



Welcome to your deck of Family STEM Cards!  
 These cards are meant to be a way for the whole family to get involved in STEM and see that STEM happens everywhere!

**HOW THEY WORK:**

There are four "suits" of cards, just like a normal deck. In each suit you will find a different theme of activities - science, technology, engineering, or math

**A-4 CARDS**

students Pre-K - 2nd grade

**5-9 CARDS**

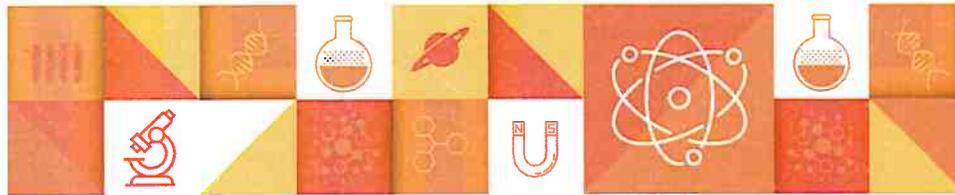
students 3rd - 5th grade

**10- K CARDS**

students 6th grade and older

Let us know what you think of them by contacting us and include pictures!

# SCIENCE



## A MAGICAL MILK

- MATERIALS:**
- 1 cup of milk
  - 4 tbsp vinegar
  - food coloring (optional)
  - microwave
  - strainer (or paper towels)

- STEPS:**
1. Warm milk in microwave for one and a half minutes.
  2. Add vinegar slowly and stir for about a minute, the milk should start to clump.
  3. Strain the milk using the strainer or paper towel, push out all the liquid.
  4. Take the solid "plastic" out of strainer and add food coloring if you wish.
  5. Use the "plastic" to create different shapes.
  6. Set aside to dry - about 2 nights.

**ENDING QUESTION:**  
 Why do you think the milk reacted the way it did to the vinegar?

**FUN FACT!**  
*The process you just went through is very similar to how you make a popular Indian Cheese, paneer!*



## 2 HOT ICE

- MATERIALS:**
- 4 cups of white vinegar
  - 4 tbsp of baking soda
  - glass measuring cup
  - a pot
  - a plate
  - a spoon

- STEPS:**
1. Place 4 cups of vinegar in a pot.
  2. Add baking soda to pot, slowly, one tablespoon at a time, stir.
  3. Boil the solution over medium low heat for an hour.
  4. Pour solution in a glass and place in the fridge to cool (45 minutes).
  5. On the plate, add some of the crystals from the pot.
  6. Slowly pour the liquid on the plate on top of the crystals.

**ENDING QUESTION:**  
 How does how you pour the solution relate to how your ice looks?

**CONCEPT EXPLORATION:**  
*You made a solution called sodium acetate, research the qualities of it to learn how this experiment worked!*



## 3 WATER XYLOPHONE

- MATERIALS:**
- mason jars or other glasses (4+)
  - food coloring
  - water
  - spoons

**ACTIVITY:**  
 Investigating sound/pitch using water.

- STEPS:**
1. Fill the jars with varying levels of water.
  2. Add food coloring to color the water.
  3. Tap an empty jar with the spoon.
  4. Predict how the jars with water will sound.
  5. Tap jars with varying levels of water with the spoon.
  6. Have fun creating different beats or songs!

**ENDING QUESTION:**  
 How do jars with more water sound compared to jars with less water?

**FUN FACT!**  
*When you made your prediction, you were making something called a hypothesis. Try making hypotheses in other experiments!*



## 4 PENDULUM PAINTING

- MATERIALS:**
- foam or paper cup
  - 2 chairs
  - broom
  - large paper
  - paint or water
  - scissors
  - string
  - tape
  - drop cloth

- STEPS:**
1. Cover the floor with a drop cloth.
  2. Poke a hole in the bottom of the cup, and one whole on each side near the rim.
  3. Tie the string through the two holes.
  4. Place the broom horizontal between two chairs, put string tied cup in middle of broom, over drop cloth.
  5. Place paper under cup.
  6. Tape the hole on bottom of cup and add paint.
  7. Grab the cup, remove the tape and swing.

**ENDING QUESTION:**  
 How would changing the length of the string effect the experiment?

**FUN FACT!**  
*Take it outside! 1/3 cup of cornstarch, 1/3 cup of water, and a tbsp of washable paint makes washable sidewalk paint.*



## 5 RAINBOW CELERY

- MATERIALS:**
- Celery (with some leaves)
  - jars/glasses
  - water
  - food coloring

**ACTIVITY:**  
 Explore "capillary action" in plants using colored water.

- STEPS:**
1. Add food coloring to the jars/cups of water to create a rainbow.
  2. Break celery apart into stalks, add the same amount of water in each cup.
  3. Add celery into the cups so the leaves are at the top.
  4. Create an observation sheet, mark how you created each color and how many drops you used.
  5. Let the celery soak overnight. *Write your prediction on your observation sheet.*

**ENDING QUESTION:**  
 What is something other than celery you could use for this experiment?

**TIP!**  
*Make sure your water colors are vibrant, if you don't use enough food coloring the experiment will be harder to see.*



## 6 ICE GAME

- MATERIALS:**
- 1 ice cube per player
  - ripped paper
  - water
  - dice
  - 6 bowls
  - salt
  - crushed ice
  - coins

- STEPS:**
1. With 5 of the bowls, fill with the materials so there's one bowl of each material. Leave one empty.
  2. Put the bowls in a circle.
  3. Have each player put their ice cube in the empty bowl.
  4. Take turns rolling the die and moving your ice cube around the "game board".
  5. Play until there is only one ice cube left.
  6. Last one standing is the winner!

**ENDING QUESTION:**  
 What are some other materials that might keep the ice from melting quickly?

**FUN FACT!**  
*Hot water freezes faster than cold water.*



## 7 FINGER PRINTS

### MATERIALS:

- baby powder/flour
- dark piece of paper
- clear tape
- makeup brush

### ACTIVITY:

Look for finger prints around the house and match them to family members.

### STEPS:

1. Have each family member dip one finger in baby powder/flour.
2. Press finger onto clear tape.
3. Tape the finger print onto the dark paper, write name underneath.
4. Examine finger prints.
5. Using makeup brush, apply baby powder/flour to surfaces/items that might have finger prints.
6. Use the clear tape to pull up the finger print.
7. Try to match the finger prints!

### FUN FACT!

The study of fingerprints is called *dactyloscopy*. No two fingerprints are alike!

L

## 10 HEAT OF A RAINBOW

### MATERIALS:

- different colors of construction paper
- tape/glue
- ice cubes
- lamp
- stopwatch

### STEPS:

1. Create open faced paper cubes for each color of paper (see TIP!).
2. Place the paper cubes on it's side under the lamp, put the ice cube inside, turn on the lamp.
3. Start your stop watch (your phone works well!).
4. Record how long it takes for each ice cube to melt.

### ENDING QUESTION:

How does knowing which color is the warmest help you in everyday life?

### TIP!

Create your cube by cutting the construction paper into a square. Fold the square diagonally, open up and fold the other diagonal. Open up to the square and fold in thirds one way, and then the other. Fold the corners in and tape/glue to hold them.

10

## K AN APPLE A DAY

### MATERIALS:

- 1 apple (sliced)
- baking soda
- lemon juice
- milk
- vinegar
- 5 bowls

### ACTIVITY:

Is there a substance that keeps apples from browning?

### STEPS:

1. Slice the apple into equal pieces.
2. Place one apple slice in each bowl.
3. Cover the slice with one substance per bowl, leave one apple with nothing on it.
4. Let the apples soak for an hour.
5. Compare each apple in a substance to the "control" apple.

### ENDING QUESTION:

Oxygen reacts with an enzyme in the apple to brown it. How is this similar to when iron or steel rusts?

### FUN FACT!

Having a control in an experiment allows you to see how variables (elements that change) affect what you're testing. Try this experiment again but with new variables!

K

## 8 MYSTERIOUS "M"

### MATERIALS:

- bowls or cups
- M&M's in all colors
- water

### STEPS:

1. Pour water into bowls or cups.
2. Place 1 M&M in each bowl or cup with the "m" facing up.
3. Predict what you think will happen.
4. Wait and observe.

### ENDING QUESTION:

The chocolate and candy shell are water soluble meaning water molecules surround the solid and dissolve it in the water.

What else is water soluble?

### ONE STEP FURTHER:

Try this activity with other candies to see if they are water soluble (maybe Skittles?).

8

## 9 RING THE GONG

### MATERIALS:

- two different sized metal spoons
- a ruler
- string

### ACTIVITY:

Explore sound waves and vibrations by ringing a spoon.

### STEPS:

1. Tie the string around the spoon handle so it's in the middle of the string.
2. Wrap the ends of the string around your pointer fingers and plug your ears.
3. Gently hit the ruler against the round part of the spoon.
4. Repeat the experiment using the other sized spoon.

### ENDING QUESTION:

How do you think changing the length of the string would affect the sound you hear?

### FUN FACT:

The string allows sound waves to travel, the sound of the spoon reverberates, meaning it continues even after you hit the spoon.

9

## J CLEAN COINS

### MATERIALS:

- 1/2 cup lemon juice
- 1/2 cup dish soap
- 1/2 cup baking soda paste (water and baking soda)
- 1/2 cup water
- 1/2 cup cola
- 5 nickels
- 5 pennies

### ACTIVITY:

Explore various cleaning solutions and their effects on tarnished and oxidized coins.

### STEPS:

1. Fill two cups each half way full with each of the cleaning solutions (i.e. two cups with 1/4 cup of soap each).
2. Record the condition of each coin.
3. Place one of each coin into each solution, soak overnight (i.e. a penny in soap, a nickel in soap).
4. Scoop the coins out of the solutions, label and record the condition of each.
5. Use the toothbrushes to clean the coins, rinse and then re-examine.

### ENDING QUESTION:

Did the coins become clean or remain tarnished? Is there a solution that worked best?

### EXTEND YOUR LEARNING!

Try this experiment using pennies, nickels, dimes, and quarters. Or use different "cleaning solutions".

J

## Q SALTY EGGS

### MATERIALS:

- 2 clear glasses
- lukewarm water
- teaspoon
- salt
- egg

### ACTIVITY:

Make an egg float using salt.

### STEPS:

1. Fill the two clear glasses with water.
2. Drop the egg into one glass of water. Record/discuss what happens.
3. In the other cup, add 1 teaspoon of salt, stir, add the egg. Record/discuss what happens.
4. Take turns removing the egg, adding 1 teaspoon of salt, adding the egg until the egg floats at the top of the water.

### ENDING QUESTION:

How might this experiment change if you used a different size glass?

### FUN FACT!

An object sinks when its density is greater than that of the liquid. An object floats when their density is less than that of the water.

Q

## greater cincinnati STEM collaborative

The Greater Cincinnati STEM Collaborative (GCSC) is the backbone K-12 STEM education nonprofit on a mission to create a robust STEM pipeline of diverse talent to meet the accelerating demands for STEM jobs in our regions. GCSC connects business, education, and community partners together to create hands-on learning experiences which prepare students to be the innovators and problem solvers of tomorrow.

In collaboration with schools and educators, GCSC supports the following programs:

- 3d Printers Club
- STEM Bicycle Club
- Summer of STEM
- Garden Engineers
- Game On!

To learn more about GCSC and how you can get involved, visit us at:

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