THE WONDER of WATER

Idaho Falls Earth Day Celebration

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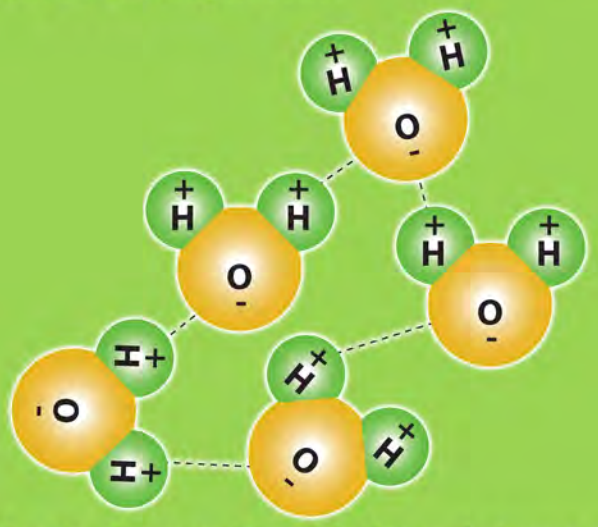
Idaho Falls EARTH DAY

From roaring waterfalls and crashing waves to gentle rain and billowing clouds, water is found across Earth's sphere. Water is even in you! Water is easy to take for granted, but water's unique properties make it a necessity for supporting all life on Earth. In this Earth Day supplement we will explore some of water's most amazing properties.

Water is a unique compound that is made up of molecules. Each water molecule consists of two atoms of the element hydrogen joined to one atom of the element oxygen. The chemical composition of water is H_2O – two hydrogen atoms and one oxygen atom.

When the two hydrogen atoms bond with the oxygen, they attach to the top of the molecule, rather like Mickey Mouse ears. This molecular structure gives the water molecule polarity, or a lopsided electrical charge that attracts other atoms. The end of the molecule with the two hydrogen atoms is positively charged. The other end, with the oxygen, is negatively charged. Just like in a magnet, where north poles are attracted to south poles ('opposites attract'), the positive end of the water molecule will connect with the negative end of other molecules.

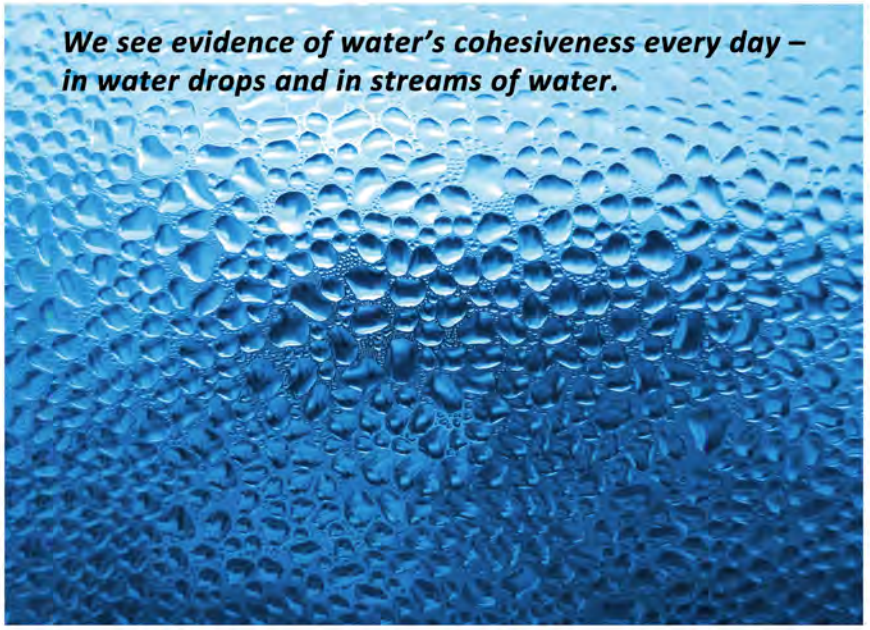
Water has an amazing ability to adhere (stick) to itself. Hydrogen bonds form between neighboring hydrogen and oxygen atoms of adjacent water molecules. The attraction between individual water molecules creates a bond known as a hydrogen bond.



Hydrogen bonds shown as the dotted lines between molecules.

WATER PROPERTY:

COHESION



This adhesive property is called cohesion. Have you ever filled a glass of water to the very top and then slowly added a few more drops? Before it overflows, the water forms a dome-like shape above the rim of the glass. Cohesion refers to the attraction of molecules for other molecules of the same kind, and water molecules have strong cohesive forces thanks to their ability to form hydrogen bonds with one another.

Testing Cohesion

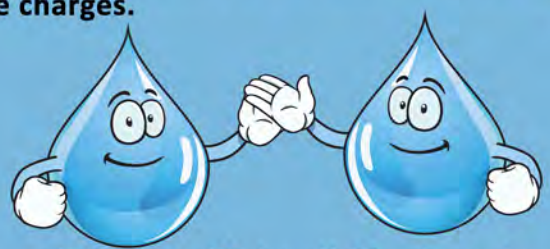
Materials: large index card, wax paper, tape, eye dropper, popsicle stick, water

1. Cover a large index card with the piece of wax paper so that the wax paper completely covers the card. Tape the wax paper in place.
2. Use the dropper to gently squeeze out a drop of water, but try not to let the drop fall completely out of the dropper. See how far you can make the drop hang off the end of the dropper without the drop falling. Can you see cohesion at work?
3. Place 4 or 5 drops of water together on a piece of wax paper to make one medium-sized drop.
4. Gently tilt the wax paper in different directions so that the drop moves. Does the whole drop of water move together? Can you see cohesion at work?
5. Use a popsicle stick to slowly drag the drop of water around the wax paper a bit. Try using your popsicle stick to separate your drop in two.
6. Use your popsicle stick to move the drops near each other. Then move one drop so that the two drops touch. What happened?

WATER PROPERTY:

ADHESION

Water likes to stick to itself, but under certain circumstances, it actually prefers to stick to other types of molecules. Adhesion is the attraction of molecules of one kind for molecules of a different kind, and it can be quite strong for water, especially with other molecules bearing positive or negative charges.



Cohesion: Water sticking to water.

Adhesion: Water sticking to something else.

Water adheres to many things— it sticks to plants, it sticks to dishes, and it sticks to your eyebrows when you sweat. In each of these cases water adheres to or wets something because of adhesion. This is why your hair stays wet after you shower. Molecules of water are actually sticking to your hair. Adhesion also explains why soil is able to hold water and form mud.

Testing Adhesion

Materials: squares of wax paper, water

1. Take a square of wax paper and fold 2 corners so they stick out – you will use them as handles.
2. Take another square and put about 5 drops of water in the middle of it.
3. Now place the first square of wax paper on top of the drops of water. Make sure the handles point up.
4. Hold only the corner handles and carefully lift them. Does the water glue the two squares together so you can pick them both off the table?
5. Continue to add squares of wax paper and lift them until the handles are no longer able to pick them all up.

Experiment with other materials. You could try plain paper, aluminium foil, even paper clips. What is water's adhesion capable of holding up?

WATER DROPS

Nearly 97% of the world's water is salty or otherwise undrinkable. Another 2% is locked in ice caps and glaciers. That leaves just 1% for all of humanity's needs — all its agricultural, residential, manufacturing, community, and personal needs.

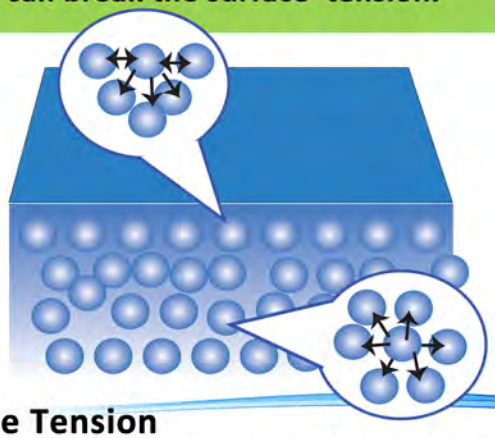
WATER PROPERTY:

SURFACE TENSION

Water has surface tension. Surface tension is a scientific term that means that the surface of a body of water has the ability to hold itself together. This happens because the molecules that make up a container of water tend to stick together. We learned about this property of water called cohesion on Page 2.

You can feel surface tension in a body of water when you poke your finger into a cup of water or when you dive into the swimming pool.

Imagine the hydrogen bonds between water molecules at the surface are like members of a red rover team holding hands. When playing red rover, team members line up to form a chain to try and prevent someone from running through their joined hands. The linked hands represent the hydrogen bonds between water molecules that can prevent an object from breaking through. Of course, a faster or heavier person can more easily break through the hand bonds during a game of red rover. Similarly a heavy object, or one that isn't carefully placed on the surface of the water, can break the surface tension.



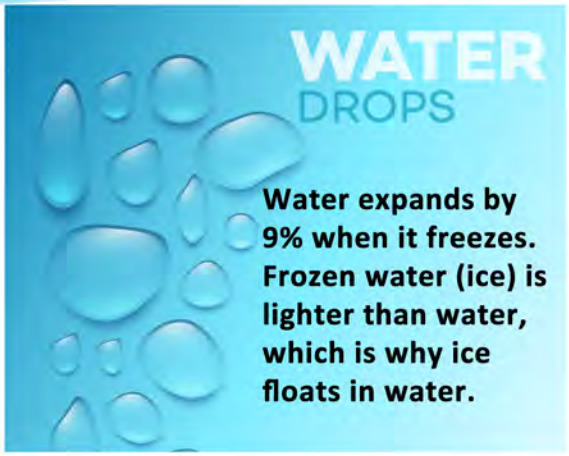
In a sample of water, there are two types of molecules: those that are on the outside (exterior), and those that are on the inside (interior). The interior molecules are attracted to all the molecules around them, while the exterior molecules are attracted to only the other surface molecules and to those below the surface.

Surface Tension

Materials: cereal bowl, water, ground black pepper, liquid soap, toothpick

1. Fill a bowl with water.
2. Shake black pepper onto the surface of the water. Notice how it stays afloat on the water? That is surface tension.
3. Take a toothpick and dip one end into the liquid soap.
4. Gently touch the surface of the water with the toothpick. Did you see how the pepper shoots back in all directions. Do you think the soap is changing the surface tension? Soap breaks down the cohesive powers of water, making it have less surface tension.

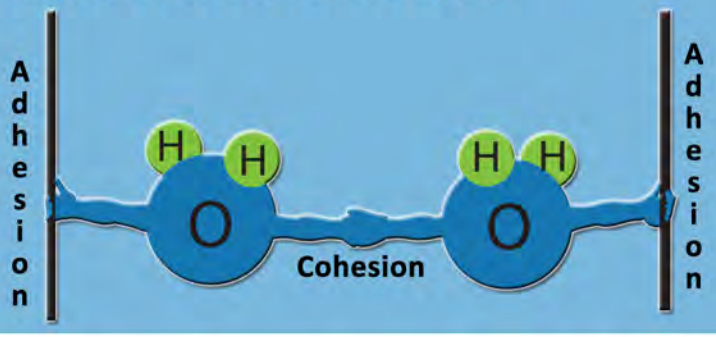
Thought Question: If you mix some soap with water and make a water droplet, what do you think the shape will look like?



Water expands by 9% when it freezes. Frozen water (ice) is lighter than water, which is why ice floats in water.

You've just poured a big glass of water, but as you're putting the pitcher into the refrigerator, your elbow knocks the glass over, spilling water all over the counter top. You grab a paper towel and put it over the puddle. The water immediately soaks into the paper towel and the counter is dry. You've just used capillary action to clean up your mess.

Capillary action is the amazing, gravity-defying scientific phenomenon that causes liquids to flow up. This happens when the three forces called cohesion, adhesion, and surface tension work together. Let's look at how these forces cooperate to cause capillary action.



WATER PROPERTY:

CAPILLARY ACTION

Climbing Water

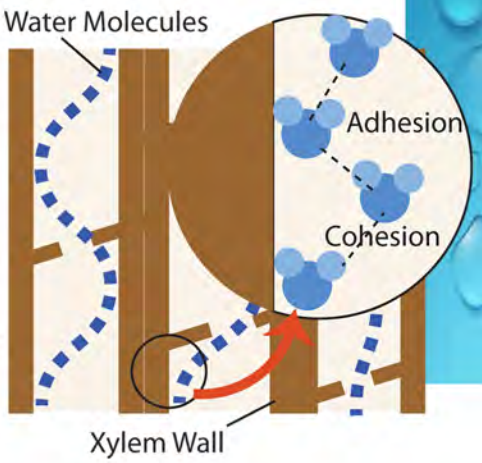
Can the water from one cup climb uphill and then back down into a second cup?

Materials: 2 glasses, water, paper towels

1. Twist two pieces of paper towel together until it forms a rope-like tube. This will be the wick that will absorb and transform the water.
2. Fill one glass 1/2 full of water.
3. Place one end of the paper towels into the glass with water and the other into the empty glass. Watch what happens.

Your paper towel rope starts getting wet. After a few minutes you will notice that the empty glass is starting to fill with water. It keeps filling until there is an even amount of water in each glass. How does this happen?

It's capillary action at work! The water uses this process to move along the tiny gaps in the fiber of the paper towels. It occurs due to the adhesive force between the water and the paper towel being stronger than the cohesive forces inside the water itself. This process can also be seen in plants where moisture travels from the roots to the rest of the plant.



WATER DROPS

Capillary action is part of the reason that water rises in a plant stem and moves throughout the plant. The water enters the plant's roots and moves to other parts of the plant through tiny tube-like structures called xylem.

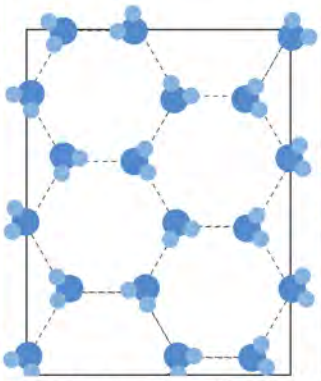
WATER PROPERTY:

STATES OF MATTER

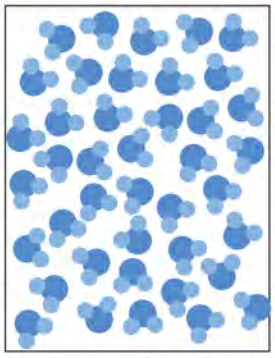
There are three forms of water: liquid, solid, and gas. The water will change between these three forms based upon the temperature of the environment.

Water is unique because it is the only natural substance that can exist in all three states of matter at the temperatures normally found on Earth! Water is usually a liquid, but when it reaches to 32° F, it freezes into ice (solid). When water reaches 212° F, it boils. When it begins to boil, some of the water turns into steam (gas). When steam comes into contact with cool air (which reduces energy), it can condense back into water droplets (liquid again). Those water droplets could then freeze into solid ice.

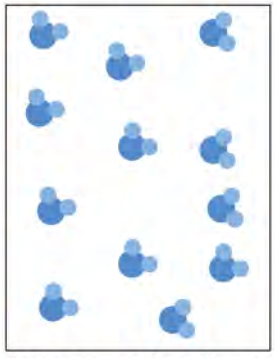
Even with all of these state changes, it is important to remember that the substance stays the same—it is still water, which consists of two hydrogen atoms and one oxygen atom. Changing states of matter are only physical changes; the chemical properties of the matter stays the same regardless of its physical state!



Water molecules in solid ice.



Water molecules in liquid water.



Water molecules in water vapor (gas).

Discover Water's States of Matter

Materials: Koolaid packet, water, ice cube tray, ziplock plastic baggie, masking tape

1. Mix the Koolaid according to package directions.
2. Fill the ice cube tray with the Koolaid and put it in the freezer to harden.
3. Place the ice cubes in the plastic baggie. Which of water's states of matter do the ice cubes represent?
4. Using the masking tape, attach the baggie to a sunny window. Check the bag for changes every half hour. Are the ice cubes still solid? Is the water liquid or gas? How do you know? (Liquids take the shape of their container and are flowing.)
5. Keep watching the water in the baggie. After a couple of hours, do you notice droplets of water forming at the top of the baggie? Heated by the sun, the water is evaporating, forming a gas in the baggie. Water vapor is a gas, but since it can't escape the baggie, it begins to condense and form droplets of water, becoming a liquid again.

Thought Questions: What causes the water to change from one state of matter to another? (The temperature.) What could you do to prevent the water droplets from forming in the baggie? (You could refreeze the water, so it could become a solid again. Or you could open the baggie to let the water vapor escape. Eventually all the water would evaporate into the air.)

WATER DROPS

Clouds are a mixture of solid, liquid and gaseous water. Clouds are made up of millions of tiny droplets of liquid water. In addition to liquid water, clouds contain water in gaseous form, called water vapor, and in cold weather, they can contain ice crystals.

WATER PROPERTY:

SPECIFIC HEAT CAPACITY

Heat capacity is the amount of heat required to raise the temperature of a object by 1° C without changing the state of matter. Different substances have different specific heat capacities. The table shows some examples.

Substance	Specific Heat Capacity
Water	4184
Ice	2008
Average Rock	2000
Wet Sand	1500
Snow	878
Vegetated Land	830
Air	700

Notice that water has a particularly high specific heat capacity. That's why it takes so long for a cup of hot cocoa to cool down.

The high heat capacity of water has a great deal to do with regulating extremes in the environment. Large bodies of water, like the ocean, don't change temperature very much throughout the year. The ocean keeps the temperature on land relatively stable.

It takes less energy to heat up sand. That is part of the reason why deserts like the Sahara and the Mojave are so hot . The sand heats up very quickly. And deserts are usually pretty cold at night, because once the sun sets, the sand cools off very quickly.

Fireproof Balloon

Materials: AN ADULT HELPER, balloons, candle, match, water

1. Inflate one balloon with air and tie it off.
2. Stretch another balloon over a water tap and fill with water until the balloon is about the fist-size. Inflate the balloon to the same size as the first and tie it off.
3. Light the candle with help from your adult helper. What will happen when the flame touches the "air only" balloon?
4. Place the balloon into the flame. What happened?
5. We will now test the "air and water" balloon. What do you think will happen?
6. Lower the balloon from above the flame, making sure the sides of the balloon do not touch the fire. What happened? Why? *There will be a black pot on the bottom of the balloon. It's not burned; the black patch is soot from the flame.*

The reason a balloon filled with air pops when you put it over a flame is because the rubber of the balloon gets very hot and weak and then breaks. When you fill a balloon with water instead of air, the water absorbs most of the heat, so the rubber doesn't get very hot.

But watch out! If you turn the balloon so that the candle flame is close to the side of the water balloon, the balloon will pop because the water is not conducting the heat away from the surface of the balloon.

Hot water freezes faster than cold water. This is known as the Mpemba Effect.

WATER PROPERTY:

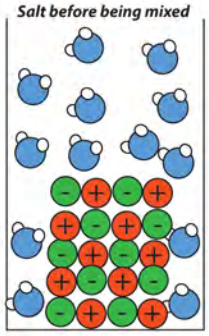
Universal Solvent

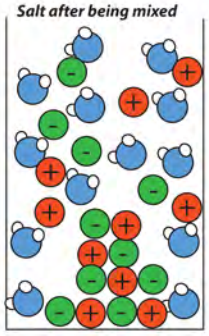
Have you ever made a beverage from a powdered drink mix? If you put the powdered drink mix in a bottle with water and shake the bottle really hard, the powder will seem to disappear. The powder will dissolve into the water. Not only will powdered drink mix dissolve in water, so will many other substances. Why is this the case? What makes water such a good solvent?

A solvent is a substance that other materials dissolve into. It's typically a liquid but it's sometimes a gas or a solid. Water is called the universal solvent because many materials are able to dissolve in water.

This is important to every living thing on earth. It means that wherever water goes, either through the ground or through our bodies, it takes along valuable chemicals, minerals, and nutrients.

As stated in earlier sections, it is water's polar arrangement of the oxygen and hydrogen atoms with one side (hydrogen) having a positive electrical charge and the other side (oxygen) having a negative charge. This polarity is what makes many other substances attracted to the water molecule. The attraction to the water molecule can be so strong for some molecules that water break the bonds that hold other molecules together. This is what causes materials to dissolve so well in water.





The Universal Solvent

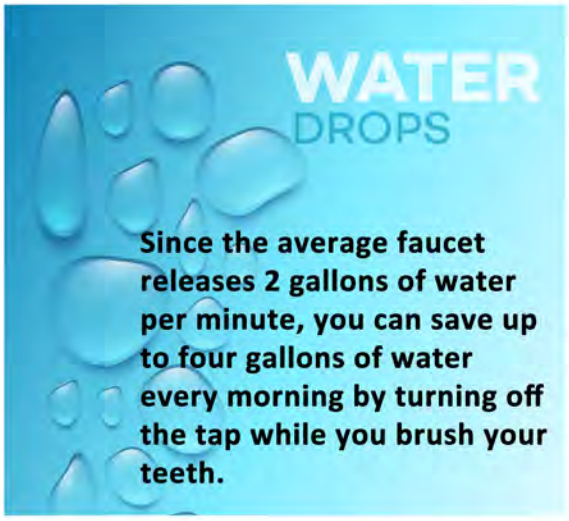
A general rule that determines whether a substance will dissolve in a solvent depends upon its polarity. Polar solvents dissolve polar solutes and nonpolar solvents dissolve nonpolar solutes.

In this activity, you will compare the ability of water, alcohol, and vegetable oil to dissolve certain solids.

Materials: Alcohol, vegetable oil, sugar, salt, margarine, masking tape, pencil, tablespoon, teaspoon, and 9 small, clear cups or test tubes.

1. Using the masking tape and pencil, number the cups 1-9.
2. Pour 2 tablespoons of water into cups marked 1-3.
3. Pour 2 tablespoons of alcohol into cups marked 4-6.
4. Pour 2 tablespoons of vegetable oil into glasses marked 7-9.
5. Place a 1 tablespoon of sugar in cups 1, 4, & 7.
6. Place a 1 tablespoon of salt in cups 2, 5, & 8.
7. Place a small piece of margarine in cups 3, 6, & 9.
8. Cover each cup with your hand and shake. How well does each solvent dissolve the solute?

What conclusions can you make about water as a solvent?



WATER IN OUR WORLD:

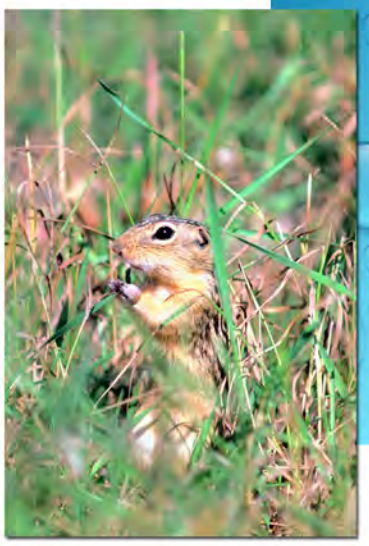
Water: Resource for Life

Human beings are about 67% water. In fact, every living organisms, whether composed of one cell or many millions of cells, contains water. Water is needed to transport nutrients and oxygen through living organisms and to carry out waste. Water also is vital for cooking, cleaning, growing crops, raising animals, transportation, production of electricity and manufacturing. Without water, we would not only be unhealthy, we would not be alive.

How much do you know about water?

Please circle the letter beside the correct answer to each question.

1. ***What makes water special?***
   - ***a. Dinosaurs drank it.***
   - ***b. It is clear.***
   - ***c. All living things need it.***
   - ***d. It evaporates.***
2. ***Why are water drops round?***
   - ***a. Water likes to stick together.***
   - ***b. Water is slippery.***
   - ***c. Water is the same as oil.***
   - ***d. Water is wet.***
3. ***Which of these is made mostly of water?***
   - ***a. Brick***
   - ***b. Orange***
   - ***c. Peanut***
   - ***d. Sweater***
4. ***Which these substances will dissolve in water?***
   - ***a. Wood***
   - ***b. Sand***
   - ***c. Flour***
   - ***d. Sugar***
5. ***How much water should a person drink in one day?***
   - ***a. 2 glasses***
   - ***b. 4 glasses***
   - ***c. 6 glasses***
   - ***d. 8 glasses***
6. ***Where is most water absorbed into the rest of the body?***
   - ***a. Mouth***
   - ***b. Small intestine***
   - ***c. Large Intestine***
   - ***d. Stomach***



WATER DROPS ɔund

In the desert, most herbivores living there get the majority of their water from the plants they eat rather than drinking directly from water sources.

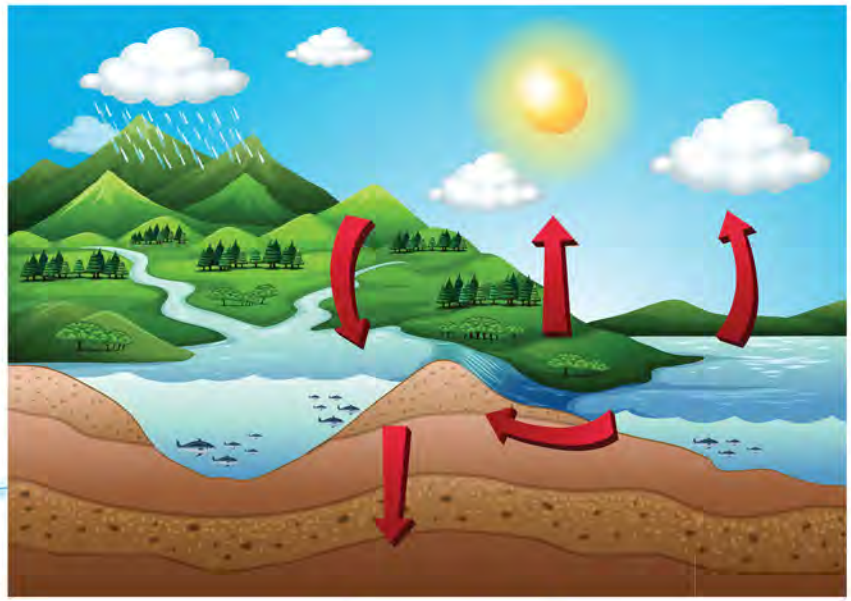
1c, 2a, 3b, 4d, 5d, 6c

WATER IN OUR WORLD:

Water Cycle

Water is one of the few substances that can be found in all three states--liquid, solid and gas--at any given time somewhere on Earth. When we are talking about water, we usually think of liquid water. However, if water were not continuously cycling among its three states, the world's stores of freshwater quickly would become depleted or too polluted to use.

Fortunately, our supply of freshwater continually is collected, purified and redistributed as part of the water cycle. This continuous process replenishes our water sources through precipitation (rain, snow and sleet, for example). Some water from precipitation soaks into the ground. The rest runs off into streams, lakes and the oceans. Heat from the sun causes water to evaporate from the land and from bodies of water. Water vapor collects in the atmosphere until there is too much for the air to hold in clouds, leading once again to rain or snow.



Water Cycle Model

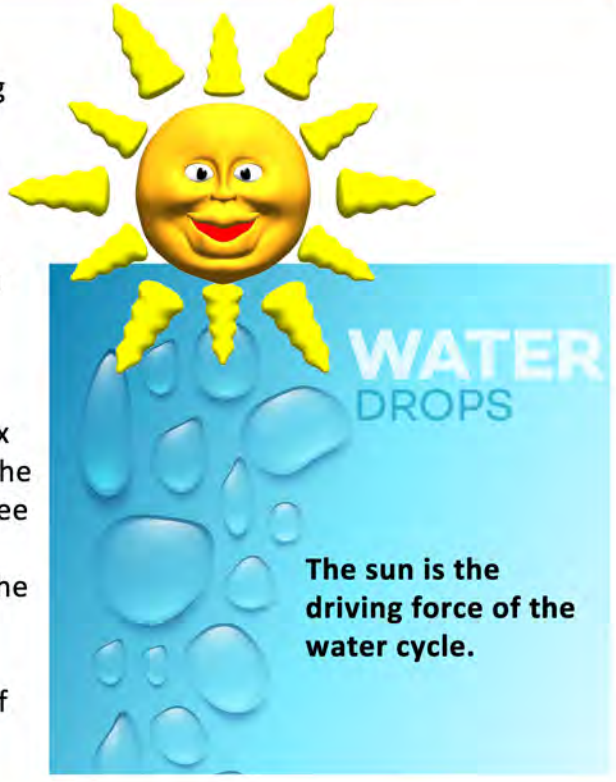
Materials: 2 cups of sand, 20 ice cubes, shoebox, aluminum foil, plastic wrap, large rubber band, measuring cup, lamp or sunny window

1. Line the inside of the shoebox by pressing a single sheet of aluminum foil along the bottom and up the sides of the box.
2. Measure 2 cups of sand and place it in a pile at one end of the box.
3. Smooth the sand to create a hill at one of the box, gradually sloping it toward the other end. This will be the land in the model.
4. Place 20 ice cubes on top of the land. The ice cubes represent snow and ice in the model.
5. Cover each box with a sheet of clear plastic wrap and secure it with a large rubber band.
6. What do you think will happen if we place the model in the sun? Place the box in a sunny window or under a lamp with an incandescent light bulb. Observe the model at intervals through the day. What happens to the ice cubes? Do you see any condensation in the model?

Water in all three states of matter have been present in the model. Where is the water now?

FOR FURTHER STUDY

What would happen chemicals were introduced into the model? Place drops of food coloring on the sand of your model and add more ice cubes. Where do the colors end up in the system?



The sun is the driving force of the water cycle.

WATER IN OUR WORLD:

How Do We Use Water?

Water is essential for life, and each of us uses water in many ways. We drink water and consume water in the food we eat. We use water to wash dishes and food to remove microorganisms that can cause illness. We prevent other kinds of diseases when we use water for bathing and for brushing teeth.

However, many daily uses of water are non-essential. We use water to wash our cars or driveways because they look better wen they are clean. We sprinkle our lawns with water, even though we don't use those plants for food. In addition, we often use more water than necessary to carry out essential task. We may leave the water running while brushing teeth, take a long shower or fill the bathtub to the brim.

This activity will help make you aware of the ways you use water each day.

Typical Amounts of Water Used in American Homes

Amount	Activity
2 gallons	Brush teeth
2 gallons	Run faucet until water is cold
2-7 gallons	Flush toilet
12-20 gallons	Run dishwasher
50 gallons	Run clothes washer
25-50 gallons	Take a 10-minute shower
25-50 gallons	Fill bathtub
50 gallons	Run garden hose for 5 minutes.

Source: US Environmental Protection Agency, Office of Water

WATER DROPS

It takes 1,400 gallons of water to produce a meal of a hamburger, French fries and a soft drink.

1. **What are some of the ways you use water every day? Make a list.**
2. **For 24 hours, record your water use for the day.**
3. **How many uses of water on your list help you stay healthy? In how many of these healthy uses could you save water without affecting your health?**
4. **Make a new list of ideas for saving water.**

Estimating water use for washing face or hands

1. **Get a bucket and a stop watch or watch with a second hand.**
2. **Turn on a faucet so the water comes out like it usually would when you wash. Put the bucket under the faucet and at that very same moment start timing.**
3. **Wait until exactly one minute is up then turn off the faucet. Pour the water into an empty gallon container and estimate how many gallons of water you used. This will tell you the flow rate (gallons per minute) of your faucet.**
4. **Next, time how long it takes to wash. If you measure this in seconds you will need to convert the time to minutes.**

Flow Rate X Time = Amount of Water Used

On land, plants and animals must conserve water within their bodies. Animals lose water through evaporation from lung surfaces and the outer body surface, and through elimination in feces and excretion in urine. Water that is lost must be replaced.

The threat of water loss is especially significant for animals living in dry environments. Most of these animals have evolved special strategies to conserve water.

The most universal behavioral adaptation used by small mammals, reptiles, and insects to deal with high temperatures is staying in the shade of plants or rocks, thus avoiding the direct rays of the Sun.

These animals also seek shelter by burrowing into the ground. Just as a basement room is cooler than an above-ground room, a burrow, even a few feet underground, can decrease the temperature by several degrees.

Another behavioral adaptation used by desert animals is to remain inactive during the hot daylight hours. They hunt at dusk, night or dawn when temperatures are cool and when there is less risk of losing precious body water. Animals that are active at night are nocturnal. Animals that are active at dusk and dawn are crepuscular.

WATER IN OUR WORLD:

How Much Water Do Animals Need?

Kangaroo Rat

Water Conservation in Desert Animals

Materials: 4 sponges, a plastic sandwich bag, scale, disposable aluminum pan, sand

The sponges will represent desert-dwelling animals. We will simulate three adaptations that some desert animals exhibit to help retain water and reduce overheating.

1. Moisten all 4 sponges to the point of saturation. Weigh each sponge and record its weight.
2. Place one sponge in a shady area for 24 hours.
3. Place a sponge in a shallow burrow. Fill a disposable aluminum pan with sand, then dig a shallow burrow in the sand. Place the sponge inside and cover it with an inch of sand. Place the pan in an area receiving direct sunlight for 24 hours.
4. Place one of the sponges in a plastic bag and securely fasten it. Place the sponge in direct sunlight for 24 hours.
5. Place the last sponge in a non-shaded area for 24 hours. This is your control sponge.
6. After 24 hours, weigh the sponges and note the results.

Shaded Sponge: Many desert animals avoid heat by being crepuscular. That is, they are primarily active at dusk and dawn and retreat to a shady place during the day. Examples: Pronghorn antelope, mule deer, coyotes

Burrow Sponge: Some desert animals avoid heat by digging a burrow under the surface of the soil or sand to escape the high surface temperature. Examples: ground squirrels, mice, rats, badgers

Waterproof Skin Sponge: Some desert animals retain water by having a waterproof skin that retains moisture. Examples: lizards, snakes, insects

WATER DROPS

All reptiles possess a thick, scaly skin composed of keratin. This reptilian skin greatly reduces the loss of water.

WATER IN OUR WORLD:

Water Pollution

Water pollution happens when toxic substances enter water bodies such as lakes, rivers, oceans and other bodies of water. The toxic substances dissolve and are either suspended in the water or deposied on the bed. This degrades the quality of water.

Not only does this harm aquatic ecosystems, the pollutants also seep through and reach the groundwater, which could end up in our households as contaminated water we use in our daily activities.

Water pollution can be caused by a number of contaminants, including sediment and plant waste, litter, soaps and detergents, oil, chemicals, plastics, microscopic organisms, pesticides and fertilizers, and animal and human waste.

WATER POLLUTION EXPERIMENT

Materials: tap water, 6 clear glasses, vegetable oil, dishwashing liquid, soil, coffee filter papers, spoon

1. Put some tap water in 3 separate clean, clear glasses.
2. Add the oil to one glass of tap water to create polluted water.
3. Add dishwashing soap to the next glass.
4. Add soil to the last glass.
5. Observe the pollution in each glass.
6. What will happen if you stir the polluted water? Stir the glasses of water with a spoon to create movement in the polluted water. Observe what happens to the water. How could this happen in nature?
7. Continue to observe the water for 5 minutes. What do you think is happening?
8. Filter the polluted water through the coffee filter into a clean glass, repeating for each of the glasses. Can you think of any other materials that might filter polluted water in nature (i.e. clean rocks, sand, etc.)? Could the filtered water still be contaminated?

We just made a simple filter to clean our own dirty water. This is how basic water purification processes work, but it doesn't filter out everything. What didn't the filter remove? What pollutants are there in real life that we didn't include?

Note: The filtration methods used in this activity are a simple demonstration and the water should not be considered safe for drinking.

What we can do? Everyone has a role to play in reducing pollution!

WATER DROPS

About 40 percent of rivers and lakes in the U.S. surveyed by the EPA are too polluted for swimming or fishing.

Water that looks clean and clear may still contain many different types of chemical and biological materials. Most of these are harmless--especially in tiny quantities.

However, some types of water contaminants are harmful to human health, even in very small amounts. The concentration of many of these substances usually is measured in parts per million, or even in parts per billion. The Environmental Protection Agency (EPA) sets limits for the amounts of potentially harmful chemicals in drinking water sources.

WATER IN OUR WORLD:

Parts Per Million

What Does One in a Million Look Like?

Materials: 6 clear 2-oz cups, 2, plastic cup, pipets or droppers, food coloring, water

1. Mark the 6 small cups with numbers 1-6.
2. Add one drop of food coloring and nine drops of water to Cup #1. The amount of food coloring in Cup #1 is 1 drop in 10.
3. Take 1 drop from Cup #1 and put it into Cup #2. Add nine drops of water to Cup 2. The amount of food coloring in Cup #2 is 1 drop in 100.
4. Continue adding one drop from the previous cup and nine drops of water to each new cup until all six cups hold 10 drops, then fill out the table. ***Hint:*** Look for a pattern in the amount of food coloring that ends up in each cup.

Cup Number	Total Drops in Cup	Amount of Food Coloring Present
1	10	1 drop in 10
2	10	1 drop in 100
3	____	1 drop in 1,000
4	____	1 drop in _____
5	____	1 drop in _____
6	____	1 drop in _____

The concentration in Cup #6 is one part in one million. Each cup has a food coloring solution that is 10 times more diluted than the solution in the preceding cup.

Could the water you drink contain tiny amount of other things we can't see? Almost no water, except in a laboratory, is completely pure. Minerals, microorganisms, or chemicals might be present, even in very tiny amounts. Not all of these things are necessarily harmful, but some pollutants can be harmful to human beings even in very tiny amounts, often measurable only in parts per million or parts per billion. City, county, state and federal agencies test drinking water for potentially harmful chemicals routinely.

WATER DROPS

The Safe Drinking Water Act was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply.

WATER IN OUR WORLD:

Exploring the water around us

Water is constantly moving. When it rains, where does all that water go? Sometimes rain falls and ends up in a stream or pond. Sometimes rain falls on the ground and is used by plants or soaks into the ground and becomes groundwater.

Walk around your home, school or neighborhood to find places water might travel. Use the Water Travel Checklist below for ideas or use your own ideas to help identify water's path.

After you have found places water could go, make a map of the journey water might take, starting from falling from a cloud.

Water Travel Checklist

Check all of the places you see the drops going. Write out other places water travels that are not listed here.

- ☐ Falls on the roof and down the gutters
- ☐ Runs into the street
- ☐ Soaks into the ground
- ☐ Drains down the storm sewer
- ☐ Hits the top of an umbrella
- ☐ Flows to a nearby stream
- ☐ Waters the garden
- ☐ Filters to roots for use by a plant
- ☐ Falls in a bird bath
- ☐ Drank by an animal
- ☐ Stored in a pond/lake
- ☐ Collects in a rain barrel
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

WATER DROPS

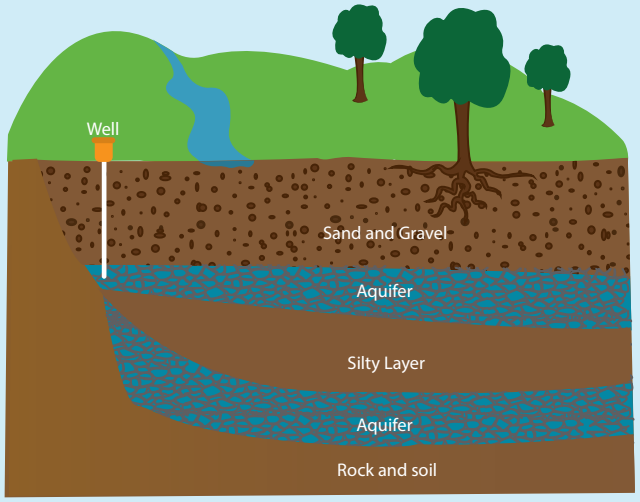
If your home sits on a 1-acre lot and a storm that drops 1/2 inch of rain covers your yard, 13,577 gallons of rainwater fell.

Rainwater Calculator: water.usgs.gov/edu/activity-howmuchrain.html

IDAHO ENVIRONMENTAL COALITION

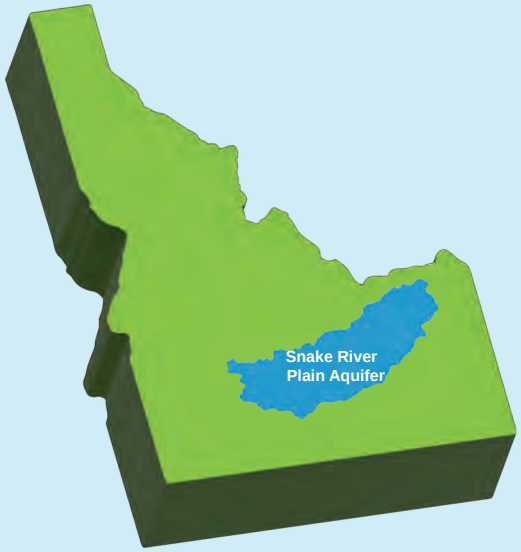
What is an Aquifer?

An aquifer is an underground water source.



Why are aquifers important?

Aquifers store water that can be brought to the surface using a well for drinking, farming, and industrial uses.



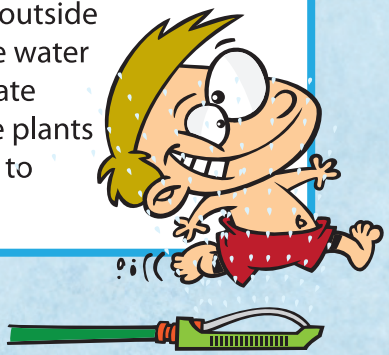
The Snake River Plain Aquifer is a large groundwater source used by more than 130,000 residents in eastern and southern Idaho.

As the contractor for the The Idaho Cleanup Project, Idaho Environmental Coalition is working to protect the Snake River Plain Aquifer by removing spent nuclear fuel (pictured), radioactive and hazardous wastes disposed of decades ago at the Idaho National Laboratory Site.

Make sure to stop by Idaho Environmental Coalition's booth at the Idaho Falls Earth Day Celebration in the Idaho Falls Zoo on April 23, to learn how the robots and drones we use clean up the environment, remove waste, and protect the aquifer!

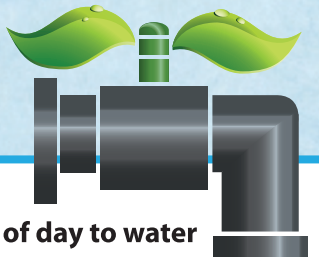
Water Quality - Water Sense

Although it is fun to run through the sprinklers at the hottest time of day, your lawn should only be watered in the early morning or late evening when it's cooler. Watering the yard when it's really hot outside causes the water to evaporate before the plants have time to drink it.

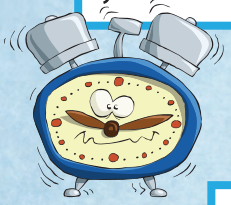


Washing your bike with a bucket and sponge will not only get your bike extra clean, it will also save water. Hoses can waste more than 6 gallons a minute while a bucket only uses a few gallons for a whole wash. Use a bucket and sponge when you help your parents wash the car!

How can a small family use so much water? It may seem hard to believe, but the average person uses 100 gallons of water each day--that's enough to fill 1,600 drinking glasses!



Put a bucket under the tap while you make the water the right temperature. The water you collect can be used to water plants or fill up a squirt gun. Use a clock to keep your showers under 5 minutes. Use a broom instead of the hose to clean your driveway or sidewalk.



You can save up to 8 gallons of water by turning off the faucet when you brush your teeth in the morning and before bedtime. That adds up to more than 100 gallons of water each month!

1. When is the best time of day to water your lawn?
A. Early morning or late evening
B. In the afternoon
C. All day long

2. How much water does a family of four (mom, dad, brother, and sister) use everyday?
A. 50 B. 100 C. 250 D. 400

3. Which of these everyday objects is a water-saving tool?
A. Bucket B. Clock C. Broom D. A,B,&C

4. How much water could you save by washing your bike with a bucket and sponge rather than letting the hose run?
A. 1 gallon a minute
B. 3 gallons a minute
C. 4 gallons a minute
D. 6 gallons a minute

5. True or False: Keeping the water running when you brush your teeth wastes a lot of water.
A. True B. False

Come and see us at the Department of Environmental Quality's booth inside the Zoo
Earth Day Celebration 2022
Saturday, April 23rd

Come Hang with Our Gang!

Student Challenge

Identify the main idea and supporting details in the paragraphs below.

IDAHO FALLS ZOO AT TAUTPHAUS PARK

www.idahofallszoo.org

African, or black-footed penguins are native to the coast of South Africa and most endangered penguin species. They are carnivores that feed mainly on fish like sardines, anchovies, mackerel, herring and have been known to also eat squid and crustaceans.

Commercial over-fishing, loss of nesting sites, and people collecting their eggs for food has caused the wild African penguin popoulation to drop over 70% in the last 20 years.

Your Idaho Falls Zoo has 17 African penguins and works with other zoos and aquariums, as well as SANCCOB, a conservation organization in Cape Town, to save these magnificent birds from extinction.

Student Day Camps:

1st week of camps
June 27 - 30th
2nd week of camps
August 1 - 4th
Two age groups:
6-9yo (9am-1pm) – Sold Out
10+yo (9am- 3pm)
Day Camp Themes:
Escape the Museum - Work together on STEAM based games and puzzles on a mission to explore the museum in this escape room style camp.
Museum Camp Out - We'll mix nature, adventure, technology, and more in this day-long pajama party at the museum.
Myths & Legends - Unicorns, dragons, sea monsters, oh my! Explore the science and history behind your favorite mythical creatures and even design one of your own in this creative, hands-on camp.
Build & Destroy - We'll engineer our way through buildings, bridges, explosions, and more! Along the way, we'll explore the weapons and resources that have been used to build and destroy in ancient empires like Genghis Kahn's.

Teacher Professional Development Camps:

Archaeology of Idaho: Wasden Caves
July 6th-7th, 2022, 9am-5pm each day
1 CEU credit
Project Learning Tree
July 11th-12th, 2022, 8am-4pm each day
1 CEU credit
Expedition Yellowstone!
July 18th-19th, 2022, 8am-4pm on the 18th and 7am-7pm on the 19th
2 CEU credits
Code Invent
July 25th-26th, 2022, 9am-6:30pm each day
2 CEU credits
Project WET: Ocean to Idaho
July 27th-28th, 2022, 8am-4pm each day
1 CEU credit
Wolves, and Bears, and Birds, Oh my!
August 8th-9th, 2021 (OVERNIGHT), meet at 8am on the 8th at MOI.
2 CEU credits

HAPPYVILLE FARM
Community Food Basket
Idaho Falls

Earth Day at the farm

10 am to 3 pm
Saturday, April 23

Visit the region's only certified organic urban farm growing tasty produce for the hungry families served by the Community Food Basket-Idaho Falls

Demonstration, Information, Plants & Honey for Sale

City Forester: *Get answers to all your tree questions*

Soil Improvement: *Hands-on help from professional soil scientists*

Honey bee demonstrations

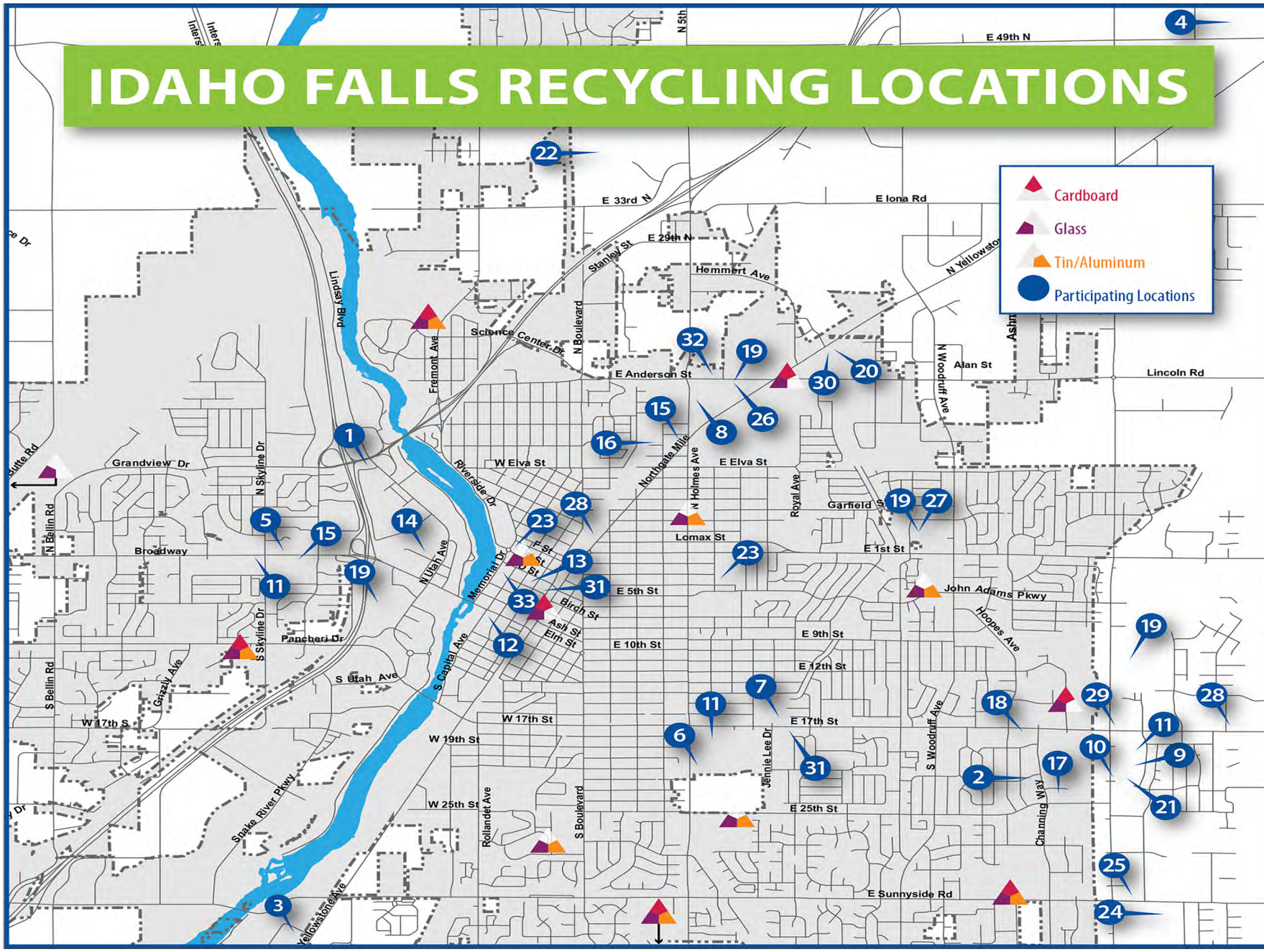
Planting for Pollinators: *Learn how you can help native bees, butterflies and more*

Plants for sale: *Our very own organic and heirloom peppers, celery, herbs and more!*

600 South Saturn Avenue
Idaho Falls

www.happyvillefarm.org
Follow us on FB: @communityfoodbasketfarm
Follow us on Instagram: @commfoodbasketfarm

IDAHO FALLS RECYCLING LOCATIONS



CURBSIDE RECYCLING PROGRAMS

Western Recycling 529-9908 (Idaho Falls, Ammon, Rigby, and surrounding areas)
westernrecycling.net | Email: curbside@westernrecycling.net
$10/mo. residential – newspapers, magazines, paper, cardboard, #1&2 plastic, aluminum, tin

City of Chubbuck 237-2400
cityofchubbuck.us/streets-sanitation/
$5/month – All paper, cardboard, #1&2 plastic, aluminum, tin

Bingham Curbside Recyclers 681-8597 (Blackfoot, Firth, Snake River area)
$5.50/month – Paper, cardboard, plastic, aluminum, tin

City of Pocatello 234-6192
pocatello.us/395/Recycling-Programs | Email: pocatellorecycles@pocatello.us
Included in City garbage service – paper, newspaper, magazines, cardboard, #1&2 plastic, aluminum, tin

RECYCLING PLASTICS

Due to an international importing ban, most locations do not accept plastics #3-7

WHAT CAN I DO AT HOME?

- Unplug battery chargers or power adaptors, or plug TVs and radios into a power strip and turn off when not in use
- Check air filters and replace as needed
- Install a programmable thermostat (could save about $175/yr)
- Seal outlets and electrical boxes on outside walls with outlet gaskets
- Plant trees or shrubs around windows to block heat in summer and insulate in winter
- Set your water heater to 120°F or less
- Ride a bus or a bike to school, or carpool
- Plan your errands to reduce trips
- Recycle
- Wash only full loads of dishes & clothes
- In winter, open south facing window coverings during the day and close at night
- Install insulation, energy-efficient appliances, windows, doors, or renewable energy systems (see energystar.gov/taxcredits for tax credit information)
- Replace incandescent light bulbs with CFL or LED bulbs and turn off when not in use

BATTERIES (Lead-Acid)

1 Automotive Charging/Starting, *935 Lindsay Blvd*
2 Batteries Plus, *2182 Channing Way*
3 The Battery Guy, *1345 Enterprise St*
4 Start Specialists, *3125 E 49th N*
5 Auto Parts Stores (various, call first), *1562 W Broadway St | 2517 N Holmes Ave*

BATTERIES (Rechargeable)

2 Batteries Plus, *2182 Channing Way*
6 Home Depot, *2075 S Holmes Ave*
7 Lowe's, *925 E 17th St*
9 Staples, *1999 S 25th E*
10 uBreakiFix, *2003 S 25th E D-2*

BOOKS

11 Albertsons (outside bins 3 locations),
1705 W Broadway St | 590 E 17th St | 1901 S 25th E
12 Idaho Falls Public Library, *457 W Broadway St*

BULBS (CFL/Florescent)

2 Batteries Plus, *2182 Channing Way*
6 Home Depot, *2075 S Holmes Ave*
7 Lowe's, *925 E 17th St*

CARDBOARD

13 City of Idaho Falls (see map for 7 outside bin locations)
14 Western Recycling (outside bins), *1020 Denver St*
15 U-Haul, *1091 Northgate Mile | 1545 W Broadway St | 2595 E 17th St Ammon*
16 Pacific Steel and Recycling, *1155 N Higbee Ave*

ELECTRONICS (verify with location accepted electronics)

2 Batteries Plus, *2182 Channing Way*
17 Best Buy, *2404 S 25th E*
18 Cartridge World, *2064 E 17th St #2*
19 ecoATM (4 locations inside kiosks),
500 S Utah Ave | 333 N Woodruff Ave |1555 Northgate Mile | 1201 S 25th E
20 ECyclers, *1976 N Yellowstone Hwy*
8 Office Max/Depot, *1425 Northgate Mile*
9 Staples, *1999 S 25th E*
21 Target, *2171 S 25th E*
10 uBreakiFix, *2003 S 25th E D-2*
16 Pacific Steel and Recycling, *1155 N Higbee Ave*

INK CARTRIDGES/TONER

18 Cartridge World, *2064 E 17th St #2*
20 ECycler, *1976 N Yellowstone Hwys*
8 Office Max/Depot, *1425 Northgate Mile*
6 Home Depot, *2075 S Holmes Ave*
9 Staples, *1999 S 25th E*
21 Target, *2171 S 25th E*

GLASS

13 City of Idaho Falls (see map for 13 outside bin locations)
21 Target, *2171 S 25th E*

HAZARDOUS WASTE

22 Bonneville Cty Transfer Station, May 8 & Sept 11, 2021
2455 Hemmert Ave

PAPER

14 Western Recycling (outside bins), *1020 Denver St*
23 Post Office (customers only inside bin), 875 N Capital Ave | 605 4th St
12 Idaho Falls Public Library (for shredding only), *457 W Broadway St*

PLASTICS (#1 & 2)

14 Western Recycling (outside bins), *1020 Denver St*
21 Target (#'s 1-7), *2171 S 25th E*

PLASTIC BAGS/FILM

11 Albertsons (3 locations inside bins),
1705 W Broadway St | 590 E 17th St | 1901 S 25th E
24 Broulim's (2 locations inside bins), *2730 E Sunnyside Rd*
25 Kohl's, 3175 S 25th E
21 Target, *2171 S 25th E*
26 Fred Meyer, *1555 Northgate Mile*
27 WinCo, *333 N Woodruff Ave*

SCRAP METAL

17 Best Buy (appliances, *2404 S 25th E*)
16 Pacific Steel and Recycling, *1155 N Higbee Ave*
14 Western Recycling, *1020 Denver St*

TIN/ALUMINUM

13 City of Idaho Falls (see map for 9 outside bin locations)
14 Western Recycling (outside bins), *1020 Denver St*
16 Pacific Steel and Recycling, *1155 N Higbee Ave*
21 Target, *2171 S 25th E*

TIRES

28 Big O, *265 Northgate Mile | 3193 E 17th St*
29 Discount Tire, *2523 E 17th St*
30 Fred and Wayne's, *1970 N Yellowstone Hwy*
31 Les Schwab, *210 Constitution Way | 970 E 17th St*
32 Jack's Tire and Oil, *595 E Anderson St | 4490 Andco Dr*

UNUSED/DISCARDED MEDS

33 Bonneville Cty Law Enforcement, *605 N Capital Ave*

CHRISTMAS TREES

13 City of Idaho Falls (seasonal), *308 Constitution Way*

Locations provided as information only. Listing does not indicate endorsement of listed business. Subject to change. All city locations have bins to accept glass bottles for recycling.

Idaho National Laboratory

IDAHO FALLS EARTH DAY CELEBRATION

AT THE IDAHO FALLS ZOO

April 23, 2022 9:30am - 2:00pm

$0.50 Kids admission to the Zoo with a paying adult and a canned food donation

IDAHO FALLS EARTH DAY

Come explore and visit interactive Earth Day booths throughout the Zoo!

The Wonder of Water

#IFEarthDay

Learn at booths from...

MUSEUM of IDAHO

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

IDAHO ENVIRONMENTAL COALITION

IDAHO FALLS ZOO AT TAUTPHAUS PARK

INL Idaho National Laboratory

...and many more!