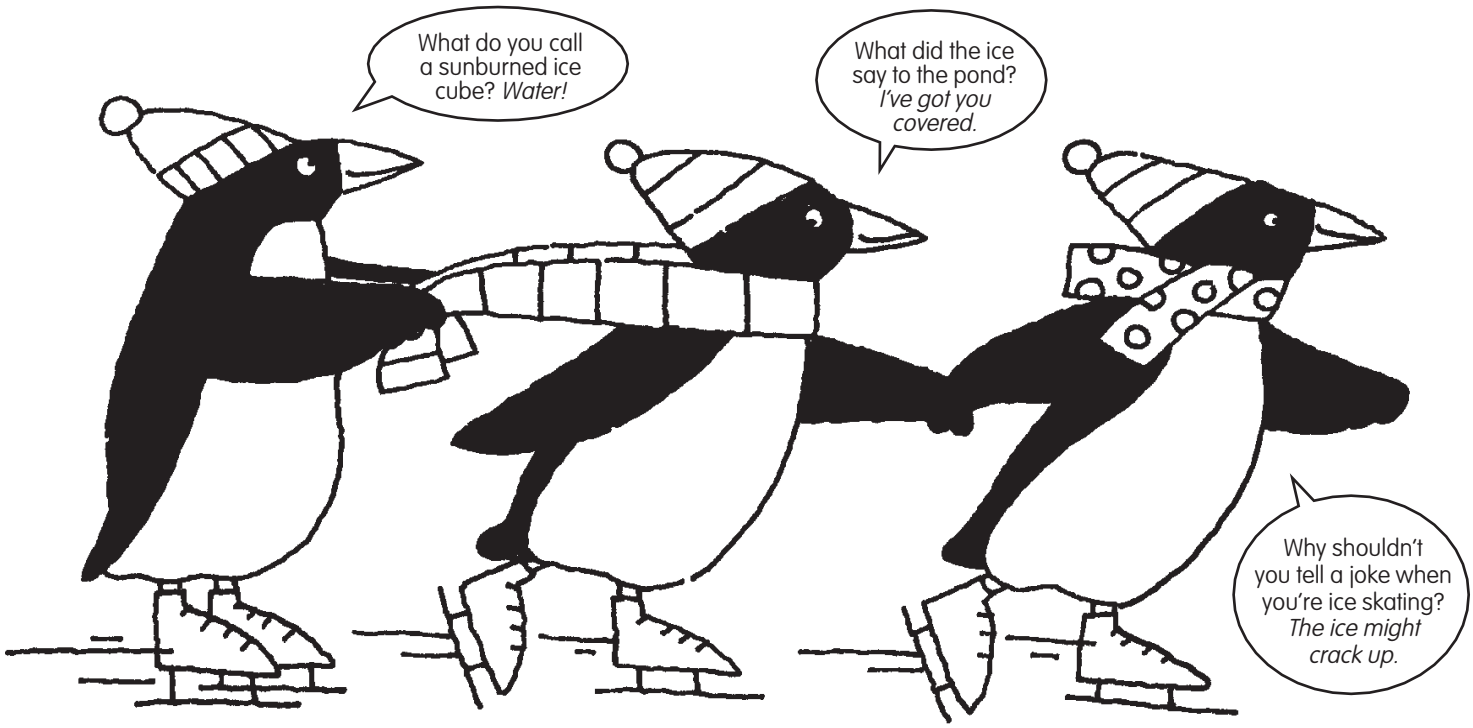


COOL Science

Chill out with some cool science experiments and plan lots of fun with ice activities.

WELCOME to the Ice Age

Get ready to spend an entire week studying ice and participating in ice activities. Ice is "cool" and kids will be anxious to learn all about it. Set the scene on Monday by prepping kids with discussions about water and ice. Then enjoy a fun activity—ice cube painting—to learn about melting ice. On Tuesday, make some unique ice cube shapes and introduce students to an ice keeper challenge. Wednesday will be a perfect day to try the freeze lab as you build up to Thursday when you stage an Ice Age Day. Generate a banner on your computer entitled "Chill Out...Welcome to the Ice Age!" and fill the day with hands-on ice activities. Enlist the help of parents to assist as well as prepare ice for all the experiments. Use Friday for a day of follow-up, completing any activities missed, demonstrating kids' ice keeper challenges, and reinforcing the many concepts students learned about ice.

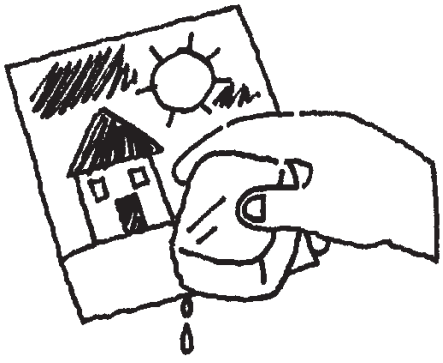
Wondrous Water

There wouldn't be ice without water, and our wondrous water is everywhere. In fact, water covers just about 3/4 of the planet Earth, makes up more than half the weight of a human body, and is essential to life. All living things need it to survive. Water can be found in three forms—liquid as in our oceans, rivers, lakes, rain, and from our faucets; gas in the form of vapor when water has been boiled; and solid when the temperature drops below the freezing point and the water changes into ice. Like everything on Earth, water is made up of very tiny particles called molecules. Give kids an idea of how small a molecule is by having them imagine the tiniest droplet of water. Explain that this water droplet is tinier than the head of a pin. As small as this drop of water is, it would contain more than 300 trillion molecules of water! Write the numeral 300,000,000,000 on the chalkboard. If you were to look at a water molecule under a microscope, you would see something that looked like Mickey Mouse. Draw a water molecule on the chalkboard as illustrated below and explain that water has two atoms of hydrogen that might look like Mickey's ears and one atom of oxygen that would form his face.

Scientists have given water the chemical symbol H_20...two atoms of hydrogen and one atom of oxygen. This unit will focus mainly on water's properties as ice—the solid form of water.

Ice Cube Painting

Ice is frozen water! Kids will discover this fact as they participate in a fun art project, ice cube painting. When water molecules get cold they slow down and pack together more tightly. They start bonding when they get freezing cold. Soon they lock together to form a solid structure. Unlike other solid substances such as rock or metal, ice can remain solid only at temperatures of 32°F or less. At room temperature ice will melt and turn into water. Try some ice cube painting with your class to demonstrate this fact. You will need ice cubes, plastic trash bags, art paper, and different flavors (colors) of an unsweetened powdered drink mix like Kool-Aid®. Spread plastic trash bags over a table or several desks and give each student a sheet of art paper. Sprinkle different colors of the drink mix on the art paper and give each student an ice cube to use like a paintbrush.



Encourage kids to enjoy the experience, feeling the cold of the ice and the wet of water, seeing the colors form, and smelling the flavors. See if they can guess what makes the ice cube melt... the heat in the room, the heat of their hand, and the heat from the pressure applied to holding and pressing the ice cube.

Ice Shapes

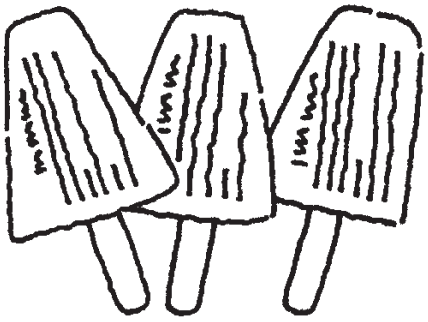
Ice is the solid state of water! Demonstrate this fact with a simple experiment that you should begin in the morning so that you can draw your conclusions by the end of the day. Gather together a variety of vessels in which to make ice...different sized cups, ice cube trays both normal and fanciful, a cupcake tin, a brownie pan, etc. and fill each with water. Place all of the water-filled containers into the freezer until set. Then, before the end of the school day, release each shape from its container and invite kids to look at and touch the ice. Compare the shape of the ice and the shape of the vessel. Conclude that ice takes on the shape of the container in which it is formed. Encourage kids to try different ice shapes at home and help them make the connection that ice is frozen water.

Ice Cube Keeper Challenge

Ice will melt and become water at room temperature! Over the years we have learned ways to keep ice in its solid state with refrigeration. But can we keep ice from melting without a refrigerator? Insulation is the answer! Insulating ice means to keep the heat out and the cold in. Duplicate an Ice Cube Keeper Challenge page for each student and ask kids to create their own invention for keeping ice cold. Brainstorm a list of things that might insulate ice and provide each student with two sandwich-sized zippered plastic bags that they may use for experimenting. Read over the rules on the challenge together and send the project home with instructions to bring the ice cube keeper back to school so that kids can demonstrate their invention for the class. When students return with their ice cube keepers, arrange them on a large table. Place an ice cube inside each keeper and set a time limit for the challenge. When the time has expired, have the children take the remains of their ice cube out of their keeper and place it on a paper plate or towel. Compare the size of all the ice cubes. Who won the challenge? Give children an opportunity to explain how they kept their ice cube cold!

Ice Age

During certain periods of our Earth's history, the climate became so cold that enormous ice sheets formed over low-lying areas of the continents and spread toward the equator. Eventually these ice sheets covered nearly a third of the planet's surface. We call these periods the Ice Ages. The ice sheets formed and advanced during cold spells and retreated during warm spells more than 20 different times during the Pleistocene Ice Age that lasted for over 1.6 million years. There were many other ice ages in Earth's history. The last Ice Age ended about 10,000 years ago, and some scientists wonder if we are presently living in an interglacial period meaning that Earth will experience another Ice Age sometime. Have your class ponder this thought. Today, two areas of our Earth are covered in ice sheets. Help kids identify these polar regions—the Arctic and the Antarctic—on your classroom globe. Explain that these areas are capped in ice all year long and are not frozen sea ice but fresh water ice created when loads of snow build on top of each other. Have your students ever made a snowball? When you press the snowflakes together to make a ball, you are creating a mini-version of the way an ice cap forms.



Ice Labs

Encourage cooperative discovery by experimenting together with some ice labs. Make the learning experience more fun by presenting each set of instructions in the shape of a giant popsicle. Duplicate the labs on different colored paper and identify the groups as the "strawberry pops," "grape pops," "lime pops," etc., according to their color. Cut out the popsicle shape and attach a tongue depressor (or a piece of cardboard in the shape of a tongue depressor) at the bottom of each popsicle. Divide kids into small lab groups and encourage them to proceed through the experiments. Duplicate open lab worksheets so that kids can work in groups, writing observations on the front of the worksheet and drawing illustrations on the back.

• Ice Tricks Lab

Most liquids contract when they cool. Water does to a degree, but below the freezing point water actually expands. This is the reason you don't fill an ice cube tray to the top with water and the reason lakes freeze only on the surface. When water expands as it turns to ice, it becomes less dense than the water around it. Because of this, ice floats in water. Kids often have ice in their drinks, but they may not have given much thought to the unique ability of ice to float in liquids. Give each group of students the needed materials to perform this lab, a blank worksheet, and an Ice Tricks Lab popsicle. Guide students so that they will observe several things as they proceed though this experiment.

1. The ice cube makes a crackling sound when it hits the water. This sound comes from the interaction of the warmer water with the ice cube. The difference in temperature between the surface of the ice and cold interior of the ice cube produces stress. This stress causes small cracks that you hear as they form.
2. A kind of sizzling sound may be heard. These are air bubbles that are frozen into the ice and that are now escaping as the ice melts.
3. The ice floats on top of the water. As ice freezes, it expands by 10%. Expansion makes the ice less dense than water so that ice cubes float.
4. The ice tends to flip over as it melts. Since the ice melts more on the bottom where it is exposed to the warmer water, the ice becomes top heavy and turns over.

• Freezing Lab

Water, unlike other liquids, expands when it freezes. Give each group of students the needed materials, a blank worksheet, and a Freezing Lab popsicle. This lab will demonstrate that water molecules expand or get larger when they freeze. Even before the freezing point of 32° water begins to expand. The water molecules take up more space as they pull away from each other, making ice lighter and less dense. They expand! As a bonus, carry out a class demonstration with water and an empty plastic soda bottle. Fill the soda bottle with water and close it tightly with the cap. Slip the bottle into a plastic zippered freezer bag and place it in the freezer overnight. You should find that the bottle has shattered when the water expanded as it turned into ice. Ice exerts a tremendous force as it expands.

• Melting Lab

Experiment with substances which might make ice melt more quickly on a slippery road. Give each group of students the needed materials, a blank worksheet, and a Melting Lab popsicle. You can use table salt, sidewalk salt, or sea salt for this experiment. Obviously, the bigger salt crystals will work better than the smaller ones. Discuss kids' conclusions. The hot water will melt ice the fastest because the heat of the water is most effective. Hot water is impractical for melting ice on roads since the cold, outside temperature would merely freeze the water once again on the road's surface. The salt most likely worked well and better than the sand and dirt. The dirt might help to make a road less slippery but does not melt the ice much. Gravel may apply a small amount of pressure on an icy road that may cause ice to melt just a little bit.

• Cutting Lab

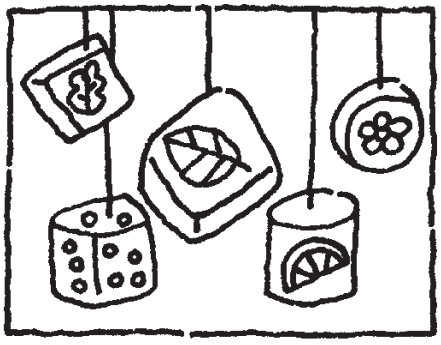
Kids will be surprised to learn that you can cut right through an ice cube without dividing it in two. Give each group of students the materials needed for this lab, a blank worksheet, and a Cutting Lab popsicle. It is true that a wire can slice ice...the wire will pass through the ice cube, but once the pressure of the wire is removed, the water freezes again. The pressure of the wire weighted down by the batteries applies heat energy to the ice. The ice melts beneath the wire and because the inside of the ice cube is below the freezing point, the melted ice above the wire freezes again. This phenomenon works well for ice skaters, too. The weight of the skater's body presses on the ice and melts the ice to form a film of water under the skate. This film lubricates the skate and makes the ice slippery. In a brief time, the ice will freeze again.

Ice Tower Challenge

Challenge students to create an ice tower by stacking as many ice cubes as possible, one on top of another. Give each child a paper towel and a bowl full of ice cubes. Most will find the task daunting until they discover the trick that will make the cubes stick together…salt. Salt lowers the freezing point of water. The ice melts all around the grains of salt and the salt dissolves. An uneven, pitted area is created on the ice making it possible to grip another surface. (This is why salt is put on sidewalks in icy weather.) When an ice cube is placed on top of this pitted surface, it will stick because the now salty water joins the cubes together. Armed with this information, give students a salt shaker and see how tall an ice tower they can build. Who can build the tallest tower?

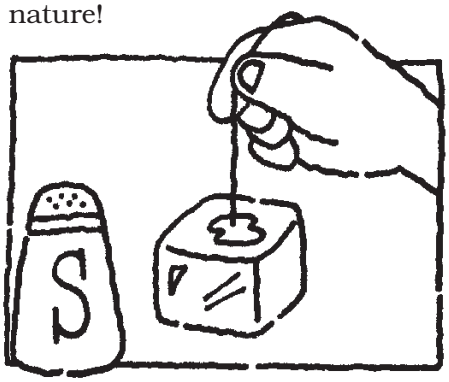
Ice Cube Fishing Contest

Since ice is lighter than the water surrounding it, it rises to the surface. This explains why ice forms only on the top layers of rivers and lakes when the temperature drops below freezing in the winter. This layer of ice protects or forms a "blanket" over the water and keeps it from freezing solid. A solid freeze would kill all the plants and animals that make their home in the water. Even in the middle of winter, fishermen are able to fish because only the top layer of water is frozen. Have some fun by inviting your kids to try some ice fishing…"ice cube fishing." Once again the trick will be adding salt, which will then make it possible to catch the ice cubes. Divide kids into small groups and provide each group with a tub of water filled with cold water and ice cubes. Give each child a 24" piece of string to use as a fishing line and have kids attempt to fish for ice cubes. Can anyone catch an ice cube on their fishing line and lift it out of the tub? Chances are kids will be unsuccessful until they sprinkle some salt onto the surface of the ice cube they wish to catch. After sprinkling their cube with salt, have kids lay the fishing line on top of the cube and count to 20. Then have them try to lift the ice out of the tub. Voila! The salt made the ice melt and a little pool of water was formed on the surface of the ice cube. When the fishing line sank into the pool of water, the coldness of the ice made the surface water freeze and trap the line in the cube.



Icicle Sun Catchers

Make sparkling icicle Sun catchers! Ask kids to bring different shaped plastic or metal containers or trays from home—peanut butter jars, small pans of different shapes and sizes, meat trays, tennis ball cans, etc. Then collect objects from nature such as berries, seeds, leaves, nuts, flowers, etc. Have students write their names on the containers and arrange their collected treasures inside. Carefully add water, filling no more than 3/4 full to allow for expansion. Then place one end of a 24" piece of colored yarn in the container. Check with your school kitchen staff about using the cafeteria freezers to freeze the Sun catchers or if you live in a cold climate leave them outside overnight. On the following day, unmold the Sun catchers and hang them outside your classroom window. What a joy to see the sunlight lighting your beautiful jewels of nature!



Ice Pops

A study of ice would not be complete without treating everyone to an ice pop. Purchase fruit pops from the grocery store or try making your own. Store-bought molds work very well or make it easy and use disposable cups and popsicle sticks. Remember not to fill the molds more than 3/4 full because the mixture will expand as it begins to freeze. If you don't already have a favorite ice pop recipe, kids might like one of the following.

• Strawberry Fruit Pops

Blend together in a blender:

1 bag frozen strawberries
2 T. sugar or honey
juice of one lemon
2 cups of orange juice.

Pour the mixture into molds and freeze.

• Root Beer Ice Pops

Combine 1 bottle of root beer, 1 tablespoon lemon juice, 1 tablespoon brown sugar, and a few grains of salt. Pour into molds and freeze.

Ice Cube Keeper Challenge

Here's your challenge! Make an ice cube keeper that insulates an ice cube so that it will stay frozen. Think about things that could insulate the cube. Remember...you want to keep the cold in and the heat out!

Follow these rules:

1. Use the zippered sandwich bag for your ice cube.
2. Do not add more ice or anything else that is frozen.
3. Do not seal the bag with anything other than the zipper.

You will receive two sandwich bags so that you can experiment.
Test different ways to keep the ice cube cold and choose the best one.
Fill out the ice cube keeper label below.
Bring your keeper back to school on _____.

Name _____ Date _____

My ICE CUBE Keeper

How did you make your ice cube keeper? _____

_____

_____

_____

Why do you think your keeper did a good job of insulating the ice cube?

_____

_____

_____

_____

_____

Name _____ Date _____

Ice Cube Lab Worksheet

State the Problem: _____

_____

_____

Predict: *What do you think will happen?* _____

_____

_____

Test and Observe: *Write down your observations.*

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

Conclusion: *What did you learn?*

_____

_____

_____

_____

_____

_____

Ice Tricks Lab

You will need: 2 ice cubes, glass of water (half full), worksheet

Problem: What tricks can ice do when placed in water?

Predict: What do you think will happen?

Test and Observe:

Follow these steps and write down your observations.

1. Place one ice cube in a glass of water. Observe.
   What do you hear? What do you see?
2. Add another ice cube. Observe.

Conclusion: What did you learn?

Freezing Lab

You will need: clear glass jar, water, masking tape, worksheet

Problem: Does ice expand (get bigger) or contract (get smaller) when it freezes?

Predict: What do you think will happen?

Test and Observe:

Follow these steps and write down your observations.

1. Fill the jar with water until it is 3/4 full.
2. Mark the water line on the jar with tape.
3. Place the jar into the freezer until the water is frozen.
4. Check the water line now. Where is it compared to the first line?

Conclusion: What did you learn?

Melting Lab

You will need: plastic bowl, ice cubes, salt, dirt, gravel, hot water, tablespoon, worksheet

Problem: What will melt ice the fastest?

Predict: What do you think will happen?

Test and Observe:

Follow these steps and write down your observations.

1. Place an ice cube in the bowl. Pour one tablespoon of salt on top of the ice cube and watch for 5 minutes. Write down what happens.
2. Try the same experiment using dirt, gravel, and hot water. Write down what happens.

Conclusion: What did you learn?

Cutting Ice Lab

You will need: fine wire (12"), 2 "D" batteries, soda can, ice cube, worksheet

Problem: Can a wire cut an ice cube in half?

Predict: What do you think will happen?

Test and Observe:

Follow these steps and write down your observations.

1. Place an ice cube on top of a soda can.
2. Wind one end of the wire around each of the batteries.
3. Place the wire across the middle of the ice cube with the batteries hanging from each side. Wait.
4. Observe. Is the ice cube cut in half?

Conclusion: What did you learn?