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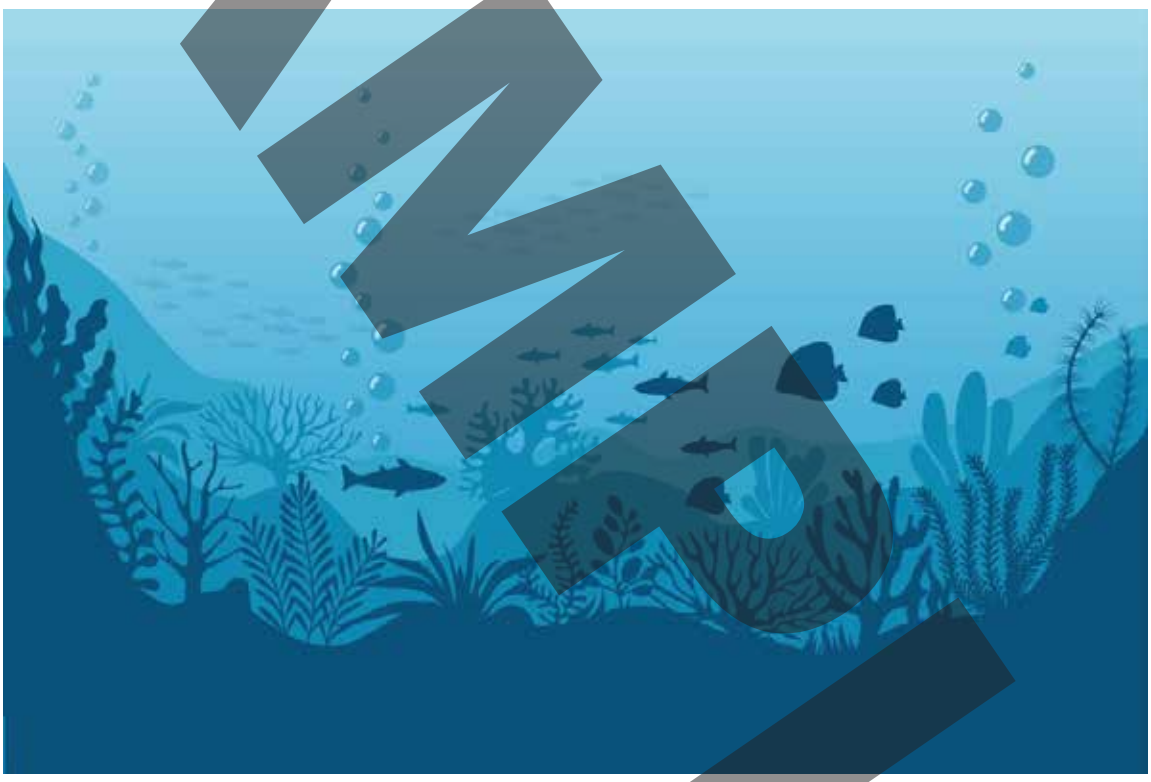
Surprising Science for Kids:



Oceans!

KIT-550

5 Francis J. Clarke Circle, Bethel, CT 06801

Phone (203) 74-TEACH (83224)
www.TeacherSource.com

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Welcome to Surprising Science for Kids: Oceans!

Grades 5-8

Your **Surprising Science for Kids: Oceans!** kit includes almost everything you need to perform hands-on experiments and dynamic demonstrations related to the deep blue sea.

Biology is the natural science that studies life. The name comes from the Greek words *bios* (life) and *logos* (study). The world around you is teaming with life, and though it may not seem to be, everything is connected in one way or another. When the balance of an ecosystem is disrupted, it can have major effects on everything in it. This is one reason we study the oceans.

We have gathered some exciting experiments in this kit. We hope you enjoy them! In some of these activities, you may be asked questions you can't easily answer. See if you can research the answers on the internet. You'll be an ocean expert in no time at all!

Please note: Many of the materials below are used in several activities. Please do not discard them until the unit has been completed.

Included in this kit:

- Quart size plastic baggie
- 5 blue color tablets
- 2 red color tablets
- 1 yellow color tablet
- 5 small plastic cups
- Permanent marker
- 1-Liter plastic bottle (empty)
- 10 ml graduated cylinder
- Pipet
- Plastic spoon
- Petri dish
- Salt
- Nail
- Sunscreen sample
- 5 UV detecting beads
- Hand lens
- 1-Liter plastic bottle (with vegetable oil)
- Glitter
- Sponge
- Plastic test tube and cap

You will also need:

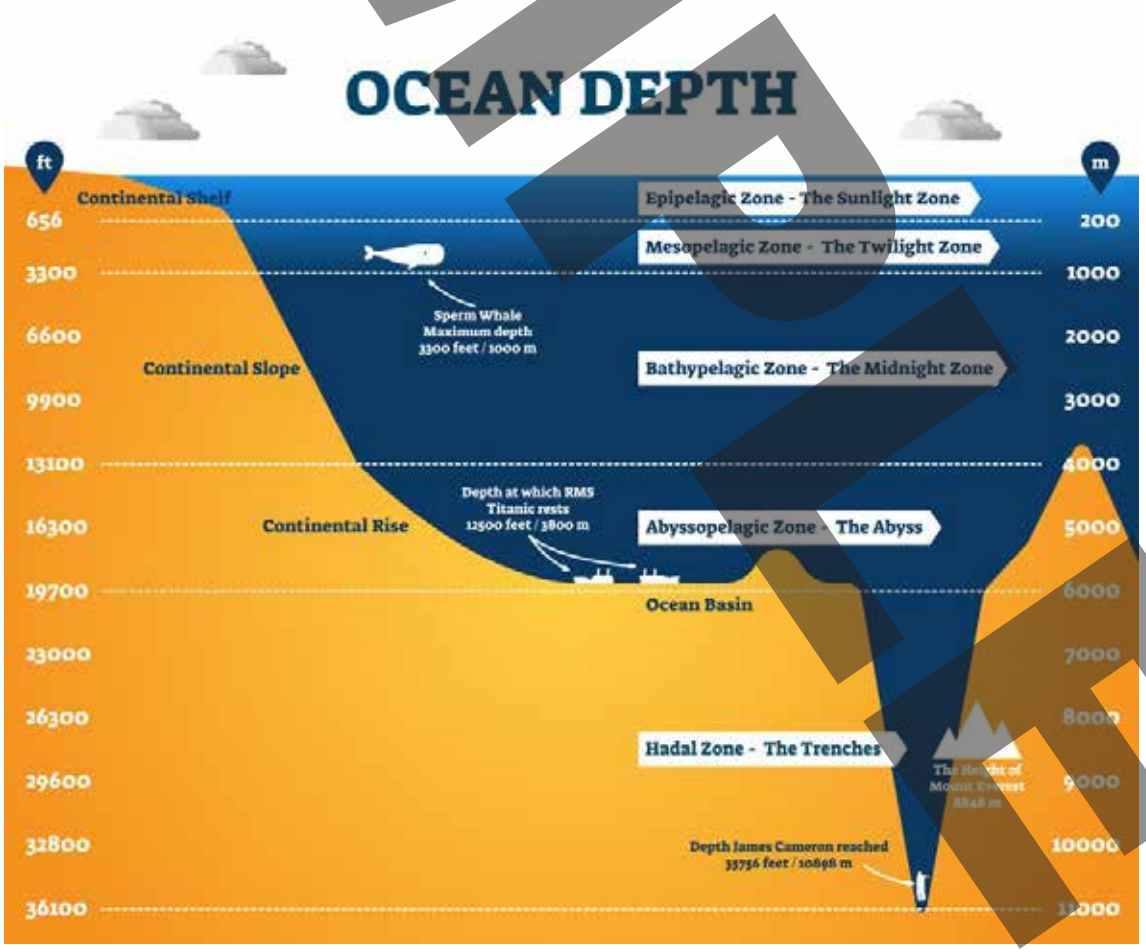
- Water
- Sink or bowl
- Ruler
- Clear tape
- Masking tape

About Oceans

The ocean ecosystem covers most of the Earth's surface and is home to millions of marine plants and animals—ranging from microscopic phytoplankton to the largest mammal on Earth, the Blue Whale, which can grow over 30 meters long! Additionally, the ocean ecosystem influences the weather all over our planet and produces about 70 percent of the oxygen we breathe.

The saltiness (or salinity) of our oceans is a quality that makes these bodies of water unique from freshwater systems such as lakes, rivers, and streams. Ocean water contains many different mineral salts such as sodium, chloride, sulfate, and calcium—just to name a few. As rivers flow and empty into our oceans, the water passes over and breaks down rocks and soil while picking up more salt along the way. Additionally, salt builds up in the ocean due to evaporation. Remember, when ocean water evaporates, it doesn't take the salt with it.

There are five ocean basins covering the surface of our planet with an average depth of about 4 km (2.5 miles). The largest of the world's oceans is the Pacific Ocean, which covers nearly one-third of the Earth's surface. The deepest part of this ocean, the Mariana Trench, is 11,034 km (36,201 feet) deep—that's almost seven miles deep! Just imagine: the Mariana Trench is deeper than Mount Everest is tall!



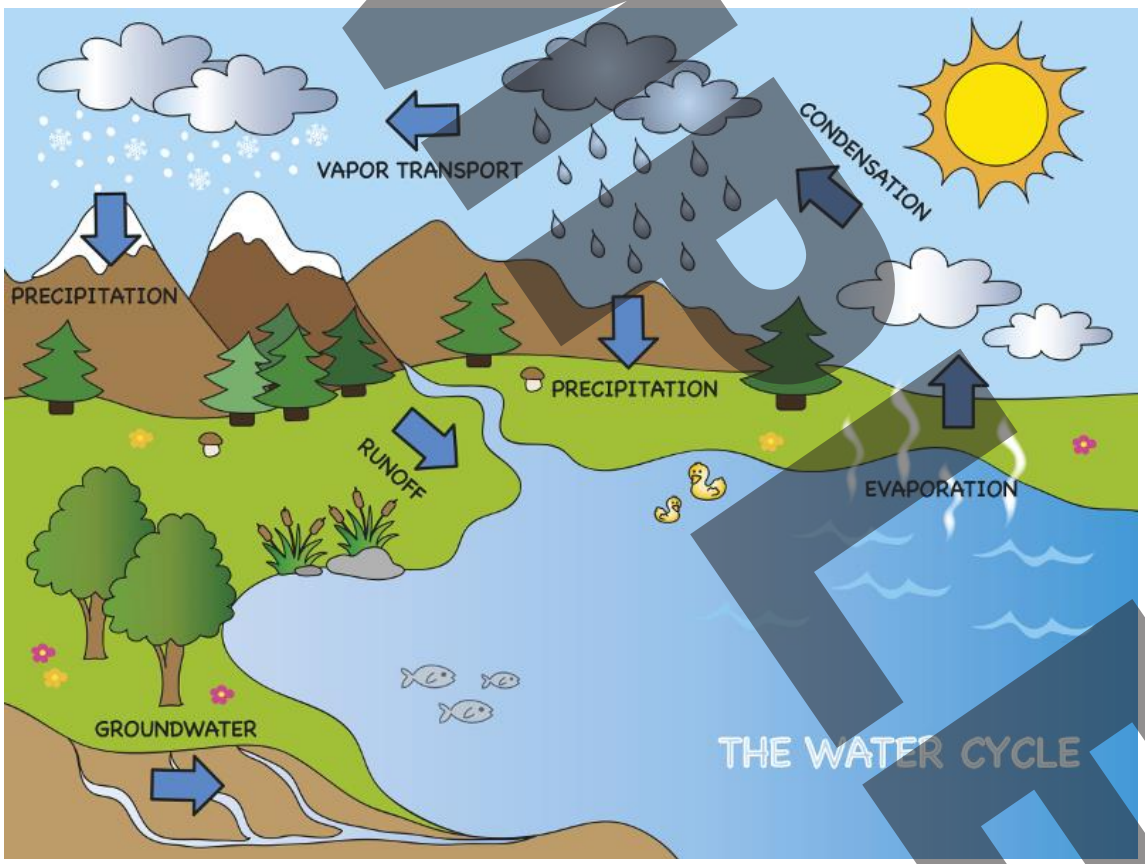
Activity 1:
Where Does Water Come From?

Background Information:

The water cycle is the way that water moves all around our planet. It never stops and doesn't really have a beginning or an end. It's a cycle! For example, let's take a look at ocean water. Some water on the surface of the ocean evaporates due to heat from the sun. When this happens, the liquid water turns into vapor water (a gas) and—because water, in its gaseous state, is less dense (lighter) than liquid water—it goes up into the atmosphere.

This water vapor collects with other water vapor molecules, which then condense and form into clouds. Clouds move about the Earth with the weather. Soon, they become so full of water that they drop the water back down to Earth in some form of precipitation. This precipitation could be rain, snow, sleet, or hail.

When the water hits the Earth again, it may fall right back into the ocean or a lake or even feed a tree on the top of a mountain. Eventually this water heats up and evaporates… and starts the whole cycle again.



Activity 2:
Our Salty Planet

Background Information:

If you look at a globe, over 70% of the surface is covered by water. Of that total water, approximately 97% is in the oceans and is undrinkable without the removal of salt. That leaves only about 3% of the remaining water in the form of fresh water that we can drink. Additionally, most of that fresh water (roughly 68%) is trapped in ice and glaciers. And a third of the remaining fresh water is stored underground.

Water (H_2O) is a very important resource as it supports many different life forms on land and sea. Because of this, it is important to understand how much is available, where water comes from, and how to make sure we will have enough drinkable fresh water in the future.

Materials:

- 1 Liter plastic bottle
- 1 small graduated cylinder
- 5 small plastic cups
- Salt
- Permanent marker
- 2 blue color tablets
- Plastic spoon
- 1 pipet
- 1 Petri dish
- Water (not included)

Part One Procedure:

1. Fill your bottle with water. Add two blue color tablets to the water. This will represent all the water on the planet.

2. Using your graduated cylinder and the information below, measure out the following portions into individual clear cups, and be sure to label them with your marker so it is easy to see the distribution of water on the planet.

ICE	20.6 mL
GROUNDWATER	9.0 mL
LAKES	0.08 mL
SWAMPS	0.01 mL (roughly 5 drops)
RIVERS	0.002 mL (roughly 1 drop)
OCEANS	970 mL

3. Next add four heaping spoonfuls of salt into the bottle with the remaining water representing the ocean. Remember this water is not drinkable.

4. Have a closer look at the model you have created. What are your thoughts and observations? Draw and record them in the table on the next page.

Activity 3:
Waves in a Bottle

Background Information:

Oceans are actually layers of water under a layer of air called the *atmosphere*. Because air is much less dense (molecules being farther apart) than water, it seems like air would have little influence on a wave. However, most waves are formed by winds blowing across the surface of the water. The friction between the air molecules and the water molecules causes energy to be transferred from the wind to the water. This results in the formation of waves.

As wind travels across the water's surface, it pushes against it, and the energy in the wind is then absorbed by the water. A wave becomes the result of the movement from this energy. The water in the ocean moves up and down, but not sideways in the direction of the wave's motion, causing water molecules to move in a circular motion. In order to understand how waves work, we will add a layer of oil on top of the water. Wondering how this relates to air and affects a wave on the water surface? Well, roll up your sleeves and let's dive in!

Materials:

- 1 Liter plastic bottle with vegetable oil
- 2 blue color tablets
- Water (not included)

Procedure:

1. The sealed plastic bottle already contains vegetable oil. Fill the bottle the rest of the way with water.
2. Add 2 blue color tablets to the water. You will notice that they will mix with the water but not with the oil.
3. Screw on the top as tightly as possible.

Activity 4:
Under Pressure

Background Information:

Have you ever gone swimming and dove down to the bottom of the deep end of the pool or lake? If so, did you notice anything about how your ears feel? Water, like all things on Earth, is continually pulled downward by the force of gravity. As you go deeper into the ocean, there is more water above you and therefore a greater weight pushing down on you. This is the reason water pressure increases with depth. In fact, for every 10 meters traveled deeper into the ocean, there is an additional 6.47kg (14.27 lbs) of pressure on each square inch of surface.

In order to dive deep beneath our oceans, scientists must use specially-designed equipment that can operate under extreme pressure. Remotely operated vehicles (ROVs) and manned submersibles are some examples of the specialized equipment used to study these mysterious depths. With less than five percent of our oceans explored, there is much more to learn from uncovering the mysteries of the deep.

Materials:

- 1 Liter plastic bottle
- 1 nail
- Water (not included)
- 1 Adult (not included!)
- Permanent marker
- Duct or clear tape (not included)
- Sink or bowl (not included)
- Ruler (not included)

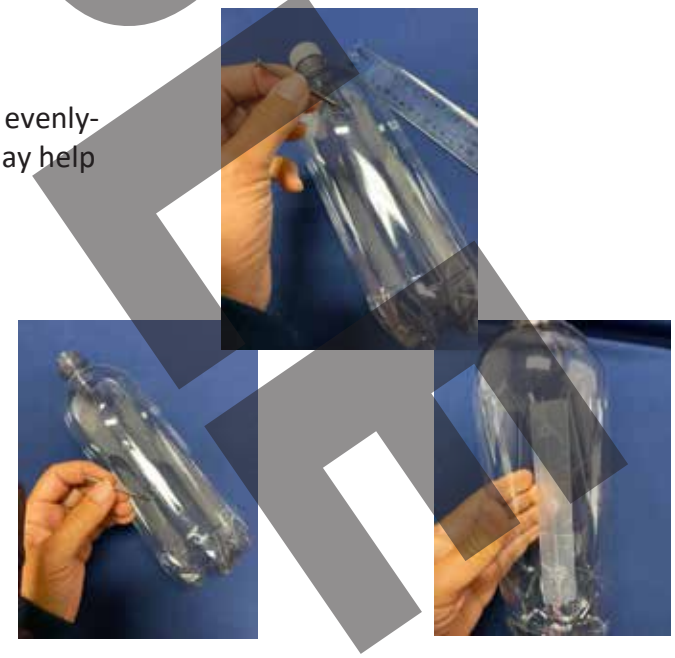
Procedure:

1. **With the help of an adult**, use the nail to make three evenly-spaced holes down the side of the plastic bottle. It may help to heat the nail slightly.

2. Cover the three holes with a single long strip of tape. Make sure the tape is firmly affixed.

3. Next, fill the bottle with water.

4. Hold the bottle over a large bowl or sink, making sure you can see all the holes.



Activity 5:
Catching Rays

continued

6. Take your beads outside and collect readings for all three beads in the following locations:

   - in the shade
   - in full sunlight
   - back indoors through a window

7. Record your observations in the data table below. Write yes in the appropriate box if there was a color change and no if there was no change. For more detailed observations, record the color the bead changes to and its intensity (if it was a vibrant or pale shade).

My UV Exposure Data Table

	Shade	Sun	In a Window
Control			
Sunscreen			
In Water			

Questions to Consider:

1. Which bead turned the brightest and where?

2. Which bead had the least amount of color change?

3. What do you think happens to UV rays on a cloudy day?

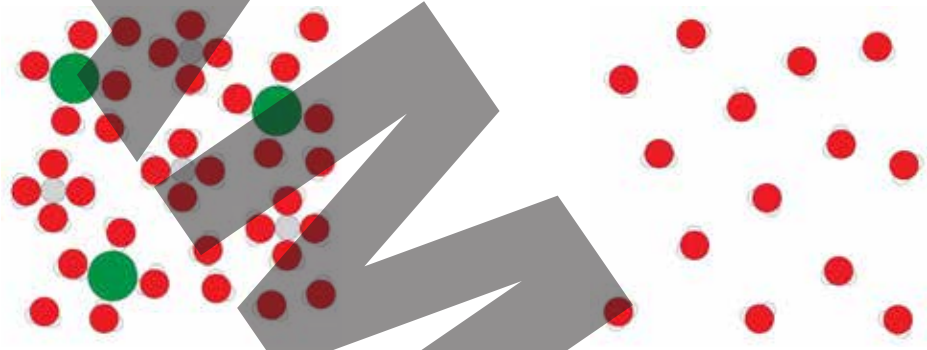
4. Did you find that the shade was really free of UV rays? Explain your answer.

Activity 7:
Ocean Layers

Background Information:

As you know, the oceans contain saltwater. Some, like the Atlantic, are saltier than others. Most lakes, but certainly not all (like the Dead Sea and the Great Salt Lake), contain freshwater. If you went swimming in an ocean or a salty lake, you would find it much easier to float than if you went swimming in a freshwater lake or a pool. Why is that? It has to do with the density of the water, or how closely packed the molecules are in the water.

Saltwater is denser than fresh water, which means it's heavier, so objects float more easily.



Saltwater Freshwater

Materials:

- 3 small cups
- Plastic spoon
- Pipet
- 5 color tablets (2 blue, 2 red, 1 yellow)
- Test tube and cap
- Water (not included)
- Salt

Procedure:

1. Fill two of the cups ¾ of the way with warm water. Place two red tablets in one cup and two blue tablets in the second cup and allow to dissolve.

2. Add three level spoons of salt to the red cup and stir.
3. Add one level spoon of salt to the blue cup.
4. Fill the third cup halfway with warm water. Add the yellow tablet and allow time for it to dissolve.
5. Stir the red and blue cups to dissolve the salt, being sure to rinse the spoon before stirring the other cup.