the weight reached the ground, the spinner picked it up, wound up the yarn, and continued the spinning process.

The spinning wheel made yarn much faster. A four-foot wheel was spun by one hand. The four-foot wheel, in turn, spun a smaller wheel with a band made of twine and twisted yarn. Projecting from the small wheel was a spindle that turned very swiftly. With a "bunch" of carded wool in the other hand, fibers of the wool would be connected to the spindle. As the spindle turned, the colonist maneuvered the wool so that a small strand slowly came out of the "bunch". As the fibers wrapped around the spindle it also twisted the strands into yarn at the same time. Making twists in the yarn made it very strong.

Physical change or Chemical Change

Everything that is made is either a physical change or a chemical change. Now that you have read about each of the products and written about how they were made by early colonists, make an educated guess whether you think the product is a physical change or chemical change and tell why you think this. (Some of them may involve both a physical change and chemical change in the process.)

1. Making Soap _____

_____

2. Making Bricks _____

_____

3. Making Candles _____

_____

4. Making Butter _____

_____

5. Making Bread _____

_____

6. Making Yarn _____

_____

Changing Matter in Colonial Days

Science Standard I

Objectives 2 & 3

Connections

Standard I:

Students will understand that chemical and physical changes occur in matter.

Objective 2:

Evaluate evidence that indicates a physical change has occurred.

Objective 3:

Investigate evidence for changes in matter that occur during a chemical reaction.

Intended Learning Outcomes:

1. Use science process and thinking skills.
2. Manifest science attitudes and interests.

Content Connections:

Social Studies Il-2; United States motivating expansion.
Language Arts Vlll-6; Write in different forms

Background Information

In the early colonial times of the 17th Century, everyone was mostly responsible for growing, making, and constructing their own things for survival. This included building cabins and digging wells. They made furniture, doors, latches, toys and tools. They grew their own crops, learned how to cook food, and learned how to store the food and crops to make them last through the winter. They needed bricks for their chimneys, walkways, fireplaces, and roads. Soap and candles were necessary for their cleanliness and for light at night. They also had to learn the great art of making cloth from plants and wool to make clothes. It was truly ingenious how the colonists and their predecessors discovered how to make some of these products. Certain tools were also discovered for the need of making the products.

As we think about the things they made, we can see that they all started from raw matter. This raw matter was changed into a useful product. Some of the "raw matter" went through a physical change and some of the "raw matter" went through a chemical change. The hard part was producing the items by hand with their hand tools. Even today, each finished product starts from raw matter and is changed into a useful product through physical and chemical change. However, today we have other forms of energy and more sophisticated tools.

In the student readings, the students were able to see what "raw matter" was used to make some useful products in colonial days. The students read about the tools that were needed to make these products. They saw that in most cases it was hard, long work.

In the following activities, the students will experience making some of these products. They will rotate through four stations and make the products or observe the products being made. They will experience how colonial people made candles, soap, adobe bricks, and yarn to make cloth in these rotations. Students will personally make some of these products from raw matter, and some will be made by a teacher demonstration for the purpose of safety. Students will keep a record in a journal of how the product was made and what they discovered. They will also see whether the product was produced by a physical or chemical change.

Research Basis

Myhill, D. (2006). Talk, talk, talk: teaching and learning in whole class discourse. *Research Paper in Education,* Vol. 21, No. 1, pp. 19-41

It is important that teachers don't take up too much of student learning time by talking that limits opportunities for pupil learning. Teachers are encouraged to only take up about 15 minutes of whole class time. Teachers are encouraged to use questions for student interaction with each other for discussion and discovery. The teacher only acts as a facilitator during the student learning time. Teachers are also encouraged to have students work in groups to learn from each other.

Bransford, JD., Brown, A.L., & Cocking, R. R. (Eds).(1999) *How people learn: brain, mind, experience, and school.* Washington, DC: National Academy Press

Hands-on learning provides the students with kinesthetic, auditory, and visual learning. As students perform hands-on tasks, they make learning happen for themselves. They learn quickly from their experiences. They begin to make a connection to their world. As this approach is being taught the students learn through the process of inquiry. The teachers should ask many questions during science lessons to make students' thinking process complete.

Invitation to Learn

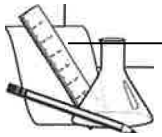
Explain to the students that when a colonial town was established, some colonists wanted to earn money by having a business instead of farming all day. They had shops making products that colonists needed on a regular basis. From the back of the book *If You Lived in Colonial Times* read out loud some of the stories of what the workers made. Ask questions as to where they got the raw matter to make these products. Ask questions of how the raw matter changed into new products. Students might be able to speculate how the products were made from beginning to the end. Ask questions if the products are a result physical or chemical change.

There is one story about the blacksmith in the book. The blacksmith was the most popular citizen in the town because he knew how to make iron that was strong. The making of iron is a chemical reaction ($Fe_2O_3 + 3CO = 3CO_2 + 2Fe$). He could make it into any shape by request with hot coals. Below is some background information that will help them understand how iron was made.

"The basic materials to make iron are iron ore, coke (made by breaking down coal by heating it), and lime (from limestone). The iron ore, coke and lime are put into a furnace. The main purpose of the coke is to use it as a fuel to heat the furnace. As the iron ore melts and the coke burns, the oxygen in the iron ore and the carbon from the coke combine to form carbon dioxide gas. This gas escapes from the furnace leaving a metallic product called pig iron. This pig iron still has impurities, which makes weak iron. The purpose of the lime is to aid in the removal of any unwanted impurities in the pig iron such as silicon and phosphorus. The lime produces more carbon monoxide and combines with these unwanted impurities and produces "slag". This slag is in the form of a solid. Even though the slag is a solid, it is lighter than the liquid iron and forms on the surface of the li4uiu iron. The slag is then lifted off the top of the liquid iron. What is left in the furnace is almost pure iron."

Materials

- ❑ Pictures of process
- ❑ Ash hopper picture
- ❑ Student journal
- ❑ *Notes on Making* ____
- ❑ Store soap
- ❑ Hand-made soap
- ❑ Extension cord
- ❑ Heating unit
- ❑ Measurement Cup
- ❑ Stainless steel pan
- ❑ Steel pot
- ❑ Wooden spoon
- ❑ Soap mold pan
- ❑ Rubber gloves
- ❑ Safety glasses
- ❑ Lye
- ❑ Lard
- ❑ Cold water
- ❑ Digital scale



Instructional Procedures

Activity One Station - Making Soap, Chemical Change

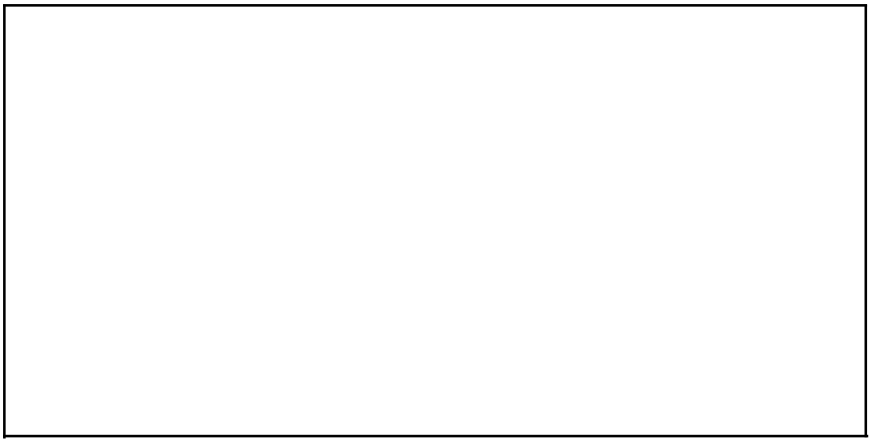
Pre-activity

1. Have students take out their journals for the review.
2. Review what the students learned about how colonists made soap.
3. Discuss how colonists found the materials and tools for making soap.
4. Show a picture of the "soap making" setup and the ash hopper and have a discussion about their uses.
5. Show the container of lye. Discuss why lye was put in the soap. (For disinfecting.)
6. Show the box of lard. Discuss why lard was put in the soap. (For cleaning.)
7. Show a sample of the real lye soap with today's soap. Pass them around and have them discuss what they observe as differences between the two students.

8. Pass out the activity sheet *Notes on Making* _____. (Have students put *Soap* on the line.)
9. Have the students write the tools needed to make soap. Explain why each is needed and have them write the reasons.
   a. Heating unit (for heat)
   b. Measuring cup (for measuring the ingredients)
   c. Stainless steel pan (for making the lye water)
   d. Steel pot (for making the soap)
   e. Wooden spoon (for stirring the ingredients while it cooks)
   f. Soap mold (for shaping the soap)
10. Have the students write down the ingredients needed to make soap. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.
    a. 1/2 pound lard (for cleaning)
    b. 2/5 cup lye (for disinfectant)
    c. 1 cold cup water (making lye water)
11. Have the students put on their safety glasses.

Making the Soap (This needs to be done outdoors.)

1. As the soap is being made, have the students write the procedure on their activity sheet.
2. Put 1/2-pound of lard in the steel pot.



3. Put the steel pot on a heating unit on high heat to melt the lard. Ask students, "What type of change is this when the lard melts? Explain." (Physical-it is just changing form but is not a new product.)
4. While it is melting make the lye water. Put the water into the stainless steel pan. Let them feel that the water is cold. Pour

the lye into the cold water. Stir it until the lye is dissolved. It will begin to show steam coming from the pan. Ask them, "What type of change is happening in the pan? Explain." (Chemical-it is giving off heat.)

5. When the lard is melted and it's not too hot, slowly pour in the lye water.
6. Stir the mixture constantly over medium-high heat for about twenty minutes until the soap is bubbly and creamy like that of a thin milkshake.
7. During the twenty minutes it is cooking, talk about the importance of soap during colonial times. (It kills germs, cleans off dirt, keeps us from smelling bad, makes people look clean, keeps things sanitary, etc.)
8. Also during this twenty minutes, have the students list at the bottom of the activity sheet what the colonists used the soap for. (Wash hair, hands, body, dishes, clothes, tools, animals, cabin, etc.)
9. When the soap gets to be quite thick and bubbly, pour the soap into the soap mold (bread pan). Get as much out as your can.
10. Ask students, "What type of change is this? Explain." (Chemical-a new product is made.)
11. Explain to them that the lye is no longer lye and the lard is no longer lard. They have mixed as a chemical change where a new product is made for cleaning.
12. Have the students write down their special observations and thoughts about making soap.
13. Have the students write down on the activity sheet what kind of a change it is and explain why.
14. The next day take the soap out as a whole piece. Weigh it. Ask them, "Does it weigh the same as the sum of the three ingredients put in?" Have them write their conclusion. (No, but it is close. Some of the water evaporated and not all of the soap was taken out of the pan.)
15. Cut the soap into eight squares.
16. The squares need to be set aside for about a month. (There is a residue of a weak lye solution on the cubes. It is not harmful, but can sting the skin. Setting the lye aside for the month lets the lye solution evaporate. It does work like soap.)

Activity Two Station-Making Sundried Bricks, Physical Change (baked in sun); Chemical Change (baked in oven)

Pre-activity

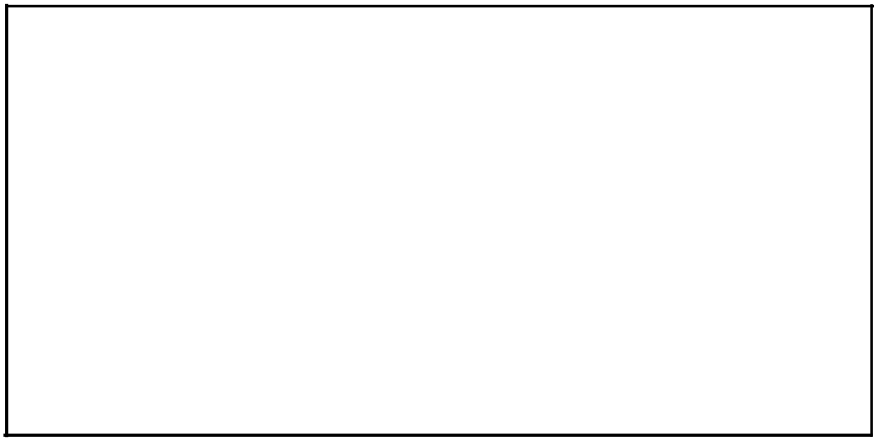
1. Have students take out their journals for the review.
2. Review what the students learned about how colonists made sundried bricks.
3. Discuss how colonists found the materials and tools for making sundried bricks.
4. Show pictures of colonists making sundried bricks and discuss the pictures.
5. Pass out the activity sheet *Notes on Making* _____. (Have students put *Sundried Bricks* on the line.)
6. Have the students write the tools needed to make bricks. Explain why each is needed and have them write the reasons.
   a. Bowls (mixing in)
   b. Brick mold (shaping the brick)
   c. Measuring cup (for measuring the ingredients)
7. Have the students write down the ingredients needed to make bricks. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.
   a. 1 cup clay dirt (main ingredient)
   b. 1/3 cup water (for making mud)
   c. Handful of straw (for strengthening the brick)
   d. Sand (to use as a lubricant)
8. Have the students put on their safety glasses.

Making the Sundried Bricks

1. Put the 1cup of clay dirt in the bowl.
2. Put 1/3 cup of water in the bowl. Mix it together until it has the consistency of bread dough. (If more water or more dirt is needed, weigh it out first then add it.) Ask students, "What type of change happened? Explain." (Physical-it is just changing form but not a new product.)
3. Once the water is mixed with the clay dirt, add a small handful of cut up straw. Ask, "What type of change is happening in the bowl? Explain." (Physical-it is just changing in looks but not a new product.)

Materials

- ❑ Pictures of process
- ❑ Student journal
- ❑ *Notes on Making* _____
- ❑ Store brick
- ❑ Hand-made clay brick
- ❑ Brick mold
- ❑ Measurement cup
- ❑ Deep bowls
- ❑ Sand
- ❑ Clay dirt
- ❑ Straw, cut up
- ❑ Water
- ❑ Digital scale



4. Wet the mold with water and sprinkle sand on it.
5. Put the brick dough into the mold. Press as hard as you can with your hand to compact the brick dough.
6. Shake out the brick while it is still wet. It should come out easy because of the sand.
7. After the students make their bricks, have them write the step-by-step procedure.
8. Have the students write down the colonists' uses of the bricks.
9. Have them write down any special observations and thoughts they had while they were making the bricks.
10. Let them bake in the sun for two days - one day on one side and one day on the other side.
11. After two days, weigh the bricks. Ask them, "Does it weigh the same as the ingredients added together? Explain." (No. The water has evaporated.)
12. Ask them, "What type of change is this? Why? (Physical change--the ingredients are still the same-clay and straw)
13. Have the students write down on the activity sheet what kind of a change it is, and explain why.
14. Ask, "What type of a change is it if the brick was put in an oven? Explain." (Chemical change-the clay melts and combines together with the other clay particles and becomes a new product. It is much more solid and stronger.)

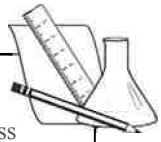
Activity Three Station - Making Candles, Physical Change (making), Chemical Change (burning)

Pre-activity

1. Have students take out their journals for the review.
2. Review what the students learned about how colonists made candles.
3. Discuss how colonists found the materials and tools for making candles.
4. Show pictures of colonists making candles and discuss these pictures.
5. Pass out the activity sheet *Notes on Making*_____. Fill in the blank with *Candles.*
6. Have the students write the tools needed to make candles. Explain why each is needed and have them write the reasons.
   a. Three tall VS cans (one to heat the hot wax; one to hold hot wax; one to hold cold water)
   b. Hot plate (used to melt the wax)
   c. Sauce pan (used to hold hot water to heat the hot wax can)
7. Have the students write down the ingredients needed to make candles. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.
   a. Paraffin wax (main substance of the candle)
   b. Wick (string, for the wax to build on and to light)
   c. Hot water (to create a double broiler to melt the wax)
8. Have the students put on their safety glasses.

Making the Candles

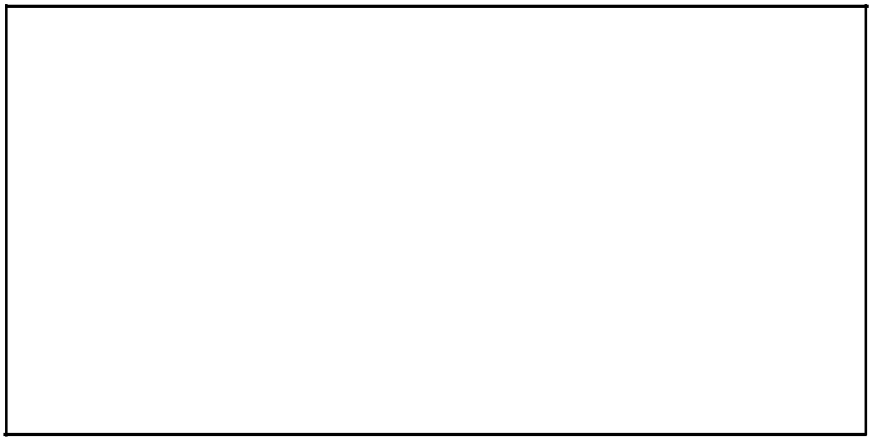
1. Plug in hot plate and set the hot plate on high.
2. Fill a saucepan half filled with water.
3. Fill a V-8 can with broken pieces of cold wax. Place it in the saucepan.
4. Set the saucepan (with the V-8 can filled with cold wax in it) on the hot plate.
5. When the water begins to boil, turn the heat down a bit so it isn't boiling as hard, but still boiling.
6. At this point the wax will begin to melt and continue to melt.



Materials

- ❑ Pictures of process
- ❑ Student journal
- ❑ *Notes on Making* _____
- ❑ Store candle
- ❑ Hand-made candle
- ❑ 3 - VS cans
- ❑ Hot plate
- ❑ Sauce pan
- ❑ Paraffin wax
- ❑ Wick
- ❑ Hot water
- ❑ Cold water
- ❑ Digital scale

7. Add more hard wax to the can until the wax almost fills the can. (Weight each one.)
8. Give it about 30 to 45 minutes to get a can full of hot wax.
9. At this point put it on simmer until ready to use.
10. Give a wick to each student, the length being a little longer than the length of the V8 can.

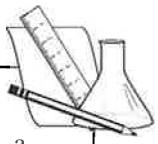


11. Fill the second V8 can with cold water and put it on a table with paper on it for easy clean up.
12. When ready to dip candles, take the hot wax can out of the simmering water and place it on a table next to the cold water.
13. Heat up some more wax in the third V8 can. (Weigh out each piece.) (As the hot wax can on the table gets low, put some more hot wax in it from the hot wax can on the hot plate.)
14. Dip the wick into the hot wax can. Pull it out of the wax and dip it into the cold-water can. This hardens the wax on the wick.
15. Repeat this procedure many times until you attain the desired size of the candle.
16. If the candle becomes crooked, it can be rolled across a smooth surface.
17. Have the students weigh their candles. Add the weight of each candle. See if the total matches the weight of the wax used.
18. After the students make their candles, have them write the step-by-step procedure.
19. Ask the students, "What type of change is this? Explain" (Physical change. The wax only changed form.)

20. Have the students write down the uses of the candles by the colonists.
21. Have them write down any special observations and thoughts they had while they were making the candles.
22. Have the students write down on the activity sheet what kind of a change it is, and tell why.

Activity Four Station-Making Yarn for Weaving, Physical Change

This will make enough yam samples for every student.



Materials

- ❑ Pictures of a loom, a spindle, sheep sheers, sheering sheep, spinning wheel
- ❑ Student journal with reading notes about yarn
- ❑ *Notes on Making* _____
- ❑ Store bought yarn and home spun yarn
- ❑ Large scissors
- ❑ 2 Wool carders
- ❑ Drop spindle/wire hook
- ❑ Cardboard
- ❑ Skeen of yarn
- ❑ Wool, unprocessed
- ❑ Paper towels
- ❑ Digital scale

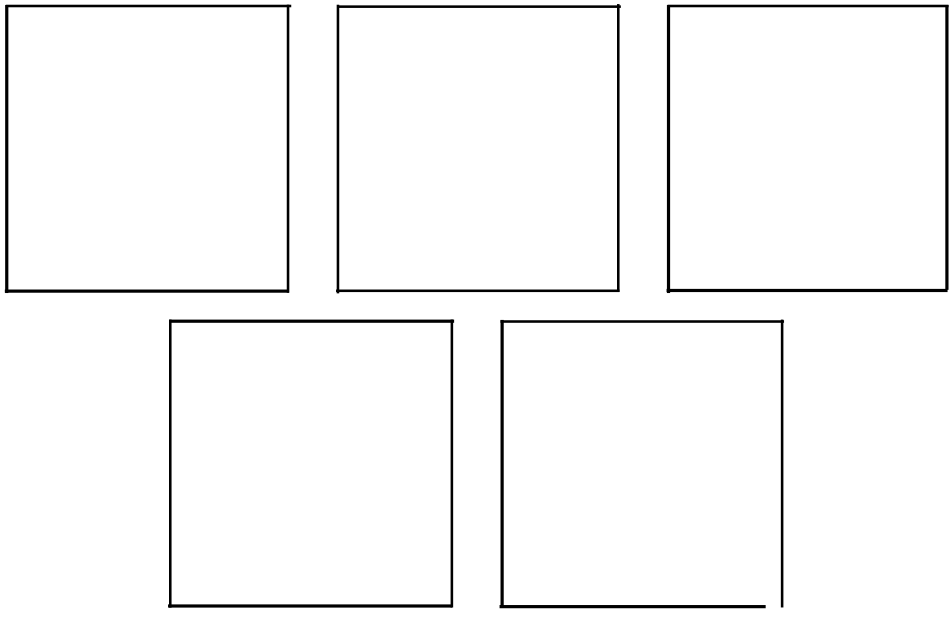
Pre-activity

1. Have students take out their journals for the review.
2. Review what the students learned about how colonists made yarn.
3. Discuss how colonists found the tools and materials for making yarn.
4. Show the process of how colonists made yarn by showing the pictures in order of the production. Have a discussion about this process.
5. Pass out the activity sheet *Notes on Making* _____. Fill in the blank with *"Yarn".*
6. Have the students write the tools needed to make yarn. Explain why each is needed and have them write the reasons. Weigh out the ingredients and record the weight.
   a. Sheep shears/big scissors (to cut the wool off the sheep)
   b. Bowl (to wash the yarn)
   c. Soap (to wash the yarn)
   d. Wool carders (to make the wool fluffy)
   e. Spinning wheel spindle (to spin the fluffy wool into yarn)
   f. Loom (to make clothing)
7. Have the students write down the ingredients needed to make wool. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record it.
   a. Wool from the sheep (main substance)

Making the Yarn

1. Cut a piece of wool from the large piece of wool. Weigh it and record it.

2. With the warm water and soap, gently wash the wool so it is clean.
3. Gently dry the wool with a paper towel. Be sure to remove all the moisture.
4. Put the piece of wool on the carders. With the carders on top of each other and opposite each other, pull out and away. Put them on top of each other and pull away again. Repeat many times. Every once in a while, fix the wool on top of the carders. Keep repeating this until the wool is fluffy. Weigh it to see if the weight is the same.
5. Pull out a small tuft of wool. Hook it onto the wire hook.
6. With the help of another person, have the other person spin the wire hook. As the wire hook is being spun, gradually let out small bits of wool. Try not to get it too thick or too thin. Keep doing it until the wool is gone. Wool yarn has just been made.
7. Have the students weigh their wool yarn pieces. Add them up. See if the total matches the weight of the wool used.
8. Ask them, "What kind of change is this? Explain." (Physical change-It is still the same type of material.)



9. After the students make their yarn, have them write the step-by-step procedure.
10. Have the students write down the uses of the yarn by the colonists.

11. Have them write down any special observations and thoughts they had while they were making the yarn.
12. Have the students write down on the activity sheet what kind of a change it is, and tell why.
13. If time allows, follow the instructions below to make a mat out of yarn.

Making the Mat (optional)

1. Take an 8" X 4" piece of cardboard and make half-inch slits about half inches apart on both of the long ends. Fold the cardboard in half so the two slitted ends are across from each other. Keep the slitted ends about three inches apart.
2. Cut off about three yards of regular yarn. Weigh it.
3. With the regular yarn, connect the top slits with the bottom slits by going up and down until all the slits have yarn through them keeping the opening about three inches apart. Cut the yarn off and tie both ends to the ends of the cardboard.
4. Take the rest of the yarn and tie it to the eraser end of a sharpened pencil. Tie the other end to the one of the end strings on the loom.
5. With a pencil, weave the pencil in and out of the yarn strings on the loom. Then, pull the yarn through. The first weave has just been made. Take the pencil back the other way, weaving it through the yarn strings on the loom. It is back where it started.
6. Keep doing this over and over until the loom is filled with woven yarn.
7. Ask them, "What kind of change is this? Why? (Physical change-It is still the same type of material.)
8. Have the students write the step-by-step procedure.
9. Have the students write down any special observations and thoughts they had while they were making the yarn mat.
10. Have the students write down on the activity sheet what kind of a change it is, and explain why.

Assessment Suggestions

- Review the activity sheets that students did. Check for accuracy and completeness.
- Take pictures of the students at each of the activities. As the pictures are shown, have the students relate what is happening

at each station. Have them relate whether it was a physical change or a chemical change.

- Make an assessment with each of the products of the four stations with pictures. Have the students tell if each product is a result of a physical change or a chemical change. Have them explain why.

Curriculum Extensions/Adaptations/ Integration

- The advanced learners can learn more about how iron was made. Have them read more about the blacksmith and how he was able to make iron. They can also read how he was able to bend iron to make different products.
- The advanced learners can learn more about the tools used in the activities and about to how they were made.
- The advanced learners can learn more about the physical and chemical reactions of each of the activities.
- The advanced learners can learn about other products that were made by colonists-how they were made and if the product is a result of physical or chemical change.
- For learners with special needs, there are many easy reader books in the library that tell about colonial living. After they read them, have them-write if the product is physical or chemical change.

Family Connections

- Have the students take home their product from each station. Have them tell about each one by describing how it was made. Have them tell if each was the product of a physical or chemical change.
- As a family visit Pioneer Heritage Park and see how these products and others were made. Watch carefully if they were made by physical or chemical changes.

Additional Resources

Books

Colonial Living, by Edwin Tunis; ISBN 9780801862274 (Paperback)

If You Lived in Colonial Times, by Ann McGovern: ISBN 059045160X (Paperback)

If You Lived in Williamsburg in Colonial Days, by Barbara Brenner:0590929224 (Paperback)

Web sites

http://brebru.com/webquests/colonialtimes/lict/lict.html
http://www.lodi.k12.wi.us/schools/es/lmc/gr5Colonial.htm
http://ri.essortment.com/coloniallifeco rndd.htm

http://ag.ansc.purdue.edu/sheep/ansc442/Semprojs/2003/sweater/front.htm

Organizations

Williamsburg, http://en.wilipedia.org/wkik/Colonial Willamsburg

Notes on Making _____

I. Write down the tools needed, along with their uses:

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

II. List of ingredients, their purposes, and their weights

a. _____

b. _____

c. _____

d. _____

Ill. Write the steps needed to make the product. Write down any physical or chemical changes observed.

_____

_____

_____

_____

_____

_____

_____

IV. Uses of the product:

V. Thoughts and discoveries while making the product

VI. Chemical or Physical Change? Explain

Colonial Tools

Bread:

Mixing Pan

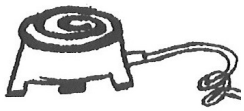
Dutch Oven

Wooden Spoon

Asbestos Hot Pad

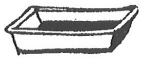
Measuring Cup

Hot Plate



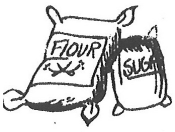
Dish Towel, Hot Pad

Bread Pan



Ingredients

Bread Board



Knife

Butter:

Butter Churn
Butter Plate
Package Salt

Butter Spoon

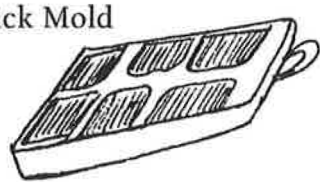
Butter Mold

Bottle of Cream
one pint

Bricks:

Mixing Pan
Wooden Spoon

Brick Mold



Measuring Spoon
Measuring Cup

Clay, Straw

Candles:

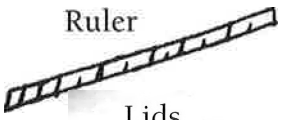
Wicks (Cotton)

2 Empty Cans

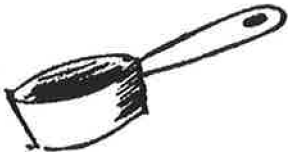
Hot Plate

Book of Matches

Ruler

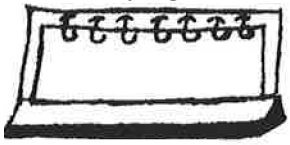


Sauce Pan

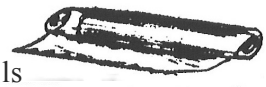


Lids

Candle Holder
for drying



Foil



6 Spools

Wool:

Bag of Wool

6 Weaving Looms

Spool Carpet Warp

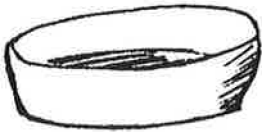
Sheep Shears

Soap:

Box of Lard

Bottle of Lye

Mixing Pan



Wooden Spoon

Soap Mold

Measuring Cup

Food Matters

Science Standard IV

Objectives 2 & 3

Connections

Standard IV:

Students will understand that chemical and physical changes occur in matter.

Objective 2:

Evaluate evidence that indicates a physical change has occurred.

Objective 3:

Investigate evidence for changes in matter that occur during a chemical reaction.

Intended Learning Outcomes:

1. Use Science Process and Thinking Skills
2. Manifest Science Attitudes and Interests

Content Connections:

Social Studies Il-2 United States motivating expansion.
Language Arts VIII-6 Write in different forms

Background Information

Cooking was one of the most important parts of colonial living. The colonists learned many ways to cook the same type of food so it didn't look the same each night. One of the highlights of the meal was bread. Bread was only made once or twice a week in an oven made in the wall of the fireplace. Maple sticks were put in the oven to burn to get the walls of the oven very hot. Once the walls were hot the ashes were scraped out and the dough was put in the oven. The bread would bake over night and the bread would be taken out in the morning.

There are two types of chemical changes here. One is the burning of the firewood. The other is the dough changing into bread.

Another commodity that was made and used extensively by colonists was butter. Butter was not only used on bread, but also used for all types of cooking and put on food to eat. It made food taste good.

Changing cream into butter is a physical change.

In the following activities the students will experience seeing bread made and experience making butter. They will rotate to the two stations and make the products or observe the products being made. They will experience how colonial people made bread and butter. Students will personally make some of these products from raw matter, and some will be made by a teacher demonstration for the purpose of safety. Each student will keep a record in a journal about how each product was made and what he or she discovered. They will also see whether the product was produced by a physical or chemical change.

Research Basis

Armstrong, T. (1994). Multiple *intelligences in the classroom.* Alexandria, VA: Association for Supervision and Curriculum Development.

Multiple intelligences let students choose a method of learning in connecting one subject to other subjects to their world. The integration of instructional methods focuses on teaching a standard in one curricular area and matching it to a standard in another curricular area such as integrating science with language arts, math, math, or social studies. As educators teach with this idea in mind it helps students see a connection between subjects relating to the real world. It helps students understand their world better to see how subjects relate to each other. This method puts into practice the teaching of multiple intelligences.

Ketch, A. (2005). Conversation: the comprehension connection. *The Reading Teacher,* Vol. 59, No. 1, pp. 8-18.

Students who engage in conversation in the classroom become reflective thinkers. Conversation brings meaning to students as they contemplate to understand our complex world. Conversation is the comprehension connection. There are literature circles, book clubs, whole-class discussions, pair-share, small-group discussion, and individual conferences that help in conversation comprehension.

Invitation to Learn

Hand out a store-made sugar cookie to each class member. Ask the students where the cookie came from. (They will probably say that it came from a store.) Ask the students where the store got it. (They will say from a cookie factory for they have probably visited one before.) Then ask them, how did they make the cookie? (They had different ingredients that they put into the cookie.)

Draw a big pot on the board. Have the students name all the ingredients that went into the cookie (sugar, milk, eggs, vanilla, flour, baking power, etc.). Write the words in the pot on the board. Ask the students, as the ingredients are being mixed, what does it turn into? (Cookie dough) Then ask them that even though we can't see any of the ingredients, are they all still in the cookie dough? (Yes) In fact, it is possible that a chemist could analyze the cookie dough and actually tell us what was in the dough because it is still in there. What kind of change is this called when we just mix things together but the substances still exist? (A physical change.)

But, we don't want to eat cookie dough. We want a cookie. What do we do to make a cookie out of cookie dough? (It is baked in the

oven with heat.) When we take the cookies out of the oven, are they still a mixture of sugar, milk, eggs, vanilla, flour, and baking powder? (No) Why not? (They have gone through a chemical change.) What does a chemical change mean? A chemical change is a process where one type of substance is chemically changed into a totally different substance. Usually, if heat is used it is a chemical change. Heat melts substances and combines them with other substances. Sometimes things fizzle, give off heat, and change into a new substance that feels different. Chemical changes occur every day all around us, especially when we are cooking.

Today we are going to look at two foods that are made everyday to see what type of change they go through. We will split you into two groups.

Materials

- ❑ Pictures of process
- ❑ Student Journal
- ❑ *Notes on Making* _____
- ❑ Store bread
- ❑ Hand-made bread
- ❑ Wooden spoon
- ❑ Mixing pan
- ❑ Measuring spoons
- ❑ Measuring cup
- ❑ Bread pan
- ❑ Hot pad
- ❑ Oven
- ❑ Dish towel
- ❑ Sugar
- ❑ Salt
- ❑ Yeast
- ❑ Flour
- ❑ Butter
- ❑ Water

Instructional Procedures

Activity One Group - Making Bread - Physical Change (dough); Chemical Change (bread)

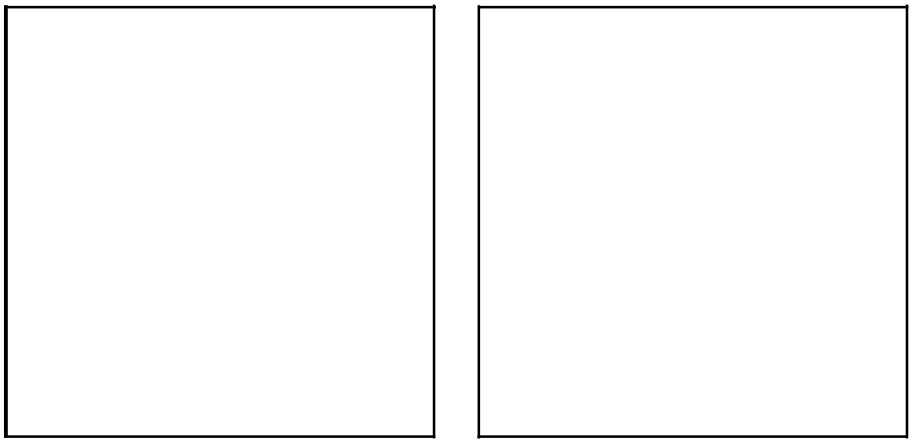
Pre-activity

1. Have students take out their journals for the review.
2. Review what the students learned about how colonists made bread.
3. - Discuss how-colonists found the materials for making bread.
4. Show pictures of the colonists making bread and the oven they used. Have a discussion about them.
5. Pass out the activity sheet *Notes on Making* _____ (Have the students write *Bread* on the line.)
6. Explain why each is needed and have them write the reasons.
   a. Wooden spoon (for stirring)
   b. Mixing pan (for mixing the ingredients)
   c. Measuring spoons (to measure out small measurements)
   d. Measuring cup (to measure out large measurements)
   e. Bread pan (for baking the bread dough in)
   f. Hot pad (to handle the hot pan easily)
   g. Oven (to bake the bread in)
   h. Dish towel (to put over the dough while rising)
7. Have the students write down the ingredients needed to make bread. Explain why each is needed and have them write the

reasons. Weigh out each ingredient and record the weight. Have the students put on their safety glasses.

a. Sugar (to sweeten the bread)
b. Salt (to give the bread flavor)
c. Yeast (to make the bread rise)
d. Flour (main substance of the bread)
e. Butter (to give the bread flavor, helps it bake better)
f. Water (helps mix the ingredients together)

Making the Bread Dough



1. Since the students are watching, have them write down the procedure as they are listening.
2. In a small bowl, put 1 cup of lukewarm water and 2 teaspoons of yeast. Let it sit for a moment to fizz up.
3. Measure and stir into the mixing pan the items below and stir them in.
   a. The bowl of water and yeast
   b. 2 teaspoons butter
   c. 2 tablespoons sugar
4. Put 3 cups of flour and 1 teaspoon of salt into the pan and mix with wooden spoon.
5. Stir until you can knead the dough with your hands. Knead at least 100 times. Gather all loose flour in the pan into the dough in the kneading process. (Colonial mothers found that the more times they kneaded the dough, the better tasting and better looking their loaves would be. Kneading makes it light weight and gives it a fine texture.)
6. Cover the pan with a dishtowel and let it rise for 30 minutes.

7. Knead the dough again until all the air is kneaded out.
8. Put dusting of flour on your hands so dough won't stick.
9. Form into a loaf. Shape carefully.
10. Butter the bread pan and put the dough in it. Let it rise for 15 minutes.
11. Ask them, "What type of change is this? Why? (Physical change--the ingredients are just mixed together.)
12. Weigh the dough. Compare it with the weight of the ingredients.
13. Have the students write down on the activity sheet what kind of a change it is, and tell why.

Baking the Bread Dough

15. Preheat the oven at 350 degrees.
16. Put the pan into the oven when the oven has preheated. Bake for 20 to 30 minutes or until the bread is well browned.
17. Take out the bread and turn the pan upside down to get the bread out.
18. What type of change did the bread go through? Why? (Physical change because it was heated and a new product was made.)
19. Weigh the bread and compare it to the weight of the dough. Why did it change? (It lost moisture.)
20. Have the students write down the uses of the bread dough by the colonists.
21. Have them write down any special observations and thoughts while they were making the candles.
22. Have the students write down on the activity sheet what kind of a change it is, and tell why.
23. For safety reasons, have store bought bread for the students to eat.
24. Can have jam and butter available if desired.

Activity Two Group – Making Butter – Physical Change

Pre-activity

1. Have students take out their journals for the review.
2. Review what the students learned of how colonists made butter.
3. Discuss how colonists found the materials for making butter.

4. Show a picture of the butter churn, cream bucket, butter bowl, butter mold. Have a discussion about them.
5. Pass out the activity sheet *Making_____*. (Have them put *Butter* on the line.)
6. Have the students write the tools needed to make butter. Explain why each is needed and have them write the reasons.
   a. Pint jar with lid (used to shake the cream)
   b. Wooden spoon (to take the butter out of the jar)
   c. Butter plate (to put the butter on)

1. Have the students write down the ingredients needed to make soap. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.
   a. ½ pint (liquid) whipping cream (main substance to making butter)
   b. Salt (to preserve the butter and give it flavor)
   c. Cold water (to separate the buttermilk from the butter)

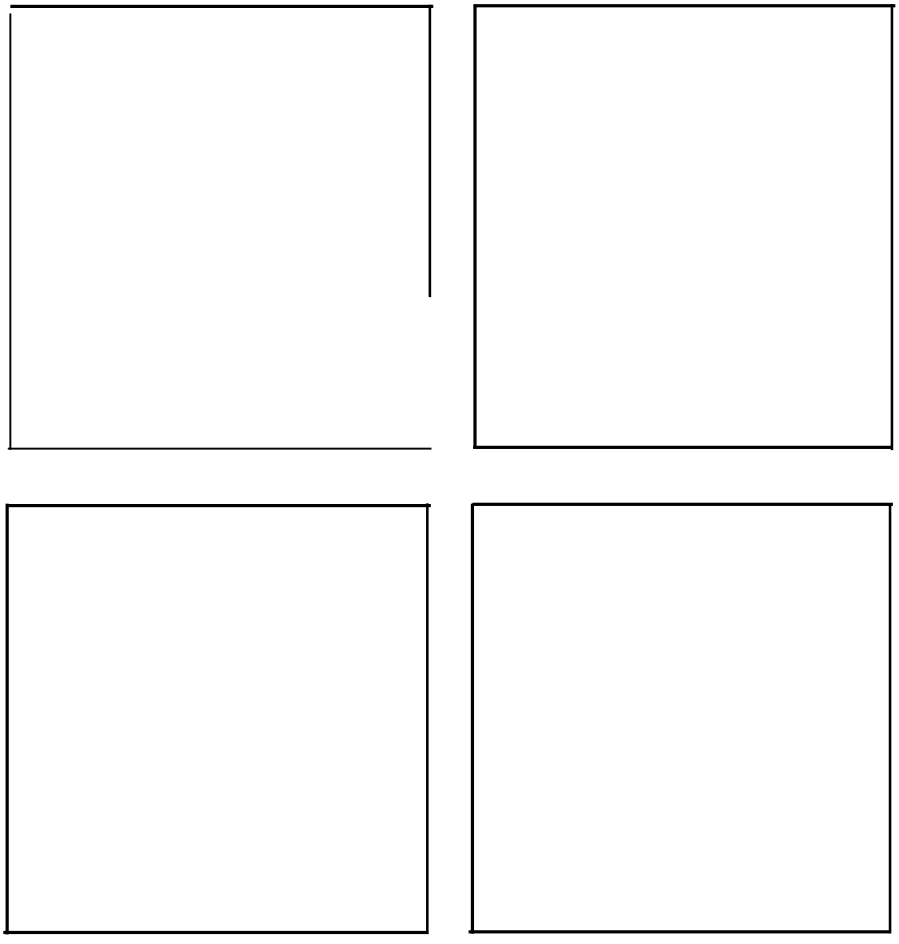
Making the Butter (To be done in a clean area.)

1. Wash hands.
2. Break up the students into groups of 4 to 6
3. Pour the ½ pint of the liquid whipping cream into a pint jar. Screw on the lid.
4. Group of students take turns in shaking the jar (20 time each student until done).
5. It takes quite a while for the liquid whipping cream to turn into butter. The liquid whipping cream will first turn into whipped cream. This is the stage right before it turns into butter. The students may think this is the end. But, they have to keep shaking a little longer for the whipped cream to turn into butter.
6. It has turned into butter when the whipped cream has turned into liquid (buttermilk) and a glob of butter in the jar.
7. Pour the buttermilk out of the jar and into a cup. (Hold the lid of the jar over the opening, leaving a gap to pour out the buttermilk but keep the butter in the jar.)
8. Add cold water to the jar. Press the cold water into the butter with the wooden spoon to flush out the remaining buttermilk in the butter so the butter doesn't go rancid. Pour the water out in the sink as described in #7.

Materials

- ❑ Pictures process
- ❑ Student journal
- ❑ *Notes on Making* _____
- ❑ Store butter
- ❑ Hand-made butter
- ❑ Pint jar with lid
- ❑ Wooden spoon
- ❑ Butter plate
- ❑ Whipping cream
- ❑ Salt
- ❑ Cold water

9. Add a pinch of salt to the butter and stir it with the wooden spoon. This will prevent it from going rancid and will add flavor.
10. Take the butter out of the jar with the wooden spoon and put it on a butter plate.
11. Weigh the butter and buttermilk and compare it to the weight of the cream. Did it change? Explain.
12. Ask the students what type of change did it go through? Explain. (Physical, because the butter only changed form but is made up of cream in another form.)
13. Have the students write down the uses of the butter by the colonists.
14. Have them write down any special observations and thoughts they had while they were making the butter.
15. Have the students write down on the activity sheet what kind of a change it is, and tell why.



Assessment Suggestions

- Review the students' activity sheets. Check for accuracy and completeness.
- Take pictures of the students at each of the activities. As the pictures are shown, have the students relate what is happening at each station. Have them relate whether it was a physical change or a chemical change.
- Make an assessment with each of the products of the two stations with pictures. Have the students tell if each product is a result of a physical change or a chemical change. Have them explain why.

Curriculum Extensions/Adaptations/ Integration

- The advanced learners can learn more about how cooking most things is a chemical change.
- The advanced learners can learn more about the tools used in the activities and about how they were made.
- The advanced learners can learn more about the physical and chemical reactions of each of the activities.
- The advanced learners can learn about other products that were made by colonists-how they are made and if the product is a result of physical or chemical change.
- For learners with special needs, there are many easy reader books in the library that tell about colonial living. After they read them, have them write if the product is a physical or chemical change.

Family Connections

- Send home the instruction sheets about how to make bread and butter. Have them make them at home with their family. The student can then explain if the products are chemical changes or physical changes and explain why to their family members.

Additional Resources

Books

Colonial Living, by Edwin Tunis; ISBN 9780801862274 (Paperback)

If You Lived in *Colonial* Times, by Ann McGovern; ISBN 059045160X (Paperback)

If You Lived In Williamsburg in *Colonial Days,* by Barbara Brenner; 0590929224 (Paperback)

Web sites

http://brebru.com/webquests/colonialtimes/lict/lict.html

http://www.lodi.k12.wi.us/schools/es/lms/gr5Colonial.htm

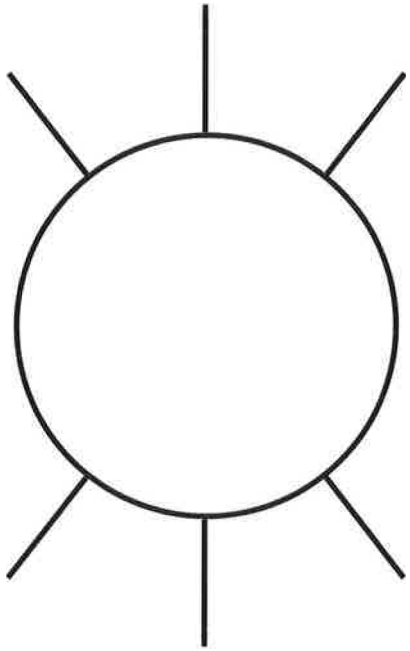
http://ri.essortment.com/coloniallifeco rndd.htm

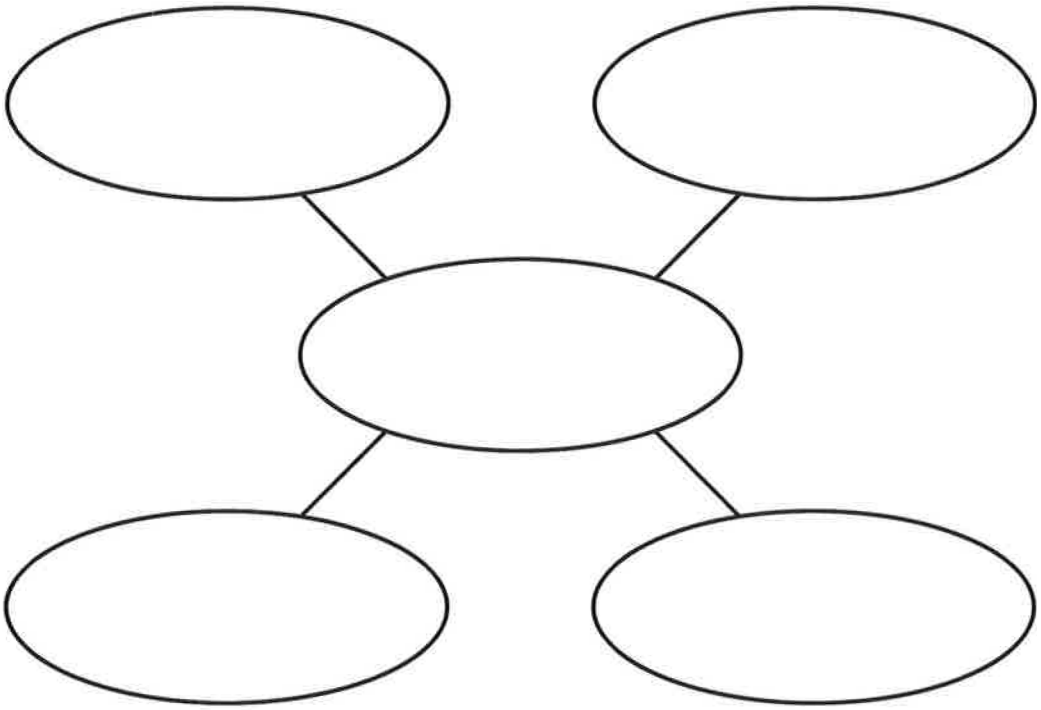
http://ag.ag.ansc.purdue.edu/sheep/ansc442/Semprojs/2003/sweater/front.htm

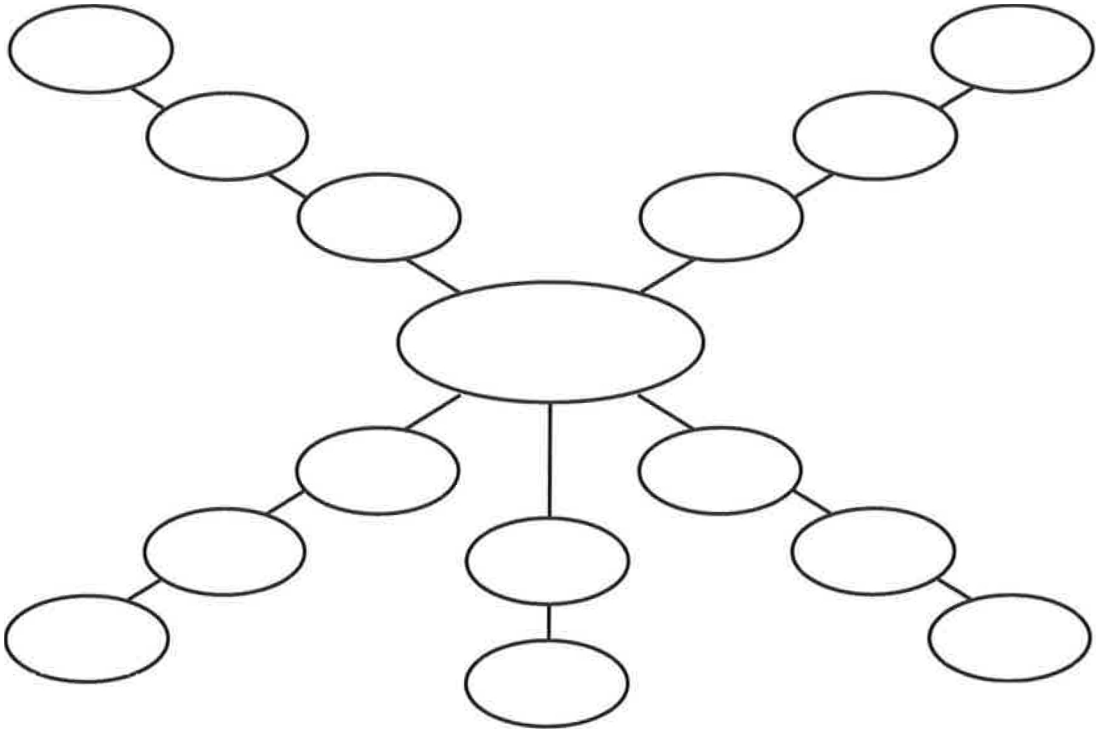
Organizations

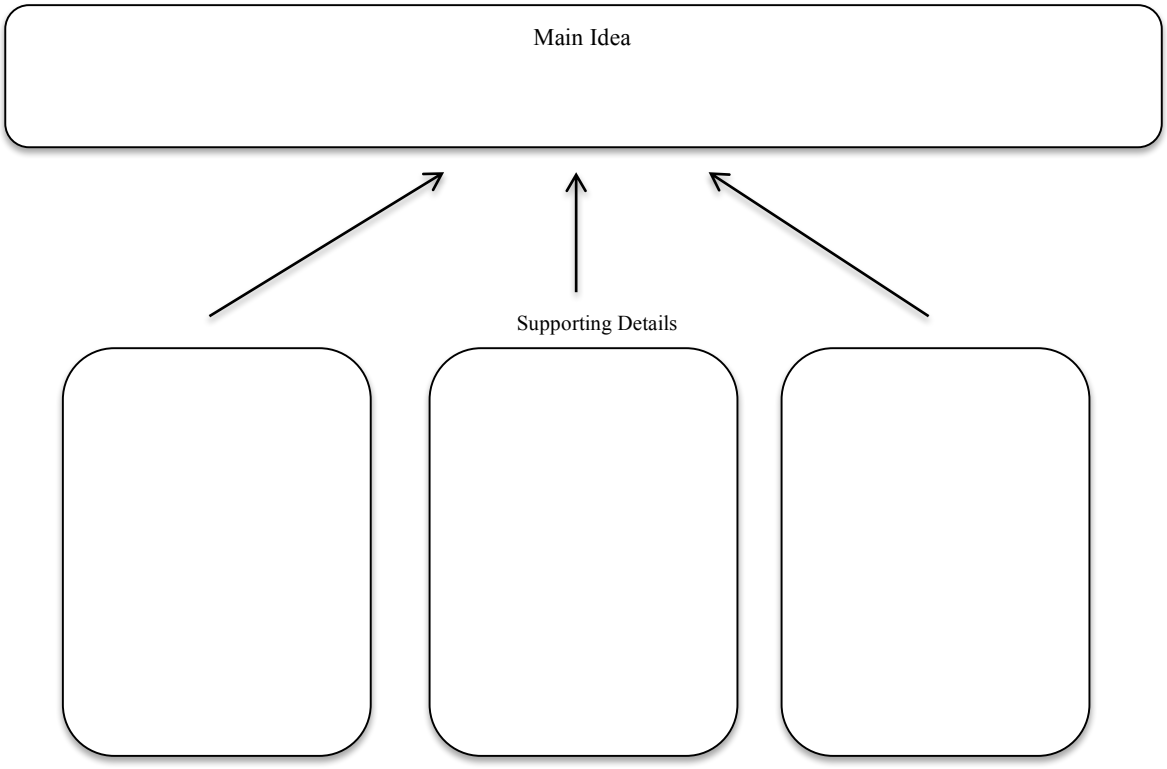
Williamsburg, http://en.wikipedia.org/wiki/Colonial_Williamsburg

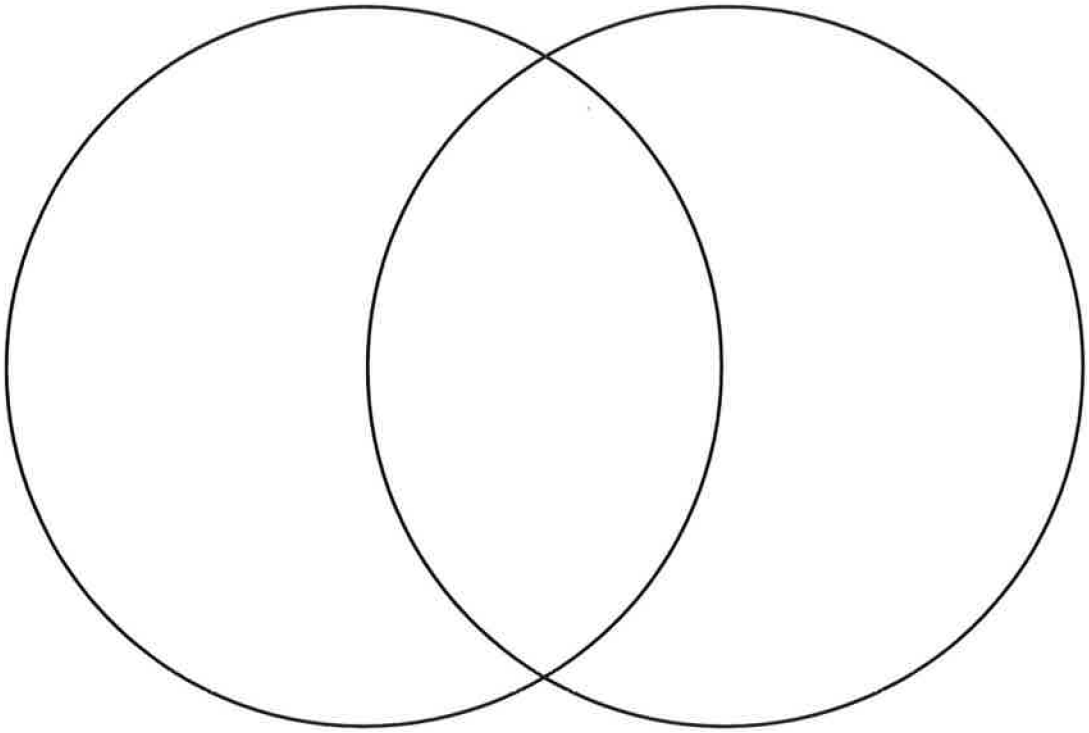
Graphic Organizers

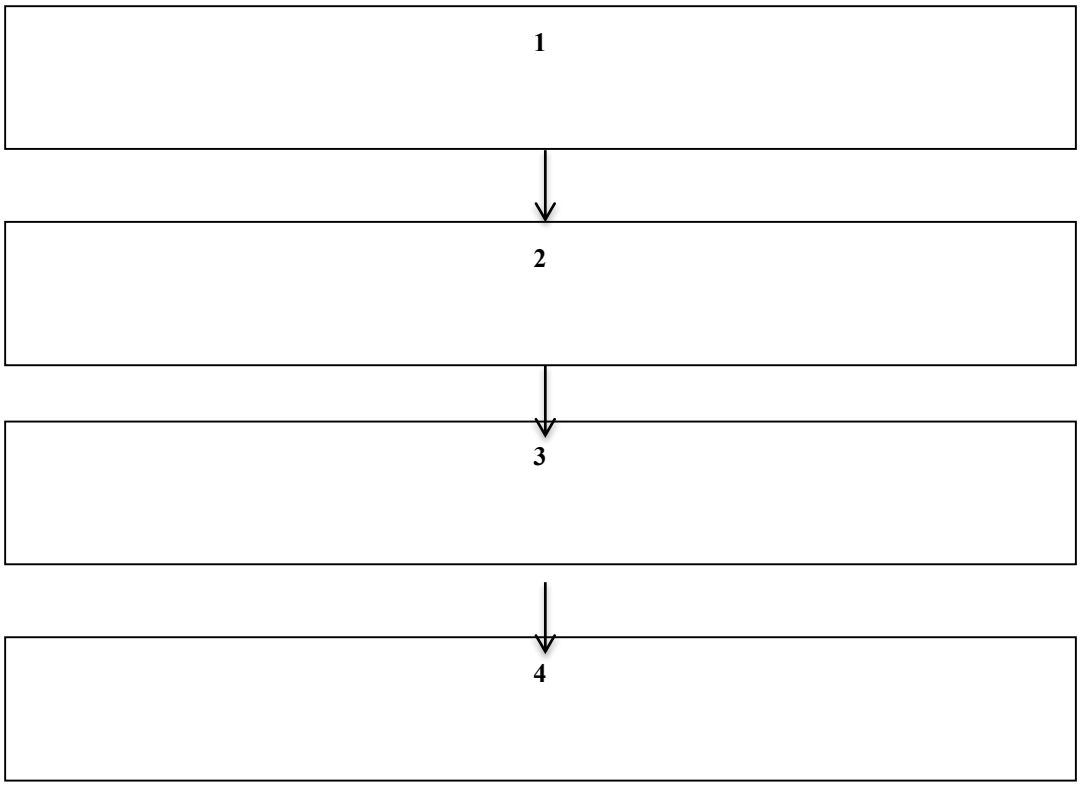







Main Idea
Supporting Details

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