



Model #: SE11



Scientific Experiments

Lesson Plans

Items Included In This Kit

Items listed on these two pages are included with this kit. Items not included must be provided by teacher or students. Many are household items, like salt or pepper, making it easy to acquire them.



Droppers



Set of Funnels



Goggles



6 Test Tubes



Measuring Cup



Magnifier



Tweezers



Glass/Plastic Cup



Beaker



STEAM Scientific Experiment Lesson Plans



Measuring Spoons



Lab Coat



ID Badge



LESSON 1: Color Mixtures

Tools:



Measuring Cups (7)



Color Pigments:
Blue, Red, Yellow



Dropper



Stirring Stick

You Will Need: Water, Pigments, Stirring Stick, (6) Additional Measuring Cups

Key Concept:

Red, yellow and blue are the three primary colors. In theory, you could get any color by mixing the 3 primary colors in different ways.

Let's experiment to get as many colors as possible.



LESSON 1: To Do

- 1 Take three measuring cups and fill each with 100ml of water. Drop red, yellow and blue pigments into the 3 cups respectively.
- 2 Use the other 4 cups and fill each with 50ml water, and mark them as A, B, C and D. Pour red and yellow water into Cup A; red and blue water into Cup B; yellow and blue water into Cup C; and finally red, yellow and blue water into Cup D.
- 3 What happened to the color of the water in cups A, B, C and D?



LESSON 2: Volcanic Eruption 1

Tools:



Effervescent Tablet



Color Pigments:
Blue, Red, Yellow



Dropper

You Will Need: Water, Cooking Oil, Pigments, Effervescent Tablet

Key Concept:

Effervescent tablets can rapidly produce a large amount of carbon dioxide when contacting water. When enough carbon dioxide accumulates, it will carry the colored water out of the oil layer and come to the top of the oil.

Eventually it spills into the air and creates a spectacular eruption.



LESSON 2: To Do

- 1 Add $\frac{1}{5}$ water $\frac{3}{5}$ cooking oil and 5 to 10 drops of pigment in sequence into a test tube or beaker.
- 2 Put half an effervescent tablet into the tube.



There will be a display of beautiful “Volcanic Magma” gradually rising from the bottom to the top.



LESSON 3: Volcanic Eruption 2

Tools:



Measuring Cups (3)



Color Pigments:
Blue, Red, Yellow

You Will Need: Water, Chinese Cabbage (or Romaine Lettuce), Pigments, (2) Additional Measuring Cups

Key Concept:

There are many tiny “pipes” inside the cabbage leaf. Water is absorbed on the inside of these tiny pipes.

Due to the difference between cohesion and adhesion, water can slowly transfer the pigment to the leaf/empty cup. This is called a “capillary phenomenon” which is common in daily life. For example, a brick can absorb water, and a towel can absorb sweat.



LESSON 3: To Do

- 1 Fill each of the three measuring cups with 50ml of water, and drop different pigments (10 to 20 drops per color) into different cups.
- 2 Pull three intact leaves from the cabbage and dip their roots into the colored water of the three cups respectively.
- 3 Observe what happens to the 3 cabbage leaves 1 day later.



Note: In addition to cabbage, some flowers with branches can also be used in this experiment.



LESSON 4: Water Absorbtion

Tools:



Measuring Cup



Color Pigments:
Blue, Red, Yellow



Tea Light
Candle

**You Will Need: Water, Pigments, Plate,
Tea Light Candle**

Key Concept:

According to the principle of thermal expansion and contraction, when a candle flame heats air in a cup, the air expands and overflows. After a few seconds, the oxygen in the cup runs out and the candle goes out. As temperature falls to make the air contract, and the carbon dioxide produced by combustion dissolves in water, air pressure in the cup drops. Then, the pressure outside the cup is higher than the pressure inside, which squeezes the water from the outside in.



LESSON 4: To Do

- 1 Pour water into a plate and stop as soon as the bottom is covered. Add 3 drops of pigment and mix well.
- 2 Place a candle in the middle of the plate and light it. Put the measuring cup upside down to cover the candle.

After awhile, some water will be absorbed into the cup.



LESSON 5: Rainbow Rain

Tools:

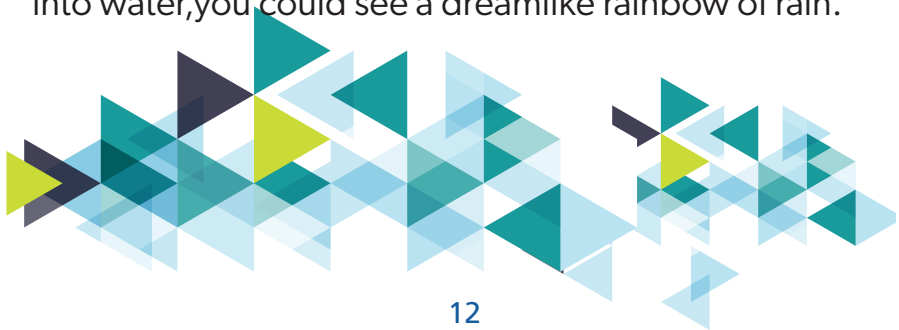


You Will Need: Water, Cooking Oil, Pigments, Stirring Stick

Key Concept:

When the cooking oil is mixed with pigment, and poured into the water, the density of the cooking oil is lower than that of the water; therefore, the pigment mixed with the oil will rise to the surface.

After awhile, due to its higher density, the pigment will begin to sink into the water. As the pigment dissolves into water, you could see a dreamlike rainbow of rain.



LESSON 5: To Do



- 1 Pour 10ml of cooking oil into a measuring cup and add 5 drops of red pigment, 5 drops of yellow pigment and 5 drops of blue pigment. Stir well.
- 2 Pour about 40ml of water into a test tube.
- 3 Pour the cooking oil mixture with the pigment into the test tube and let it stand for 10 seconds.

A fantastic rainbow of rain will appear!



LESSON 6: Air and Water Pressure

Tools:



Beaker



Straw

You Will Need: Water, Straw

Key Concept:

Put a straw into the bottle. Then, blow into the bottle, and the air pressure inside will get higher and higher. Because the bottle has limited space and the straw is a channel connecting with the outside, the air pressure inside will press the water and spray out through the straw. If you blow hard, the pressure in the bottle will increase faster and eject a strong and fast column of water. If you blow gently, the water spouts weakly.

The same principle of pneumatics can also be applied to water hoses or water cannons.



LESSON 6: To Do

- 1 Add water to the beaker and insert a straw. Adjust the insertion angle of the straw.
- 2 Take a deep breath. Block the mouth of the beaker with your mouth, hold the straw with one hand. Block the gap of beaker mouth with the other hand, and blow into the bottle.
- 3 The straw squirts a column of water.



LESSON 7: Rainbow Bubble Sugar

Tools:



Pigment



Stirring
Stick



Dishcloth

You Will Need: Plastic Water Bottle, Rubber Band, Dish Soap, Pigment, Bowl or Cup, Scissors

Key Concept:

Every little crack in the dishcloth is like a bubble tube. Numerous small cracks were found in every corner of the dishcloth. So, they blew out countless neatly arranged bubbles. This is mainly due to surface tension of bubbles, and hydrogen atoms in water attract each other.

Pigments of the dishcloth adhere and form rainbow bubbles.



LESSON 7: To Do

- 1 Pour 50ml water and 20ml dish soap into a cup and mix well.
- 2 Cut off the bottom of the plastic bottle with scissors.
- 3 Cover the bottom of the cut bottle with a dishcloth and affix it with a rubber band.
- 4 Drop pigments on dishcloth – using more drops of several colors are better.
- 5 Blow in from the mouth of the bottle and a rainbow bubble dragon appears.



LESSON 8: Discolored Apples

Tools:



Measuring Cup



Measuring Spoons



Citric Acid

You Will Need: Apple, (2) Plates, Knife, Citric Acid

Key Concept:

Phenolic compounds in apples become phenolic oxides when exposed to oxygen. This exposure causes the apple cuttings to turn black.

Citric acid inhibits the activity of phenoloxidases. The Vitamin C in lemon slows down the oxidation process of an apple. It is therefore beneficial to eat foods with high vitamin content.



LESSON 8: To Do



- 1 Pour 20mls of clear water into a measuring cup. Add a half spoon of citric acid, stir well and pour onto a plate.
- 2 Cut an apple in half and quickly place one half face down onto the plate.
- 3 After 3 seconds, pick up the two half apples and place them face up for half an hour.

Observe the differences in the discolorations between the two half apples.



LESSON 9: Fogging Glass

Tools:



Measuring Cup



Goggles

You Will Need: Hot Water, Detergent, Tissue

Key Concept:

Fog occurs when steam condenses into little drops of water on the surface of a lens. Acting as a kind of surfactant, detergent destroys the surface tension of a water drop. As a result, no fog is created.



LESSON 9: To Do



- 1 Fill a measuring cup with hot water. Place the goggles above and near the hot water. The lens will fog up immediately.
- 2 Smear some detergent on the surface of the goggle lens, and clean off with a tissue.
- 3 Place the goggles cleaned by the detergent above close to the hot water. The lens will not fog.



LESSON 10: Drinking Plant

Tools:



Pigment



Stirring
Stick

**You Will Need: White Flower
(African Daisy or Carnation), Glass,
Pigment, Stirring Stick**

Key Concept:

The petal's color changes because it absorbs water with pigment. There are many fine tubes in the stem where water is delivered to the petals.



LESSON 10: To Do

- 1 Remove all leaves from the white flower's stem and air dry for an hour.
- 2 Fill a glass cup with water, and add two teaspoons of pigment.
- 3 Cut a small piece from the end of the stem diagonally.
- 4 Put the stem in colorful water, and observe what happens to the white flowers after one day.



LESSON 11: Melting Ice Cubes

Tools:



Salt



Pepper

You Will Need: Ice Cubes, Sugar, Salt, Pepper, Plate

Key Concept:

The temperature at which ice cubes begin to melt is called its melting point. It is also the temperature at which water begins to freeze, called the ice point.

Adding different ingredients to the ice cube can change its melting point. Salt is the most effective, so the ice block with salt melts at the highest speed. Pepper is the least effective, it melts at a slower speed.



LESSON 11: To Do

- 1 Take 3 ice cubes with added salt and place them on a plate.
- 2 Take 3 ice cubes with added pepper and place them on a plate.
- 3 Observe the ice cubes to find which one melts at the fastest speed.



Notes:



Notes:



Get inspired. Think Bigger.



The HamiltonBuhl® STEAM Scientific Experiment Kits – along with these lesson plans – provide a great early introduction to STEAM concepts, as children experiment using different hands-on science tools.

These step-by-step activities help to spark their imaginations and stimulate their curiosity, helping children discover they can learn, do, and solve on their own.

- It is best to wear goggles and gloves when performing any experiment.
- Please make sure there is adult supervision available during all experiments.
- Never use any of the mixtures near sources of heat or flames.



WARNING:

Choking Hazard – Small Parts.

Not intended for Children Under 3 Years of Age.