

THE WIND, THE SUN AND THE RAIN

There may be gold and jewels in treasure chests at the bottom of the ocean. A long time ago, ships sank in the ocean, and some people go diving in the ocean to hunt for their treasures today. But the biggest treasure in the ocean is right at the top. It's the water.

Oceans give us most of the water we use. When you make lemonade, water your garden, or take a bath, you're using water. And most of that water came from the ocean. How did it get to you? It traveled on the air. How did it get up there? The sun helped. And how did it get down? Read this chapter to find out how you get your share of the ocean, the sun and the air.

See the Light

People all over the world see the sun every day. Most people don't think about the sun. But the sun makes a big difference in the world. If there wasn't any sun, the whole world would be dark and cold. It would be night all the time.

If you put a plant in a closet or under a paper bag, it dies because it doesn't get any sunlight. If there wasn't any sun, there wouldn't be any plants. If there wasn't any sun people would walk around in the dark and they wouldn't have any string beans, pumpkins, or watermelons. What else would you miss if there wasn't any sun?

The Earth's Heater

If there wasn't any sun, you would miss the heat it gives. The sun is the earth's heater. The sun is millions of miles away from the earth. But the sun is so hot that it heats the world. It keeps the world warm and comfortable for people to live.

Some places in the world are warmer than other places. The sun isn't hotter on top of those places. But one part of the world gets more sunshine than the rest. That's the part in the middle, around the equator. And two parts of the world get less sunshine. Those are the parts around the poles. It's always hot at the equator and it's always cold at the poles.

If you went north from the equator and traveled through North America, you would find that the temperature got cooler as you got farther away from the equator and closer to the North Pole. The same thing happens when you leave the equator and go south. If you went through South America and kept going to Antarctica you would find a lot of snow and ice and penguins.

Hot and Cold Belts

If you drew circles around the world with lines that went from east to west like the equator, you would have belts of temperature. People have drawn lines like that to show parts that are hot, warm, cool, and cold. Between the equator and 30 degrees north and 30 degrees south, the world is hot or warm most of the time. So that is one wide warm belt around the middle of the world. From the north pole to 60 degrees north and from the south pole to 60 degrees south, the world is cold most of the time. So there are two cold belts in the world, one at each pole. That leaves two parts of the world in the middle. One part is between 30 degrees north and 60 degrees north and the other part is between 30 degrees south and 60 degrees south. In these two middle parts the temperature changes a lot. It goes from warm to hot to cool to cold and back to hot again. The middle parts are called the middle latitudes. Most of the United States is in the middle latitudes. In most of the United States, people talk about cold winters and hot summers. Look on the map and find parts of the United States that would be cold all the time.

Put the World Together

Make your own world temperature map. Draw a circle to stand for the world. Put the North Pole and the South Pole on the circle. Draw a line across the middle of the circle to stand for the equator. Then take a string and run it around the outside of the circle. Cut the string so it's just as long as the outside of the circle. Remember that there are 360 parts in a circle, parts that we call degrees. If you folded your string 360 times, each fold would be one degree. Start to fold your string. Don't worry, you don't have to do it 360 times. Start by folding it in half. That half is as long as half your circle. Cut the string so you have half of it. Then fold that half in half again and cut it in the middle. Take one of the two pieces. It's as long as the edge of the circle from the equator to the pole. You know that there are 90 degrees of latitude between the

equator and the pole. Your string is just as long as the circle from 0 degrees to 90 degrees. That means it stands for 90 degrees in your circle.

To find the temperature belts, you have to find 30 degrees, 60 degrees, and 90 degrees. You know where 90 degrees is ... it's at the pole at the end of your string. To find 30 degrees, fold your string into three equal parts. How many degrees does each part stand for? Did you get 30 degrees? That's right. (90 divided by 3 is 30).

Cut your string into three 30 degree parts. Now you can use your string to find parts of your circle.

Start at the equator. Put one 30 degree string from the equator going north around your circle where the 30 string stops. Write 30 degrees next to the dot. Then do the same thing on the other side of the circle. Then take the string and mark off 60 degrees north on both sides of the pole. (You just add 30 degrees to 30 degrees to get 60 degrees). Mark the North Pole 90 degrees. Then draw a line between the 30 degree marks and the two 60 degree marks.

When you finish doing the northern hemisphere, do the same thing for the southern hemisphere. When you have drawn in all the lines north and south of the equator, you need to tell what temperatures are in each belt.

To show the temperatures, use crayons. Use red to show where the world is hottest - at the equator. Then use red to fill in from 0 degrees to 30 degrees north and south, but mix in some orange as you get farther from the equator. That's to show it's getting cooler. When you get to 30 degrees, switch to yellow to show it's still getting cooler. When you get to 60 degrees change to green to show it's getting cold. Color in the bands from 60 degrees to 90 degrees with green and blue. Make a chart that shows what the colors stand for. Red is for hot, orange is for warm, yellow is for mixed, green is for cool, and blue is for cold. You can mix the colors at the edges of the bands to show that the world changes by degrees.

A Question of Temperature

Now you know where the temperature belts are, here are some questions to think about. If you moved Antarctica to 30 degrees south, what would happen? Remember, Antarctica is covered with ice and snow.

If you wanted to live in a place that was hot all the time, where would you move to?

A Place for Water

If you wanted to live some place that was wet all the time, you could move in under the ocean. There's a lot of ocean in the world, so you could pick a lot of places to live. Oceans cover more than two thirds of the world.

What's an ocean? It's a lot of water. It is different from the water you drink. It has salt in it and it has fish in it.

Where the Oceans Are

Where the continents stop, the oceans begin. There are five oceans in the world. Really they are all connected. So you could say there is just one big ocean. But people have divided the oceans into five parts. And each part has a name. Use a map to plan an ocean trip around the world. Make a list of the oceans you would travel on. You'd spend a lot of time on one ocean when you went around the world. It's the biggest one. Did you guess it was the Pacific? You're right.

Oceans Make a Difference

Oceans don't get as hot or as cold as land does. So if land is near the ocean, it won't be as hot or cold as land that is inside the continent and far away from the ocean. It's good to live on the seashore in the summer. During the day the hot sun warms the land more than the water, so there is a breeze of cooler air blowing from the water to cool the land. But the water holds heat longer than the land, so at night when the land cools a breeze blows from the land to the water. Day and night

there's a cool breeze. Day and night the water helps the land stay cool and the people stay comfortable. In the winter the water helps the land stay warm. St. Louis and San Francisco are both at the same latitude - about 37 degrees north. But it's warmer in San Francisco in the winter than it is in St. Louis. San Francisco is on the ocean, and St. Louis is in the middle of North America.

Cold and Hot Running Water

Guess which ocean is the coldest ocean. You're right if you guessed the Arctic Ocean or the Antarctic Ocean. They are both in very cold parts of the world. It's so cold in those oceans that icebergs float in them. Icebergs are like gigantic ice cubes. The icebergs move around because the ocean water moves around. The oceans don't just sit there. There are currents in the ocean. A current is the way water moves. You see some arrows on the map. These arrows show you some ocean currents around North and South America.

The same kind of water is in the ocean everywhere. But the water isn't always the same temperature. The water is moving with the currents. Sometimes the ocean water comes from a cold place. Sometimes the ocean water from a warm place. Find a current that moves from a warm latitude to a colder one. If the ocean current brings warm water to a cold latitude, it helps make the land there warmer. It causes changes in the weather. It can bring warm air or cold air. It can bring rain clouds and it can take them away.

Riding the Winds

Winds are important to people who fly in airplanes. If you fly from Chicago to New York, it takes less time than flying from New York to Chicago. Do you know why? There's a wind that usually blows from west to east across most of the United States. So that wind would push an airplane going east to New York and it would blow against an airplane flying west to Chicago.

Since winds can push airplanes and rain clouds around the world, it's important to know which way they are blowing. People have measured the winds all over the world. They found that at the equator there isn't

much wind at all. They call the part of the world around the equator the doldrums. Doldrums is a word that means dull space. Life would be dull without winds. Look at a map to see the other winds in the world. If you wanted to ride the wind from east to west, what latitude would be a good place to start?

Sun + Air + Water = Rain

Now you know where the water is and how the wind moves the air. But how does the air carry the water from the ocean to the continents? It takes the sun and the oceans and the wind to get water to the land.

A Recipe for Rain

If you pour water on the sidewalk, you can make a puddle. When the sun shines on that puddle, it dries up. The water goes away. And it really does dry up. The water goes up in the air.

You can't see the water in the air unless it gets foggy. But you can feel it. Did you ever think the air feels sticky on a hot day? Air feels sticky when it has a lot of water in it. We say it's a very humid day when the air is very wet. Where does all the rain/water come from? Most of it comes from the biggest puddles of all - the oceans. And how does it get into the air? The same way as your sidewalk puddle. The sun heats the ocean water and turns it into something we call water vapor. Water vapor is like steam, but unless it's very hot you probably won't see it. If you heat water on your stove, you'll see the water vapor coming up into the air. After a while you won't see it any more, but you may feel it in the air. Your kitchen may be very humid if you heat a lot of water for a long time.

Everybody says that what goes up must come down. And the water that goes up does come down. Rain and snow are the two ways that ocean water comes back down from the air. But every puddle doesn't have its own rain cloud. And it doesn't rain just on top of the oceans. Something moves the water vapor away from the oceans. That something is wind. Wind moves the ocean across the continents.

Rain and snow fall when hot air meets cold air. The water that is in the air gets heavy and falls to the land. So the sun gets water up into the air. The wind carries the water over the land. And the temperature makes

the water fall from the air. If you live in San Francisco, where does your rain come from? Of course it falls from the sky. But how did it get there? Right, the sun heats the Pacific ocean water and the wind carries it onto the land. If you live in Florida what ocean sends you your rain? Look at the wind current map before you answer.

If you live in St. Louis, could you get rain from the Pacific Ocean?

Changing Places

In most of the United States, the weather can change in just a few hours. Winds can bring warm air, cold air, or snow to change the weather very quickly. Some days the clothes you wear in the morning are not fit for the afternoon weather. The winds and the temperature change a lot in the middle latitudes. But if you think about the way the weather is most of the time in the place you live, you can tell its climate. Climate is the way the weather is most of the time. There are many different climates in the world. You can find different climates in the same continent. Far north in North America, it's cold most of the time. Some of the Eskimos still use dog sleds. But some Eskimos drive snowmobiles today. When it snows there, the snow stays on the ground. The climate doesn't warm up very much. Eskimos need warm clothes. You'll see a lot of fur coats and boots. Some Eskimos hunt polar bears. Polar bears are white as snow. The only part of a polar bear you can see when it's standing in the snow is its black nose.

Here are the climates in four places in the United States. Try to figure out where they are:

1. This city is warm in summer, cool in winter. There is lots of rain here. It's at 47 degrees north in North America.
2. This city is cold all the time. There is snow on the ground most of the time. Look at 65 degrees north in North America.
3. This city is cold in the winter, hot in the summer. It gets lots of snow and rain. Look for it at 45 degrees north in North America.
4. This city has mild weather most of the time. It gets a lot of rain. It's at 30 degrees north right on the water.

A Place of Your Own

There's one place in North America that is very special. It's the place you live. What's the climate there? You can figure it out. What kind of weather do you have most of the time? Is it mostly warm, cool, hot, or cold? Or does it change with the seasons? Is it very rainy, dry, or mixed? Does it snow? How much? Make a climate chart for the place you live. Show what it's like there during the year.