LEARNING SCIENCE CAN BE SWEET! IN THIS LESSON, EXPERIENCE THREE MINI EARTH SCIENCE EXPERIMENTS: LEARNING ABOUT METEORITES, FOSSILS AND VOLCANOS!
Ingredients

- 1 CUP ALL-PURPOSE FLOUR
- ¾ CUP SUGAR
- 6 TABLESPOONS BAKING COCOA (DIVIDED INTO 2 TBSP AND 4 TBSP)
- 2 TEASPOONS BAKING POWDER
- ¼ TEASPOON SALT
- ½ CUP MILK
- 2 TABLESPOONS VEGETABLE OIL
- 1 TEASPOON VANILLA EXTRACT
- 1 CUP PACKED BROWN SUGAR
- 1 ¾ CUPS HOT WATER

Other Materials

- NUTS (WHOLE WALNUTS OR PECANS WORK WELL)
  - IN CASE OF A NUT ALLERGY, HARD CANDIES CAN ALSO BE USED.
- MEDIUM MIXING BOWL
- 9 IN SQUARE BAKING PAN
- MEASURING CUPS AND SPOONS
- PAPER PLATE
- SPOON/RUBBER SPATULA

Just the Recipe

IN A MEDIUM BOWL, COMBINE FLOUR, SUGAR, 2 TABLESPOONS COCOA, BAKING POWDER, AND SALT.

STIR IN THE MILK, OIL, AND VANILLA UNTIL SMOOTH.

SPREAD MIXTURE IN AN UNGREASED 9-IN SQUARE BAKING PAN.

COMBINE BROWN SUGAR AND REMAINING COCOA; SPRINKLE OVER BATTER.

POUR HOT WATER OVER ALL; DO NOT STIR.

BAKE AT 350 FOR 35-40 MINUTES.

SERVE WARM. TOP WITH WHIPPED CREAM, ICE CREAM, OR FRESH FRUIT IF DESIRED.
METEORITES ARE PIECES OF ROCK THAT COME FROM OUTER SPACE.

YOU MIGHT KNOW THESE ROCKS BY A FEW DIFFERENT NAMES - THIS IS BECAUSE THE NAME OF THESE ROCKS CHANGE, DEPENDING ON WHERE THE ROCK IS LOCATED.

EACH OF THESE ROCKS BEGIN THEIR JOURNEY FLOATING IN SPACE - THERE, THE ROCK IS CALLED A METEOROID.

AS THE ROCK GETS CLOSER TO EARTH, GRAVITY BEGINS TO PULL IT IN. THE ROCK EVENTUALLY ENTERS EARTH’S ATMOSPHERE - IT’S NOW CALLED A METEOR. YOU MIGHT ALSO KNOW IT AS A SHOOTING STAR.

AS THE ROCK GOES THROUGH THE ATMOSPHERE, IT GETS HOT, AND SOME OF THE ROCK MIGHT BURN OFF - WHICH GIVES THE SHOOTING STAR ITS LONG, STREAKY TAIL. SMALL SPACE ROCKS BURN UP IN THE ATMOSPHERE - BUT BIGGER ONES MIGHT MAKE IT ALL THE WAY TO EARTH’S SURFACE!

IF THE ROCK LANDS ON THE SURFACE OF EARTH, IT’S CALLED A METEORITE. THIS IS EASY TO REMEMBER - BECAUSE IF YOU CAN SEE A SPACE ROCK RIGHT NEXT TO YOU - IT’S A METEORITE!

WHEN METEORITES HIT THE SURFACE OF THE EARTH OR OTHER PLANETS OR MOONS, THEY MIGHT LEAVE A CRATER - A BIG HOLE.

FOR OUR FIRST EXPERIMENT, WE’RE GOING TO EXPLORE HOW THOSE CRATERS ARE FORMED!

You will need:

- MEDIUM MIXING BOWL
- 1 CUP FLOUR
- 2 TABLESPOONS COCOA POWDER
- NUTS (WHOLE WALNUTS OR PECANS WORK WELL)
  ◦ IN CASE OF A NUT ALLERGY, HARD CANDIES CAN ALSO BE USED
Make a meteorite crater!

1. IN A MEDIUM BOWL, ADD ONE CUP OF FLOUR.

2. GENTLY BRUSH THE FLOUR TO AN EVEN DEPTH - BUT DO NOT PRESS ON THE FLOUR OR COMPACT IT!

3. USING A SIFTER (OR CLEAN FINGERS), SPRINKLE 2 TABLESPOONS OF COCOA POWDER IN AN EVEN LAYER OVER THE FLOUR.

4. HOLD YOUR HAND A FEW FEET ABOVE THE BOWL OF FLOUR, AND DROP YOUR NUT OR HARD CANDY INTO THE BOWL.

WHAT’S HAPPENING HERE:


TAKE IT FURTHER:

TO EXTEND THIS EXPERIMENT, TRY DROPPING THE SAME NUT FROM VARYING HEIGHTS ONTO THE SAME BED OF FLOUR. TRY CHANGING THE DEPTH OF THE FLOUR OR TRY COMPACTING THE FLOUR. ON EACH OF THESE EXPERIMENTS, OBSERVE AND COMPARE THE CRATERS FORMED BY THE METEORITE IMPACT. YOU MAY EVEN WANT TO TRY HAVING SOMEONE ELSE DROP A “METEORITE” INTO THE FLOUR. THEN, BASED ON THE SIZE AND SHAPE OF THE CRATER, GUESS AS TO WHICH METEORITE HIT IT AND AT WHAT HEIGHT.
**Fossils**

FOSSILS ARE THE REMAINS OF PLANTS, ANIMALS, AND OTHER LIFE FORMS THAT LIVED LONG AGO.

THERE ARE MANY TYPES OF FOSSILS - CAST FOSSILS OF BONES AND TEETH, TRACE FOSSILS SHOWING TRACKS OR ANCIENT ANIMAL POOP, INSECTS PRESERVED IN AMBER, AND EVEN FOSSILIZED CHEMICALS!

SCIENTISTS CAN LEARN NEW THINGS FOR EVERY FOSSIL THAT IS DISCOVERED!

FOSSILS DON’T FORM VERY OFTEN - BUT THERE ARE SOME ENVIRONMENTS THAT ARE BETTER FOR FOSSIL FORMATION THAN OTHERS!

WET, MUDDY AREAS LIKE SWAMPS, BEACHES, AND THE SEA FLOOR ARE GREAT FOR HELPING FOSSILS TO FORM - SO WE’RE GOING TO ADD A FEW INGREDIENTS TO OUR DIRT TO MAKE IT A BETTER PLACE FOR FOSSIL FORMATION.

**You will need:**

- FLOUR/COCOA POWDER MIXTURE
- 3/4 CUP SUGAR
- 2 TABLESPOONS BAKING POWDER
- 1/4 TEASPOON SALT
- 1/2 CUP MILK
- 2 TABLESPOONS OIL
- 1 TEASPOON VANILLA EXTRACT
- 1 CUP BROWN SUGAR
- 4 TABLESPOONS COCOA POWDER
- 1 3/4 CUP HOT WATER
1. In a medium bowl, add sugar, baking powder, and salt. Stir in the milk, oil, and vanilla until smooth. Spread this mixture in an ungreased 9-in square baking pan.

2. Combine brown sugar and remaining cocoa; sprinkle over batter.

3. Using clean fingers, gently press your finger tips into the batter to create "Dino Tracks" in your "Mud"

4. Pour hot water over all; do not stir.

What's happening here:

You are simulating what happens when one type of fossil forms - Dinosaur tracks. Most animal tracks do not become fossils - they're destroyed shortly after being made. But, if tracks get quickly covered in a layer of sediment (sand), they might be preserved over time. The mud slowly turns into rock, and the footprints become fossils! Track fossils form best in wet environments, next to water.

Take it further:

To extend this experiment, thoroughly clean a plastic dinosaur toy or other extinct animal figure. After placing the batter in the container, gently push your figure into the "Mud", cover with your brown sugar/cocoa powder "sediment", and cover all with hot water. This represents how bones and other hard parts of organisms can fossilize. If an organism dies near a water source, and the body is quickly covered with fine sediment or mud, it can slow down how fast it decays - and helping the organism become a fossil! Make sure to pull out your figure before baking!!
DEEP WITHIN THE EARTH IT IS SO HOT THAT SOME ROCKS SLOWLY MELT AND BECOME A THICK FLOWING SUBSTANCE CALLED MAGMA.

SINCE IT IS LIGHTER THAN THE SOLID ROCK AROUND IT, MAGMA RISES AND COLLECTS IN MAGMA CHAMBERS.

EVENTUALLY, SOME OF THE MAGMA PUSHES THROUGH VENTS AND FISSURES TO THE EARTH'S SURFACE. THERE ARE MANY TYPES OF VENTS AND FISSURES - SOME OF THE MOST FAMOUS ARE CALLED VOLCANOS.

MAGMA THAT HAS ERUPTED FROM THESE VENTS AND FISSURES IS CALLED LAVA.

- INFORMATION COURTESY UNITED STATES GEOLOGICAL SURVEY

USING OUR BAKED LAVA CAKE, WE CAN RE-CREATE THIS LAVAERUPTION!

You will need:

- BAKED LAVA CAKE
- KNIFE/SPOON
- PLATE
Erupt a volcano!

1. Bake your Lava Cake at 350 degrees Fahrenheit for 35-40 minutes.

2. Take your Lava Cake out of the oven and let cool slightly.

3. While still warm, cut your Lava Cake and serve!

4. Top with whipped cream, ice cream, or fresh fruit if desired.

What’s happening here:

You are simulating how magma rises through the Earth’s crust! The liquid chocolate at the bottom of the cake represents a magma chamber below the surface of the Earth. Cutting the cake creates a vent or fissure in the surface, through which the "magma" can seep. When the magma erupts through to the surface (in a violent volcanic eruption, slow dribble, or something in between!) it is called “lava”.

Take it further:

Try cutting different shapes into your cake - large gashes, small holes, and everything in between. How well does the magma seep through each shape? What does this tell you about vents and fissures in the Earth’s crust?