

K-2 WATER UNIT

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LESSON 1

INTRODUCTION TO

WATER

OBJECTIVES

Students will learn:

1. The importance of water.
2. Where water is found and how much water is on the earth.
3. How we use water day to day.

ENGAGE



Have students complete **Student Worksheet 1-1: Water is Important** as an introduction to the importance of water.



BACKGROUND INFORMATION:

Water is essential for life on this planet. All living things require water for survival. Since we use water everyday and because it is so important to life, we should learn to conserve the precious water resources that we have. We can do this by learning about *where* water is found and *how much* useable water there is on earth, and *how* we use it in our daily lives. Water covers $\frac{3}{4}$ of the Earth's surface. Of all of this water, 97% is found in the oceans, leaving only 3% found in icecaps, groundwater and surface water. Only less than one percent of this water is usable. We use this small percentage of water for many things: cooking food, power, transportation, recreation, manufacturing, cleaning, bathing, and drinking, to name a few. In this lesson, students will understand the importance of water, its uses and conservation.

EXPLAIN AND DEVELOP:



1. **Transparency 1-2:** Discuss the concept of where and how much water is found on the earth.

Student worksheet 1-2: Aqua Planet

Complete the worksheet and discuss water on planet earth.

Ask students: *Where is most of the water on earth found? (Oceans)*

Where do we get our water from? (96% of Idahoans use groundwater)

If you live in a desert, where might you find water?

If there was no water on earth, what would life be like?

EXPLORE: WATER DETECTIVES

Have students explore the many ways that we use water with the following activity.



MATERIALS:

3 pieces of butcher paper or large poster board
markers

Student Worksheet 1-3: How we use water at school

Student Worksheet 1-4: How we use water at home

PREPARATION:

On large sheets of butcher paper, draw a large water drop and label them:

Water drop #1—How we use water at school

Water drop #2—How we use water at home

Water drop #3—How we use water to do other things

PROCEDURE:

1. Begin by having students brainstorm ways that water is used at the school and write their ideas on Water Drop #1.
2. Group or pair students together and give them **Student Worksheet 1-3** and a pencil.
3. Explain to students that they are going to be water detectives (or hydrologists—scientists who study water). They are going to go on a search for ways they use water at school.
4. Tour the school and have students tally the ways water is used at the school.
5. Return to the classroom and tally the results. Add any new ways water is used to Water Drop #1.

6. Give students a copy of **Student Worksheet 1-4: How we use water at home** and the **Letter to Parents**.
7. Students should complete the second list of water uses like they did the first one.
8. Have students return the list on the day specified.
9. Share home uses of water and write them down on Water Drop #2. Ask students how they use the most water each day.
10. Now that students have investigated water use, have them brainstorm other possible water uses on Water Drop #3. Possible answers: irrigation, farming, manufacturing, restaurant use, recreational uses etc;

EXTEND AND APPLY:

1. As an alternative, create another brainstorming list (Water Drop #4) and talk about ways the students could conserve water.
2. Make posters to remind people to conserve water and other natural resources.
3. Have students draw pictures of the different ways water is used to raise animals, grow a garden or cook a meal.
4. Have students list the different ways they use water during their day, from the time they get up until the time they go to bed. Discuss how life would be different if they didn't have water to do all these things.

WATER IS IMPORTANT!

 is important.

Without  there would be no life on 

 and animals need to drink  to live.

 need  to grow.

 helps us do work.

We can use  to clean our 

We can use  to clean our 

We can use  to clean our 

We have fun with  We can 

We can ride a 

We can 

We need  !!!

KEY:



Water



Earth



Boat



House



Car



Body



Humans



Swim



Fish



Plant

HOW MUCH WATER IS THERE ON EARTH?

Of the 3% of water
that is fresh water:

Only 1% is found in LAKES, RIVERS
and the ATMOSPHERE

22% is found UNDERGROUND

77% is found in ICECAPS.



97% of the World's Water is found in the
OCEAN.

AQUA PLANET

Color the OCEANS dark blue.

Draw some LAKES, RIVERS and STREAMS light blue.

Color the ICE CAPS purple.

Color the LAND green or brown.



HYDROLOGIST _____

LIST #1: WAYS WE USE WATER AT SCHOOL

	Tally how many	How many in all? Write the number HERE.
Drinking fountains		
Toilets		
Sinks		
Dishwashers		
Ice cube makers		
Water heaters		
Washing machines		
Sprinklers		
Outside hoses/fountains		
Others:		

Adapted from the "The Water Sourcebooks" EPA/904-R-94-017 (a-d)



Dear Parent,

We are studying the different ways in which we use water both at school and at home. Your child will be completing a checklist of the different ways he/she uses water around the home. Please assist your child in completing the attached form and help him/her to discover any other ways that may not be listed by adding them to the list. In order for us to complete our study your child must return the list by _____
Thank you for your assistance in our study of water conservation.

Sincerely,

HYDROLOGIST _____

LIST #2: WAYS WE USE WATER AT HOME

	Tally how many	How many in all? Write the number HERE.
Bathtubs/showers		
Toilets		
Sinks/faucets		
Dishwashers		
Ice cube makers		
Water heaters		
Washing machines		
Sprinklers		
Outside hoses/faucets		
Pools or hot tubs		
Others:		

Adapted from the "The Water Sourcebooks" EPA/904-R-94-017 (a-d)

LESSON 2

WATER & THE

HUMAN BODY

OBJECTIVES

Students will learn the importance of water to the human body.

ENGAGE



Present the following scenario to the students:

Two of them are stranded in the desert. One of them has a backpack with enough food to last a month: breads, canned fruits and vegetables, granola bars etc; The other one has no food, but enough water to last a month.

Which one of them will survive the longest?

Humans can live up to a month without food, but can only live three days without water.

BACKGROUND INFORMATION:

We have explored how we use water in our day-to-day lives. Water is not only essential for human life, but all living things on this planet require water for survival. Active living organisms are composed of at least 50 percent water. This is the case whether an organism lives in a very dry place (like the desert) or a very wet environment (like under water). No matter the conditions of where an organism lives, they must maintain a healthy balance of water in their systems. The human body is made up of 65 to 70 percent water. If we lose 8 percent of this water, we will die. This water is stored in our cells, tissues, and in our blood. Likewise, water is stored in plant cells and tissues.

EXPLAIN AND DEVELOP:

1. Explain to students where water is stored in the body and in other organisms. Water is not simply “sloshing around” inside of us.

2. MATERIALS:

Dried fruit
Ripe fruit
A scale or balance (optional, to weigh food)

- a. Display samples of dried, dehydrated or wilted food in comparison to non-dehydrated examples. (ie; grapes and raisins, plums and prunes, a whole apricot and dried apricots). Ask students why the hydrated versions of these foods weigh more.
- b. Demonstrate how much of a food is composed of water by cutting off approximately the following percentages:

Pizza	50%
Ice Cream	60%
Bananas	75%
Grapes	80%
Oranges	90%
Carrots	90%
Tomatoes	95%
Lettuce	97%

**If real food items are not available, use pictures or drawings

EXPLORE: WATER BODIES

Explain to students how much water is in the human body with the following activity.

MATERIALS:

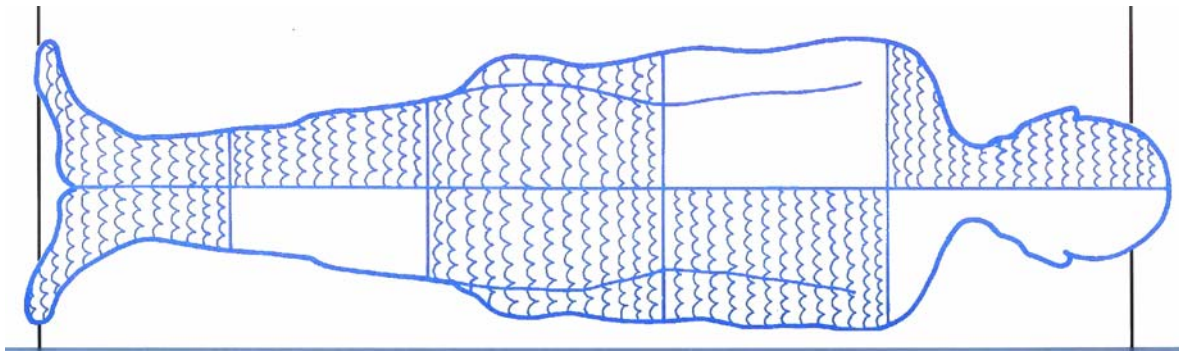
Butcher paper
Crayons or colored pencils
Markers

PROCEDURE:

1. Have students work in partners to trace their body shapes onto butcher paper with crayons or colored pencils.
2. Explain to students that the human body is approximately 70% water. For younger students, use the proportion $\frac{3}{4}$. Demonstrate the idea of $\frac{3}{4}$ by using a circle or block divided into four equal parts and color or remove three of the four pieces. For this example, you can also use some of the food items from the previous demonstration. Cut a piece of food into four equal parts and have students show the instructor what amounts to $\frac{3}{4}$ of the item.
3. Next, students should draw lines to divide their traced body figures into approximately 4 equal parts. They should color in 3 out of the four parts to represent how much water is in the human body.

EXAMPLE:

The example below shows a body outline divided into 10 parts. 7 out of 10 spaces are colored in to represent 70% water in the human body. Similarly, students will divide their drawings into 4 parts and color in 3 of them.



EXTEND AND APPLY:

1. Have older students calculate the amount of water weight in their bodies as a proportion of their actual weight. Students should approximate their weight or be weighed on a scale at the school. Have students use a calculator and multiply their weight by .70 (for example, if they weighed 100 pounds, multiply this by .70 to find they have 70 pounds of water in their body).
2. Despite dry or wet environments, all living organisms are made up of at least 50% water. Have students draw an animal and then guess how much water is in this animal and color in that proportion. All animals should have at least 50% colored in.
3. Students can compare the amount of water in the human body and other organisms. Hang up animal drawings and student body tracings in the hallway.

LESSON 3

WATER PROFESSIONS

OBJECTIVES

Students will learn about careers for which water is important and specialized jobs that are water-related.

ENGAGE—

- 2: Ask students to share what one of their parents do for a living. After they have shared their parent’s occupation, have them identify a way that their mom or dad uses water in their job.

BACKGROUND INFORMATION:

There are all kinds of professions that occupy people’s time. Some jobs keep people safe. Some provide services, food, goods, entertainment, or make sick people well. All jobs have some kind of required equipment, clothing, or items that a professional needs in order to do their job correctly. A chef cannot expect to cook without the proper kitchen equipment, just as a doctor needs certain tools to do his/her job at a hospital. While each job requires something a little different, almost every job uses water in some way. This lesson challenges students to identify how different professions use water and learn about specialized water-related professions.

EXPLAIN AND DEVELOP:

1. Explain the definition of career and some of the following water-related jobs:

Hydrologist—a scientist that studies water and tries to solve water-related problems.

Water meter reader—reads the water meter on your house to measure how much water your family uses.

Water quality expert—a scientist who tests water to make sure it is clean and safe to drink.

Fisheries expert—studies fish and their habitat (where they live).

Others: Farmer, Fishing Guide, Ski Patroller, Landscaper


****Explain any others that need clarification on Student Worksheet 3-1.**

2. Do Student Worksheet 3-1: What’s My Job?



EXPLORE: WATER IS MY JOB

MATERIALS:



Butcher paper
Activity Sheets 3-2: Water Is My Job (page 1 and 2)
Scissors
Crayons or colored pencils
Glue

PREPARATION:

1. Make a larger version of the **Graph 3-2: Water Is My Job** on butcher paper or on the chalkboard.
2. Cut apart the strips on the **Activity Sheets 3-2: Water is my job** (2 pages) and hand out to students.

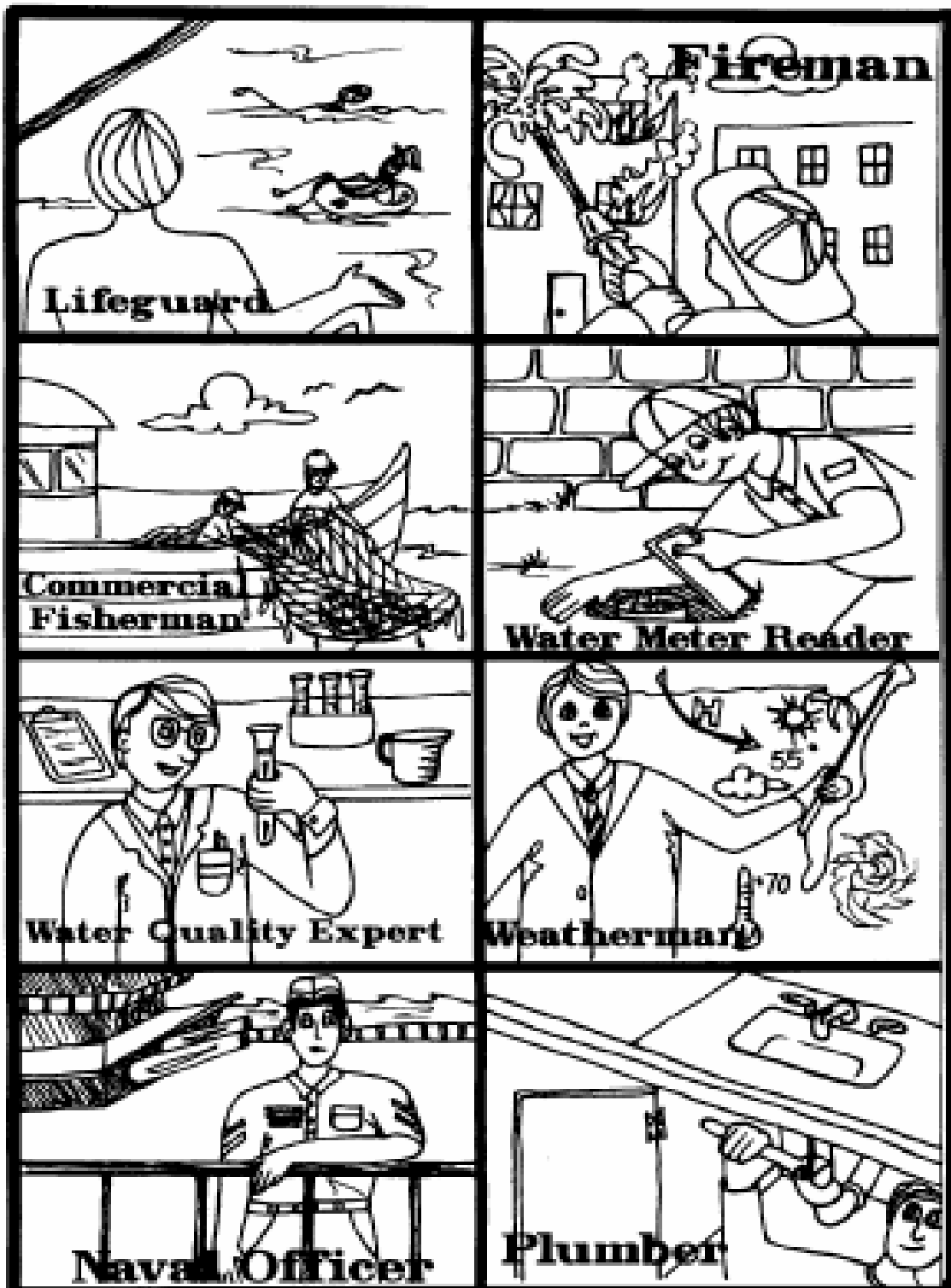
PROCEDURE:

1. Tell students to color in their strip of paper.
2. Go around the classroom and have students share the job written on their slip of paper. Discuss how water could be used as a part of this profession.
3. Students should determine how important water is to this job and then paste or tape their strip to the appropriate column.
4. After all of the strips are pasted in front of the class, have students decide if they want to change any of their answers. They should give a reason for changing their mind.

EXTEND AND APPLY:

1. Have students write down their name what they want to be when they grow up on a slip of paper. Students should then paste their professions into the columns from the previous activity and tell the class how water might be used in this job and why they chose this column.
2. Hang up the finalized graph with the student's desired professions in the hallway.
3. Older students can read about a famous person or historical figure who has a water-related "profession" or lifestyle, then present their findings to the class. (Examples include: Jaques-Cousteau, John Wesley Powell, Aldo Leopold, Lewis and Clark, etc;)
4. Tour a water-related job site or have a guest speaker. (Examples: fish hatchery, dam site, water treatment plant)

Directions: Color and cut apart the jobs below. Match them with the right career description on the next page.



Illustrations from the "The Water Sourcebooks" EPA/904-R-94-017 (a-d)

Worksheet 3-1: What's My Job?

Directions: Cut out the career cards and match them to the correct person's job. Paste them together to make a flashcard.

<p>I help to protect your country. I am in the armed services. What is my career?</p>	<p>I catch fish and bring them to market. What is my career?</p>
<p>I prevent and control fires. What is my career?</p>	<p>I forecast the weather. What is my career?</p>
<p>I find out how much water your family uses. What is my career?</p>	<p>I repair your pipes and make sure your toilet, faucets and showers are working. What is my career?</p>
<p>I watch while you swim to make sure you are safe. What is my career?</p>	<p>I test your water to make sure it is clean and safe to drink. What is my career?</p>

Activity adapted from the "The Water Sourcebooks" EPA/904-R-94-017 (a-d)

Answer Key

Students should have correctly identified, cut out, and pasted together the following careers:

1. Naval Officer
2. Fisherman
3. Fireman
4. Weatherman
5. Water Meter Reader
6. Plumber
7. Lifeguard
8. Water Quality Expert

SECRETARY

LIFEGUARD

WHALE TRAINER

CONST. WORKER

PAINTER

HOUSEKEEPER

FOOTBALL COACH

FARMER

SOLDIER

ZOO KEEPER

WEATHER MAN

HAIR STYLIST

POLICEMAN

FIREFIGHTER

TEACHER

FISHERMAN

PREACHER

BUS DRIVER

COOK

WAITRESS

DOCTOR

DENTIST

VETERINARIAN

LAWYER

What is the water cycle?



What is the water cycle? I can easily answer that—it is "me" all over! The water cycle describes the existence and movement of water on, in, and above the Earth. Earth's water is always in movement and is always changing states, from liquid to vapor to ice and back again. The water cycle has been working for billions of years and all life on Earth depends on it continuing to work; the Earth would be a pretty stale place to live without it.

Here is a quick summary of the water cycle. The links in this paragraph go to the detailed Web pages in our Web site for each topic. A shorter summary of each topic can be found further down in this page, though.

The water cycle has no starting point. But, we'll begin in the oceans, since that is where most of Earth's water exists. The sun, which drives the water cycle, heats water in the [oceans](#), which [evaporates](#) as vapor into the air. Rising air currents takes the vapor up into the [atmosphere](#), where cooler temperatures cause the vapor to [condense](#) into clouds. Air currents move clouds around the globe, cloud particles collide, grow, and fall out of the sky as [precipitation](#). Some precipitation falls as snow and can accumulate as [ice caps and glaciers](#), which can store frozen water for thousands of years. Snowpacks in warmer climates often thaw and melt when spring arrives, and the melted water flows overland as [snowmelt](#). Most precipitation falls back into the oceans or onto land, where, due to gravity, the precipitation flows over the ground as [surface runoff](#). A portion of runoff enters rivers in valleys in the landscape, with [streamflow](#) moving water towards the oceans. Runoff, and ground-water seepage, accumulate and are [stored as freshwater](#) in lakes. Not all runoff flows into rivers, though. Much of it soaks into the ground as [infiltration](#). Some of this water stays close to the land surface and can seep back into surface-water bodies (and the ocean) as [ground-water discharge](#). Some ground water finds openings in the land surface and emerges as freshwater [springs](#). Shallow ground water is taken up by the roots of plants and is [transpired](#) from leaf surfaces back into the atmosphere. Some water infiltrating into the ground goes deeper and replenishes [aquifers](#) (saturated subsurface rock), which store huge amounts of freshwater for long periods of time. Over time, though, this water keeps moving, some of to reenter the ocean, where the water cycle "ends" ... oops—I mean, where it "begins."

There are **six** important processes that make up the water cycle. These are:

Evaporation

Evaporation is the process where a liquid, in this case water, changes from its liquid state to a gaseous state. Liquid water becomes water vapor. Although lower air pressure helps promote evaporation, temperature is the primary factor.

For example, all of the water in a pot left on a table will eventually evaporate. It may take several weeks. But, if that same pot of water is put on a stove and brought to a boiling temperature, the water will evaporate more quickly.

During the water cycle some of the water in the oceans and freshwater bodies, such as lakes and rivers, is warmed by the sun and evaporates. During the process of evaporation, impurities in the water are left behind. As a result, the water that goes into the atmosphere is cleaner than it was on Earth.



Condensation

Condensation is the opposite of evaporation. Condensation occurs when a gas is changed into a liquid. Condensation occurs when the temperature of the vapor decreases.

When the water droplets formed from condensation are very small, they remain suspended in the atmosphere. These millions of droplets of suspended water form clouds in the sky or fog at ground level. Water condenses into droplets only when there are small dust particles present around which the droplet can form.

Precipitation

When the temperature and atmospheric pressure are right, the small droplets of water in clouds form larger droplets and precipitation occurs. The raindrops fall to Earth.

As a result of evaporation, condensation and precipitation, water travels from the surface of the Earth goes into the atmosphere, and returns to Earth again.

Surface Runoff

Much of the water that returns to Earth as precipitation runs off the surface of the land, and flows down hill into streams, rivers, ponds and lakes. Small streams flow into larger streams, then into rivers, and eventually the water flows into the ocean.

Surface runoff is an important part of the water cycle because, through surface runoff, much of the water returns again to the oceans, where a great deal of evaporation occurs.

Infiltration

Infiltration is an important process where rain water soaks into the ground, through the soil and underlying rock layers. Some of this water ultimately returns to the surface at springs or in low spots downhill. Some of the water remains underground and is called groundwater.

As the water infiltrates through the soil and rock layers, many of the impurities in the water are filtered out. This filtering process helps clean the water.

Transpiration

One final process is important in the water cycle. As plants absorb water from the soil, the water moves from the roots through the stems to the leaves. Once the water reaches the leaves, some of it evaporates from the leaves, adding to the amount of water vapor in the air. This process of evaporation through plant leaves is called transpiration. In large forests, an enormous amount of water will transpire through leaves.

LESSON 4

THE WATER CYCLE

OBJECTIVES

1. Understand that there is a limited amount of water on Earth.
2. Learn the basic processes of the water cycle.

ENGAGE—

Have a student go to a sink and get a glass of water and put it in a place where the class can see it. Take a good long look at the water. Ask: *Can you guess how old it is?*

Take different guesses from the students and then explain: *The water in your glass may have fallen from the sky as rain or snow just last week, last month or last year, but the water itself has been around pretty much as long as the earth has! When the first fish crawled out of the ocean onto the land, your glass of water was part of that ocean. When the Brontosaurus walked through lakes feeding on plants, your glass of water was part of those lakes. When king, queens, princesses, and knights took a drink from their wells, your glass of water was part of those wells.*

And you thought your parents were OLD!

BACKGROUND INFORMATION:

The earth has a limited amount of water that is “recycled” over and over. The water cycle is a dynamic cycle that has no “starting” or “ending” point, however this explanation begins in the oceans, since that is where most of Earth's water exists. The sun, which drives the water cycle, heats water in the [oceans](#) or other bodies of [surface water](#), which [evaporates](#) as vapor into the air. Rising air currents takes the vapor up into the [atmosphere](#), where cooler temperatures cause the vapor to [condense](#) into clouds. Air currents move clouds around the globe, cloud particles collide, grow, and fall out of the sky as [precipitation](#). Some precipitation falls as snow and can accumulate as [ice caps and glaciers](#), which can store frozen water for thousands of years. Snowpacks in warmer climates often thaw and melt when spring arrives, and the melted water flows overland as [snowmelt](#). Most precipitation falls back into the oceans or onto land, where, due to gravity, the precipitation flows over the ground as [surface runoff](#). A portion of runoff enters rivers in valleys in the landscape, with [streamflow](#) moving water towards the oceans. Runoff, and ground-water seepage, accumulate and are [stored as freshwater](#) in lakes. Not all runoff flows into rivers, though. Much of it soaks into the ground as [infiltration](#). Some of this water stays close to the land surface and can seep back into surface-water bodies (and the ocean) as [ground-water](#)

discharge. Some ground water finds openings in the land surface and emerges as freshwater springs. Shallow ground water is taken up by the roots of plants and is transpired from leaf surfaces back into the atmosphere. Some water infiltrating into the ground goes deeper and replenishes aquifers (saturated subsurface rock), which store huge amounts of freshwater for long periods of time. Over time, though, this water keeps moving, some of it reenters the ocean, where the water cycle "ends"...or where it "begins" all over again.

EXPLAIN AND DEVELOP:

(For younger students)

1. **Transparency 4-1: The Water Cycle**

Talk about the water cycle and answer student questions.

Student Activity: Color the Water Cycle

Hand out coloring pages and have students color the parts of the water cycle in groups.

2. Read **The Magic School Bus: Wet All Over** including the “note to kids, teachers and parents.” Answer any questions kids have about the reading. You may have to further explain *waterworks, evaporation, condensation, and precipitation*. Follow-up with **Transparency 4-2: The Magic School Bus Questions**.

(For older students)

3. **Transparency 4-3: The Water Cycle in Detail**

Use for more in-depth explanation of the water cycle for older students. Includes the concepts of precipitation, condensation, evaporation and transpiration.

Student Activity 4-3: Draw the Water Cycle

Hand out drawing assignments and have students draw the parts of the water cycle in groups. Students should be assigned to draw one of the following: the sun, oceans/lakes/surface water, evaporation (shown as water vapor or steam), condensation (shown as cloud formation), precipitation (snow or rain), and transpiration (plant “sweat”).



EXPLORE: WATER CYCLE PLAY (OPTIONAL)

MATERIALS:

Student Activity: Color the Water Cycle or
Student Activity: Draw the Water Cycle
Water Cycle Play Script

PREPARATION:

1. Complete water cycle drawings or coloring sheets.
2. Discuss water cycle processes using these drawings.
3. The instructor should read through and become familiar with the **Water Cycle Play Script**.

PROCEDURE:

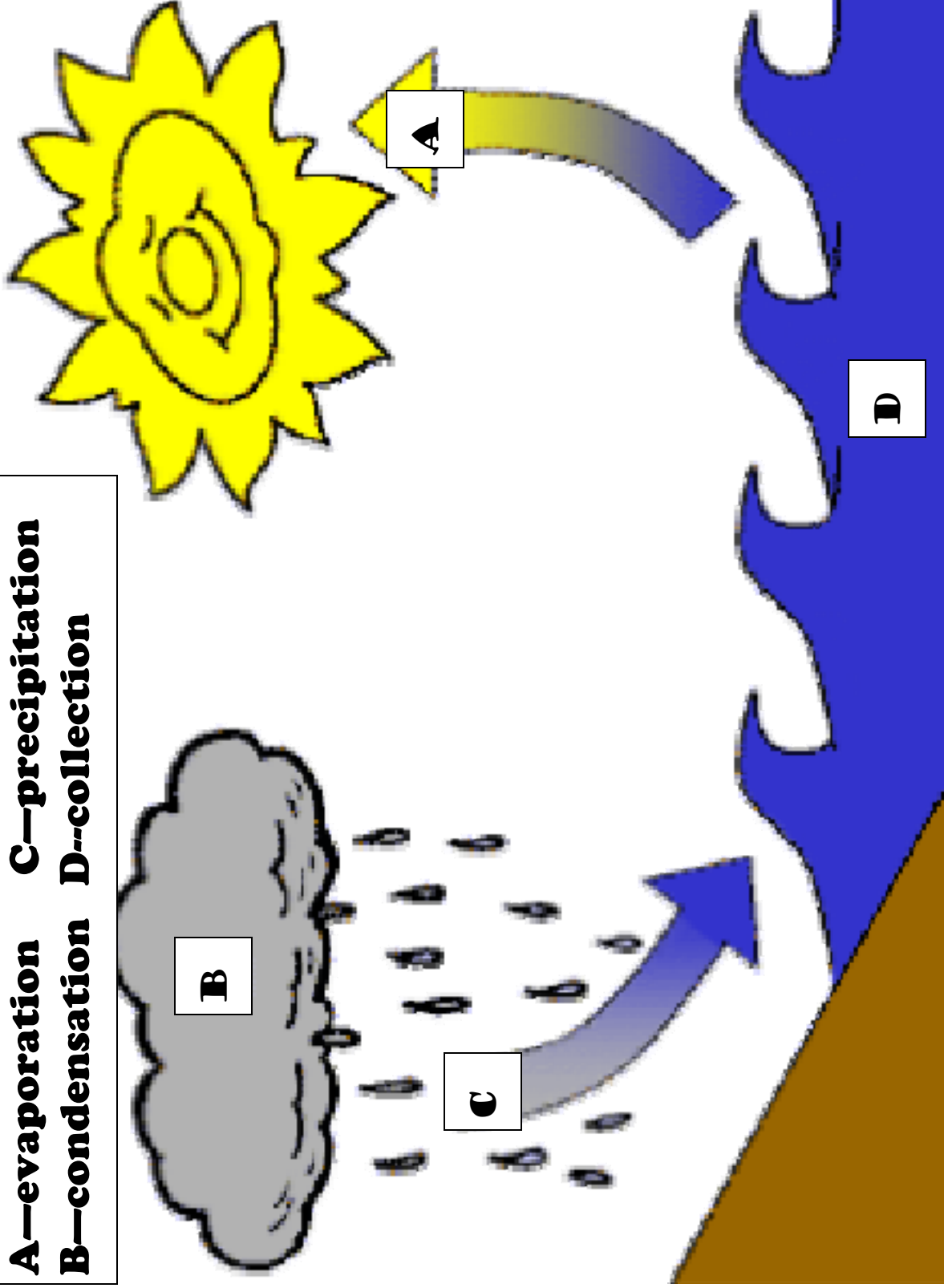
1. Group students according to their assigned parts and the Water Cycle Play set-up instructions. Have students stand in their groups in different parts of the classroom.
2. As the instructor reads the **Water Cycle Play Script** aloud, students should act out their parts as they are read. No props are necessary.
3. When the **Water Cycle Play** is finished, read and perform it again if necessary OR have students act it out and explain the cycle on their own.

EXTEND AND APPLY:

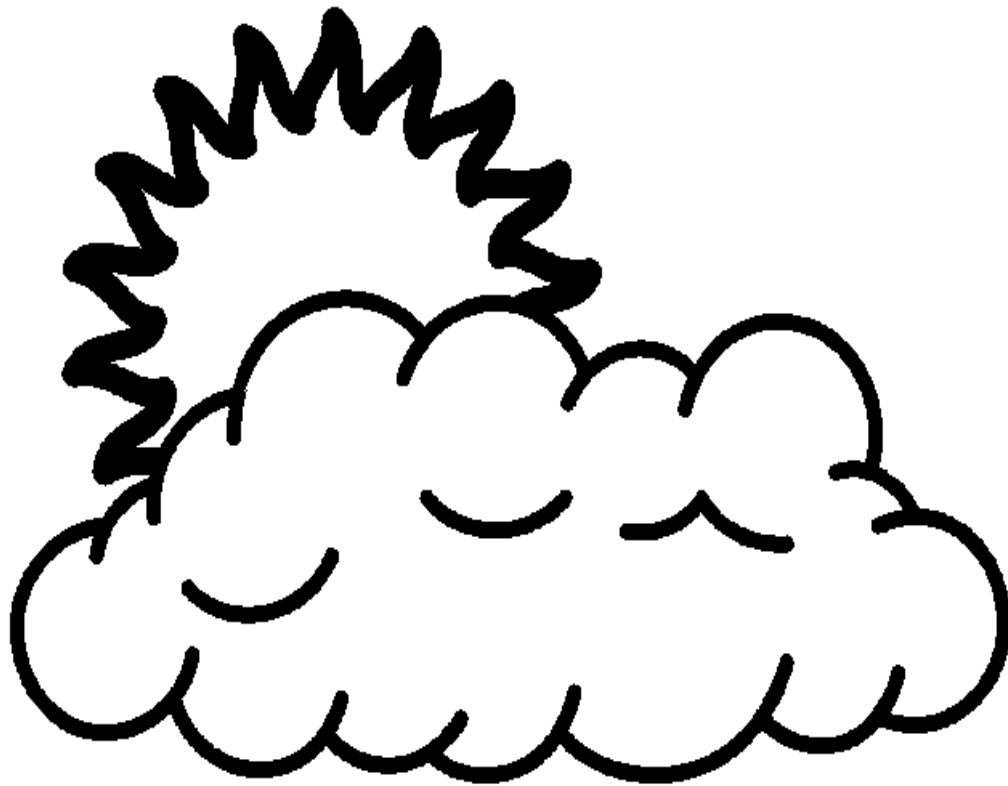
1. Create water cycle mobiles with the students' drawings or coloring sheets. Hang around the classroom.
2. Paste water cycle drawings or coloring sheets around the classroom.
3. Act out The Magic School Bus: Wet All Over Book.

THE WATER CYCLE

A--evaporation **C--precipitation**
B--condensation **D--collection**



Condensation



Water vapor in the air gets cold and changes back into liquid, forming clouds. This is called condensation.

Collection



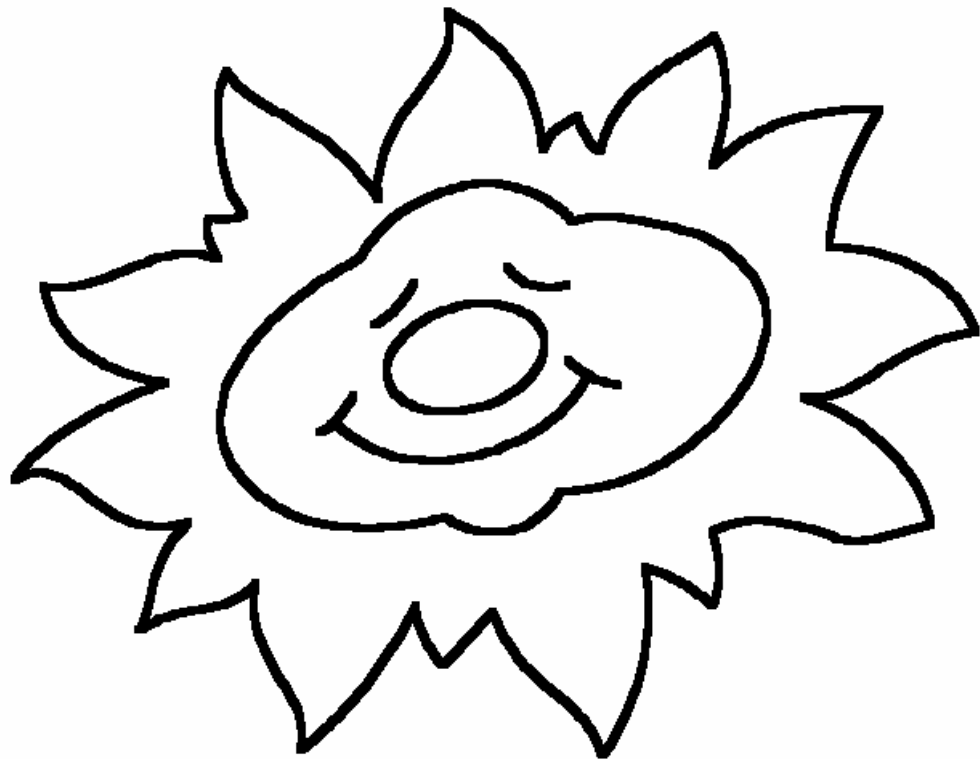
When water falls back to earth as precipitation, it may fall back in the oceans, lakes or rivers or it may end up on land.

Precipitation



Precipitation occurs when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the earth in the form of rain, hail or snow.

Evaporation



Evaporation is when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor or steam leaves the river, lake or ocean and goes into the air. Make your own

MAGIC SCHOOL BUS: WET ALL OVER

As a class, fill in the blanks with the following words:

Water	Gas (2)
Precipitation	Liquid (2)
Condensation	Water works
Evaporation	

The kids in the book The Magic School Bus turn into water drops that travel through something called the _____ cycle.

When the sun heats up water droplets, they turn into water vapor and float into the air. This is called _____.

Evaporation is when water changes from a _____ to a _____.

When water vapor (and the kids in the book) turn into clouds, this is called _____.

Condensation is when water changes from a _____ back to a _____.

When the kids fall back down to earth as rain, this is called _____.

The _____ is where used water is made clean again. We bathe, drink and cook with the cleaned water.

**If you were a raindrop falling to earth, where would you like to land?

Bonus: True or False? There is exactly the same amount of water on earth now that there was millions of years ago.

ANSWER KEY

MAGIC SCHOOL BUS: WET ALL OVER

As a class, fill in the blanks with the following words:

Water	Gas (2)
Precipitation	Liquid (2)
Condensation	Water works
Evaporation	

The kids in the book The Magic School Bus turn into water drops that travel through something called the **water** cycle.

When the sun heats up water droplets, they turn into water vapor and float into the air. This is called **evaporation**.

Evaporation is when water changes from a **liquid** to a **gas**.

When water vapor (and the kids in the book) turn into clouds, this is called **condensation**.

Condensation is when water changes from a **gas** back to a **liquid**.

When the kids fall back down to earth as rain, this is called **precipitation**.

The **water works** is where used water is made clean again. We bathe, drink and cook with the cleaned water.

**If you were a raindrop falling to earth, where would you like to land?

Bonus: True or False? There is exactly the same amount of water on earth now that there was millions of years ago. **True**

Evaporation:

Evaporation is when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor or steam leaves the river, lake or ocean and goes into the air.



Transpiration:

Do plants sweat?

Well, sort of.... people perspire (sweat) and plants transpire. Transpiration happens when plants lose water out of their leaves. Transpiration gives evaporation some help to get water vapor back up into the air.

Condensation:

Water vapor in the air gets cold and changes back into liquid, forming clouds. This is called condensation.



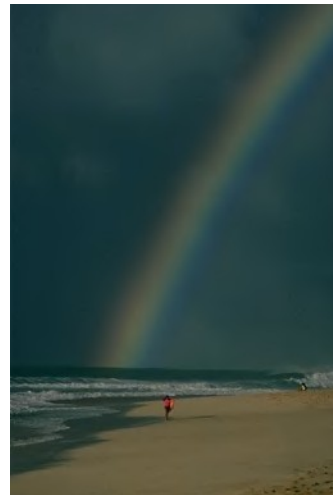
Precipitation:

Precipitation happens when there is so much water condensed in the clouds that they just can't hold any more. The clouds get heavy and water falls back to the earth as rain, hail, sleet or snow.



Collection:

When water falls back to earth as precipitation, it may fall back in the oceans, lakes or rivers or it may end up on land. When it ends up on land, it will either soak into the earth and become part of the “ground water” that plants and animals use to drink or it may run over the soil and collect in the oceans, lakes or rivers where the cycle starts



All over again!

Drawing Assignments for the Water Cycle:

THE SUN

OCEAN

RIVER

EVAPORATION
(SHOWN AS WATER VAPOR)

CONDENSATION
(SHOWN AS CLOUD FORMATION)

RAIN

SNOW

MOUNTAINS/GLACIERS

TRANSPIRATION
(PLANT "SWEAT")

WATER CYCLE PLAY

CHARACTERS:

1 Sun	Ocean Group (3-5)
Water drop # 1 (Drippy)	1 Wind
Water drop #2 (Wet)	1 Raindrop
Cloud Group (3-5)	1 Snowflake
Mountains Group (3-5)	1 Stream

PREPARATION:

Assign your students their parts and arrange them into groups. The parts are listed above and according to the suggested numbers of students for each part. The teacher may have to add members to certain groups or parts based upon class size. Explain the parts to the class. The teacher may wish to make nametags so the class can remember their assignments.

SET-UP:

Set up the groups in the following manner:

1. The **Sun** and the **Wind** should stand with the narrator.
2. The **Ocean Group** should hold hands in a circle.
3. **Water drop 1 & 2** should start standing in the **Ocean Group** circle.
4. The **Cloud Group** should hold hands in a circle. **Raindrop** and **Snowflake** should also join this group to begin with.
5. The **Mountains Group** should stand with their arms forming mountain peaks.
6. The **Stream** will stand alone.

The teacher will read the script and give acting instructions.

NARRATOR:

All ocean group members should hold hands in a circle around the two water drops.

Our water cycle story begins in the ocean with two drops of water, Drippy and Wet. We are watching our water drops be heated by the sun.

The Sun heats the ocean water drops—water drops act like they are very hot in the middle of the circle.

“It’s getting hot in here!” Drippy says, “I don’t think I can swim in the ocean any more.”

Wet replies, “I’m feeling light and dizzy. I think it’s the sun that’s doing it to me. I think I feel like floating!!!”

Have the suns take the water drops by the hand and lead them over to the cloud group. The cloud group members will be holding hands in a circle. The water drops will stand outside of the circle.

The sun is hot and full of energy and heats the drops of water until they float into the air. Now Drippy and Wet are no longer water drops, but tiny and invisible and floating in the air. They are now called water vapor. Water vapor is still water, but it is a gas....you can see water vapor when it is steam...like the steam from a shower or a tea kettle.

Our friends Drippy and Wet go up, up, up, high into the sky.

Drippy says, “It’s cold up here! I’m shivering”

Have the water drops (now as water vapor) act cold.

Drippy and Wet are condensing, or changing from invisible water vapor, back into water drops.

Wet replies, “I feel like joining the others up here in this crowd.”

“I think you mean cloud, not crowd,” laughs Drippy, “Let’s change back into water and become a part of the cloud.”

The cloud group should now let the two water drops into the circle and they will all hold hands.

Now Drippy and Wet are water again. They have joined a light and fluffy cloud, but Drippy has started to feel a little heavy.

“I feel so heavy, I think I’m going to fall out of this cloud,” says Drippy.

“I’m not ready to leave yet,” protests Wet.

“I don’t have a choice,” answers Drippy, “I’m going to fall out of this cloud any second. Is there anyone who wants to go with me?”

A little voice pipes up from the cloud, “I’m a raindrop too and I’m ready to fall to earth! Let’s go!”

Drippy and the raindrop should come out of the circle and hold hands and leave the cloud.

“I hope I see you later Drippy!” shouts Wet. “I wonder where I’ll fall to earth?”

Suddenly there is a great wind.

The wind should start blowing at the cloud group and move them towards the Mountain Group.

“It looks like we’re headed straight for those mountains,” announces Wet. Now Wet is feeling heavy and cold. “Hey, I think I’m going to fall to earth as snow!” says Wet, “Are there any other snowflakes around here?”

Another little voice pipes up from the cloud, “I’m a snowflake! I’ll go with you!”

Wet and the snowflake should leave the circle and “float” towards the Mountain Group.

Wet and the snowflake float down to the mountains. They are now a part of the snow and ice on the mountain tops.

Wet asks his/her new snowflake friend, “How long do you think we will be here?”

The snowflake replies, “Probably until Spring, when we will melt back into water drops. I hope you like skiing. We will have lots of people skiing over us all winter!”

“This is going to be a long winter!” replies Wet. “Will I ever get to see Drippy again?”

Meanwhile, our friend Drippy and the Raindrop have found their way to earth and have fallen into a river.

Drippy, the Raindrop and the River should hold hands in a single file line.

“After all that falling, it sure is good to be in a river. It is so relaxing to flow downhill. Where exactly are we going?” Drippy asks his new friends.

The River answers, “I will flow downhill until I reach the ocean again. It’s a long journey, so hold on.”

The river will lead Drippy and the Raindrop back to the Ocean Group, where they will all hold hands.

The River carried Drippy and his/her raindrop friend back to the ocean, to place where Drippy started. "Hello everyone," Drippy beams, "It's so good to be back!"

Back in the mountains, things began to heat up a bit. The sun is shining on the snowy mountain tops and Wet and his/her snowflake friend are beginning to melt.

After a long winter in the mountains they are starting to flow downhill. They fall over rocks, down waterfalls and finally to the River.

The River should take Wet and the snowflake by the hand.

"Now we are water drops again, but where are we?" asks Wet.

"You are now a part of a River," answers the River. "I will take you where you need to go."

The river should lead Wet and the Snowflake around the room.

"I can find a nice lake for you to rest in, or maybe you would prefer a water pipe so someone can brush their teeth with you later. Maybe you want to flow into a stream so a duck can float on you, or maybe you want to soak into the ground..."

"All those things seem very nice," Wet replies, "but I just want to find my friend Drippy again."

"Well, why didn't you say so?" answers the River, and he/she brought Wet and the snowflake (which by now had melted into water too) all the way to the ocean.

The River leads Wet and the Snowflake to the Ocean Group where they will all join hands.

Wet was overjoyed! Here was his/her friend Drippy all the way back in the ocean.

"Did you miss me?" asks Wet.

"Of course I did!" replies Drippy. "I'm surprised to see you! We're finally back in the ocean. You know, I've done this trip millions, maybe billions of times, and every time it's different. I was water in a kitchen sink in Montana. I was a typhoon in Thailand twice. I was snow in Alaska. I was rain in Seattle. I was a puddle in Chicago."

"Wow!" says Wet, "You *have* done a lot, but a long time ago I was rain on the nose of a Tyrannosaurus Rex. I've been water in an underground cave. And once I was the water that a Queen drank from her goblet."

"And now we get to do it all over again!" exclaims Drippy.

"What do you mean?" asks Wet.

But before Drippy has time to answer, the Sun is overhead, heating them up again.

The Sun should come back over and heat up the ocean group.

“What I mean is, I’m starting to feel hot and light, like I could float into the air!” answers Drippy.

“I wonder where we’ll end up this time!?” exclaims Wet.

And the two water drops start their next adventure in the water cycle just like that.

THE END.

LESSON 5

WATER & THE SEASONS

OBJECTIVES

1. Understand how the water cycle is connected to weather.
2. Learn how precipitation and weather are connected to the seasons.

ENGAGE—

Engage 5-1: Weather Sayings

Read the weather sayings aloud to the class and discuss what they mean. Your students may not be familiar with all of them. *What do all of the sayings have in common? They are all referring to water or the weather. Which ones do they recognize? Which ones are the funniest? Do you think that these sayings are all true?*

BACKGROUND INFORMATION:

As the seasons change, so does the amount and forms of precipitation. In the winter, we experience snowstorms, frozen ponds, icy roads and we can even see our breath in the air. In the spring the snow melts, nourishing the budding plants and adding more water to the streams. The summer days are longer, with afternoon thunderstorms building in the sky. In the fall, the days shorten, and the first frost signals the beginning of another cold season. In addition to seasonal changes, we see water in our weather everyday. We see water not only in the form of rain or snow, but hail, fog, morning mist, dew drops on leaves, ice-covered tree branches, and cloud formations to name a few. These varying weather conditions influence how we live our lives, what we can do after school, when we plant our gardens and play outside and when we simply just stay indoors.

EXPLAIN AND DEVELOP:

1. Have students pick one of the sayings from **Engage 5-1** and illustrate it. *What part of the weather or the water cycle does the saying describe?*
2. On large sheets of butcher paper or on the chalk board, list the four seasons and have students brainstorm words that describe each one. For example, to describe winter they might list: snow, skiing, cold, icicles and mittens. How many of their descriptions have to do with water in some way?



EXPLORE: WEATHER CALENDAR



MATERIALS:

Weather Calendar
Weather Cards

PREPARATION:

1. Enlarge the **Weather Calendar** on butcher paper to hang in the classroom.
2. Make copies of the **Weather Cards** and cut them apart. Sort them into envelopes.

PROCEDURE:

1. During a designated part of the school day, students will keep track of the weather for that day (sunny, partly cloudy, cloudy, raining, thunderstorm or snowing).
2. Assign a student to tape the weather for the day onto the calendar.
3. At the end of the month, students can count how many days of each kind of weather they have posted. Teachers can help students make a graph like the following:

DECEMBER WEATHER

Sunny	Rainy	Thunder-Storm	Partly Cloudy	Cloudy	Snowy

4. Keep track of the weather for multiple months and have students compare the results. Which month had the most sunny days? The most snowy days? The most rainy days?

EXPLORE: PRECIPITATION CALENDAR



MATERIALS:

Precipitation Calendar
Weather Cards
Rain Gauge
Ruler
Bucket

PREPARATION:

1. Enlarge the **Precipitation Calendar** on butcher paper to hang in the classroom.
2. Make copies of the rain and snow **Weather Cards** and cut them apart. Sort them into envelopes.
3. In an outdoor location, free from disturbance or obstacles, set a bucket to catch snow and a rain gauge to catch rain (or whichever is appropriate for the season).

PROCEDURE:

1. During a designated part of the school day, students will keep track of the precipitation that has occurred the day before. To measure rain, check the rain gauge in the morning. To measure snow, check how much has fallen into the bucket and measure the depth with a ruler.
2. Assign a student to tape the precipitation for the day on the **Precipitation Calendar**.
For every inch of precipitation, tape one snow or rain **Weather Card**. For a half or quarter inch of precipitation, cut a card into the appropriate proportion. For the purposes of this lesson, snow will be measured in inches of snow, not actual inches of precipitation.
For example, this is what a **Precipitation Calendar** for the first half of December might look like:

DECEMBER PRECIPITATION

							*							
							*							
							*							
							*							
							*							
							*							
							*							
*		*					*	*						
*		*					*	*		*				
*		*	*				*	*		*			*	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

3. At the end of the month, students can review the trends of precipitation they have posted. How many inches of precipitation did they count during the month? Which day had the most precipitation? The least? Which week had the most precipitation? What was the longest time that lapsed without precipitation?

EXPLORE: THE WEIGHT OF SNOW (For older students)



MATERIALS:

Measuring cups
Kitchen scale
Lab 5-2: Snow Lab
Stop watch
Snow or crushed ice

PREPARATION:

1. Pair or group students for snow collection outside.
2. Make copies and hand out **Lab 5-2: The Weight of Snow**

PROCEDURE:

1. Have students (in groups or pairs) collect 1 cup of snow and bring it indoors.
2. Set the stopwatch and have the students follow **Lab 5-2** for directions.
3. Help students weigh their snow and melted snow.
4. Help students describe their snow (for example: color, texture, or crystal size)
5. Discuss why snow weighs less than water. The density of snow (the proportion of snow to air spaces) varies from light and fluffy to wet and dense. Snow layers will always be a mixture of ice and air; different snow has different amounts of water content.

EXTEND AND APPLY:

1. Hang up **Precipitation Calendars** or **Weather Calendars** in the hallway.
2. With their parent's help, have students look through the newspaper, magazines or the internet to find a recent news story about the weather. For example, a news story about flooding, a snowstorm, a hurricane etc; Students should bring their news articles to school and share them with the class.
3. Create seasonal collages. Have students pick a season and write it on the top of a piece of construction paper. Then, they should leaf through magazines for pictures that represent that season. Once they are finished cutting and pasting, students should explain their collage to the class. Why did they choose the pictures they did? What pictures show water in some form?

WEATHER SAYINGS:

It's raining cats and dogs.

April showers bring May flowers.

Red skies in the morning, sailors take warning.

Red skies at night, sailor's delight.

When the clouds look like horsetails, rain in 3 days.

Rain in three days when the horns of the moon point down.

Count the cricket chirps to tell the temperature.

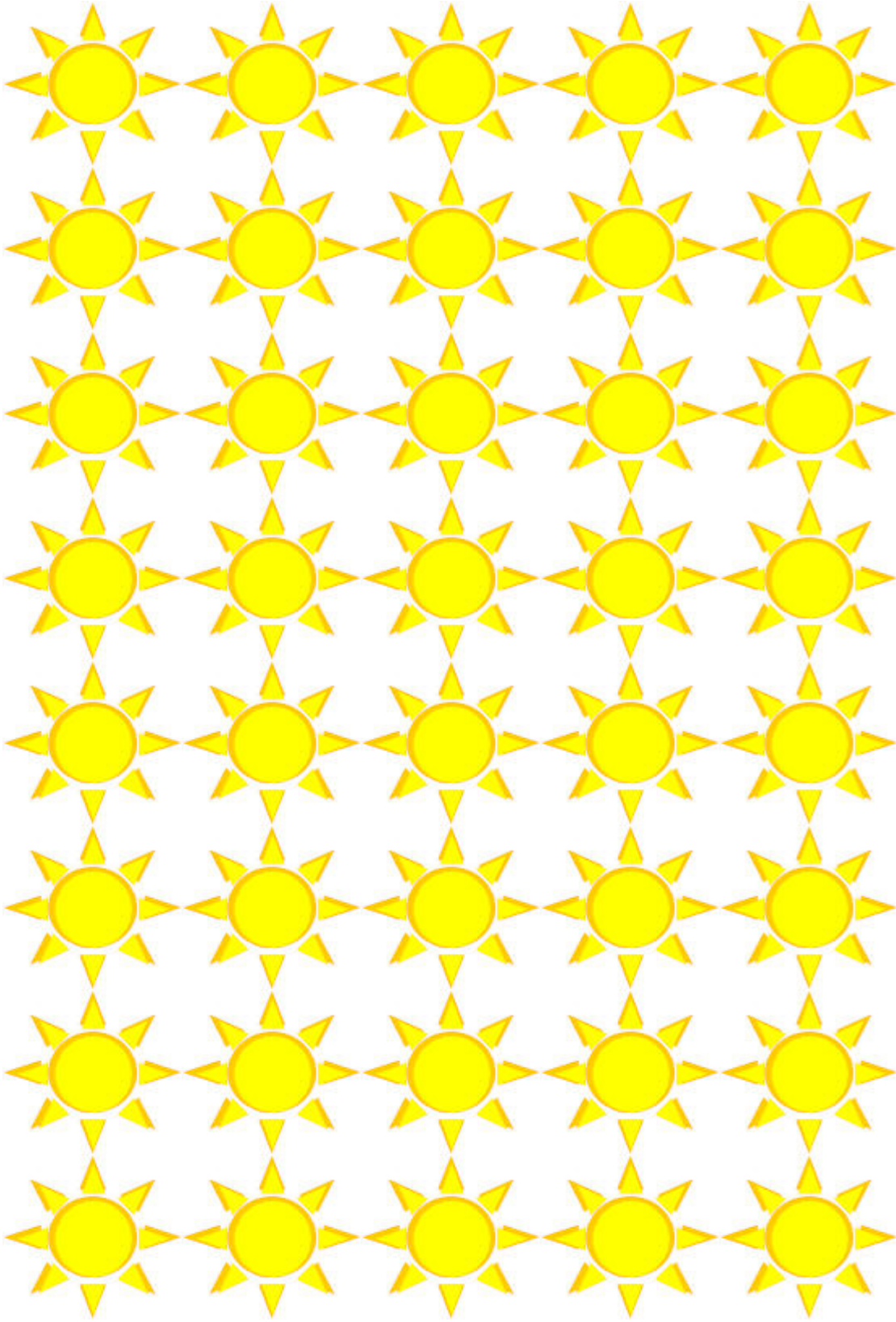
When smoke descends, good weather ends.

Flies will swarm before a storm.

March comes in like a lamb and goes out like a lion. (Or March comes in like a lion and goes out like a lamb).

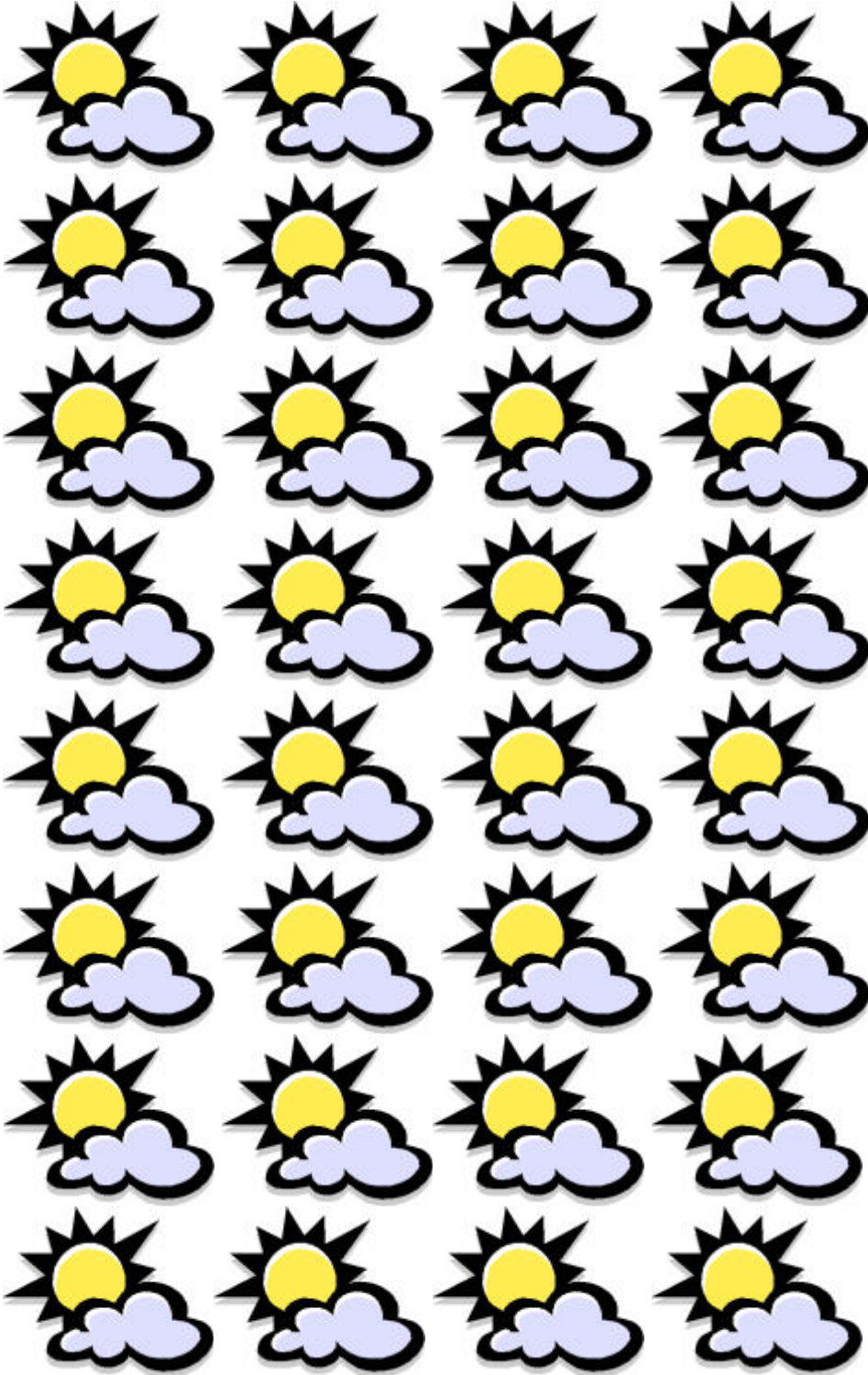
Ring around the sun, time for fun. Ring around the moon, storm coming soon.

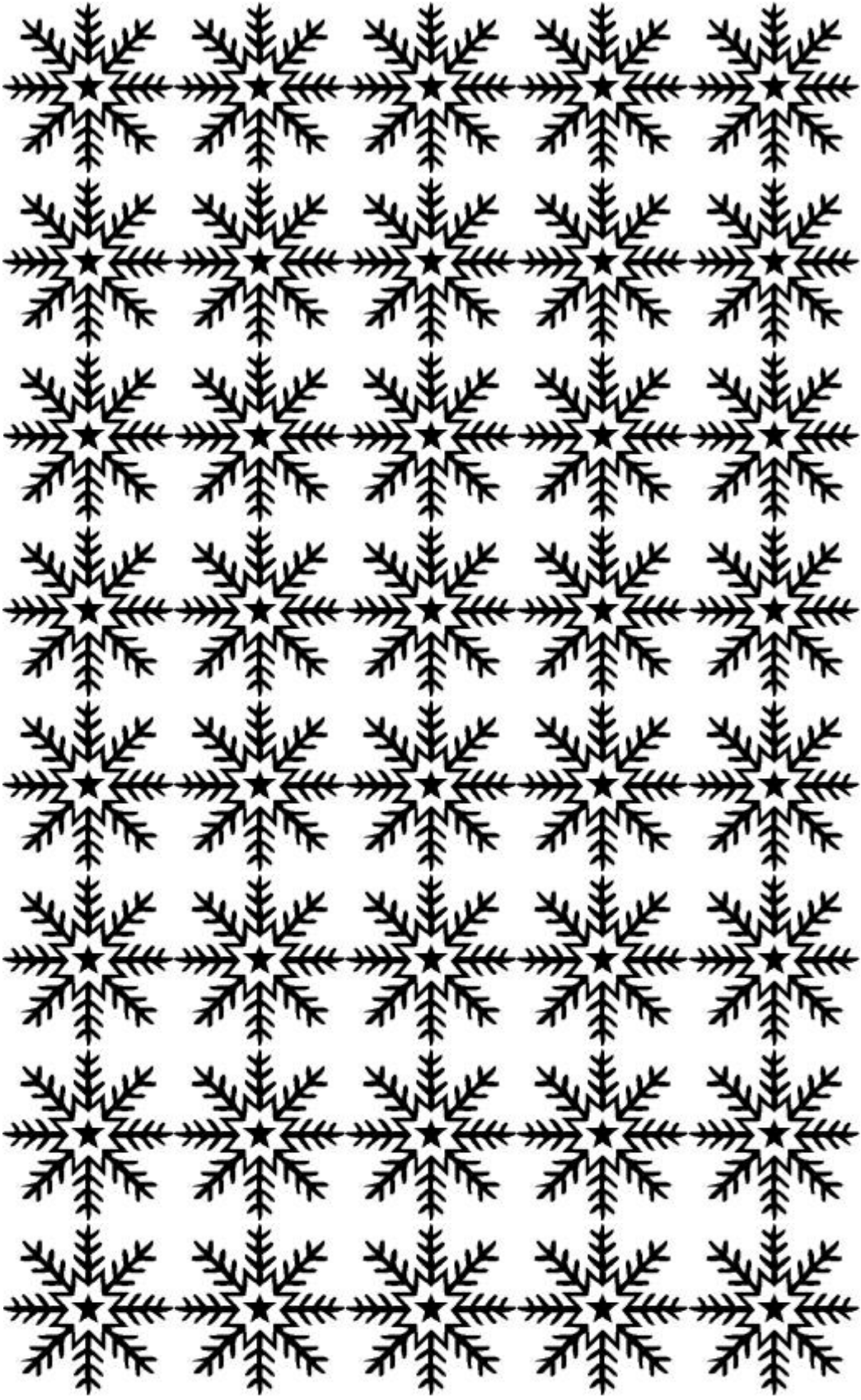
Ice in November to bury a duck, the rest of the winter is slush and muck.

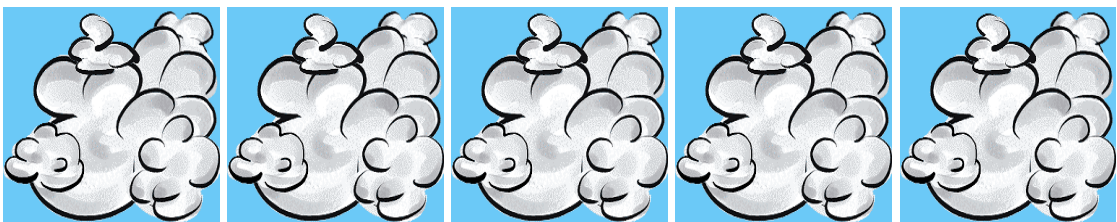










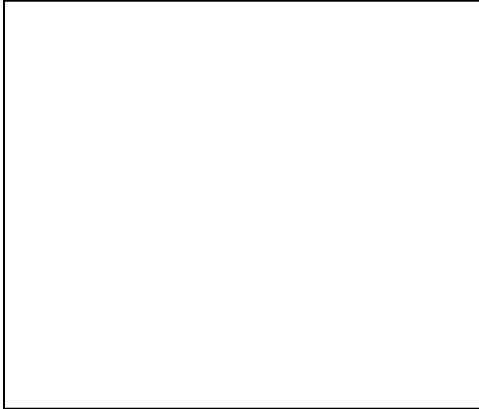


SNOW LAB

Name: _____

1. My snow weighs _____

2. While you are waiting, draw what your snow looks like:



Pick 3 words to describe your snow:

a. _____

b. _____

c. _____

3. Will your snow weigh more, less or the same after it melts? (circle one)

It will weigh **MORE**. It will weigh **LESS**. It will weigh the **SAME**.

4. It took _____ minutes and _____ seconds for my snow to melt.

5. One cup of snow equals _____ cups of water.

6. Weigh the snow after it melts. My melted snow weighs _____

7. Was your answer for #3 right? _____

LESSON 6

RIPARIAN LIFE

OBJECTIVES

1. Students will learn the definition of a riparian system.
2. Students will learn about predator/prey relationships and how these relate to a food chain.
3. The importance of keeping a riparian system healthy and in-tact.
4. The plants and animals found in the local riparian system.

ENGAGE—

Hand out **Riparian Players** cards to the students. Have them color their card and set it aside for later activities.

BACKGROUND INFORMATION:

Riparian zones are areas that are found on the edge of water systems such as rivers and streams, or around lakes and ponds. Because of their proximity to water, they support a unique and diverse array of plant and animal species that may not be found in the surrounding area. A healthy riparian system provides a source of food, water, shelter, and community for the wildlife it supports. Riparian zones encompass the plants and animals that are aquatic and terrestrial. An in-tact riparian zone is essential in supporting the food chains for predators and their prey.

EXPLAIN AND DEVELOP:

Food chains follow a single path taken as different creatures eat each other for energy. [For example: **grass** (is eaten by a) **grasshopper** (which is eaten by a) **frog** (which is eaten by a) **snake** (which is eaten by a) **hawk**]. Food chains follow just one path as animals find food.

Food webs explore how all life is interconnected. (For example: **trees** produce acorns which acts as food for many **rodents** and **insects**. Because there are many rodents, **weasels and snakes and raccoons** can live. The insects in the acorns attract **birds, snunks** and **oppossums**. With opossums, skunks, and rodents around, **hawks, foxes** and **owls** can find food). Food webs show how many animals are connected in many ways to find food.

Predators are defined as animals who eat other animals, while **prey** are the animals that are eaten. **Carnivores**, or animals that eat only other animals, aren't the only ones who require a complete food web to be in-tact. **Omnivores**, animals that eat both plants and animals and **herbivores**, those that feed exclusively on plants are integral in keeping a riparian system healthy.



1. **Transparency 6-1: Predators and Prey**

Explain the definitions of predator and prey and how they relate to a healthy food chain.

Student worksheet 6-1: Predators and Prey

Students will complete the worksheet to display understanding of predator/prey relationships.

2. **Transparency 6-2: What Do I Eat?**

Explain the definitions for omnivore, carnivore and herbivore and how they relate to a food chain.

Student worksheet 6-2: What Do I Eat?

Students will complete the worksheet to display understanding of how a food chain works.

EXPLORE: THE RIPARIAN WEB

In order have students understand the interconnectedness of a riparian system and food web, do the following activity:

MATERIALS:

Riparian Character Cards
Riparian Character Descriptions
Scissors
Glue
Yarn
Dice



PREPARATION:

1. After students have colored their **Riparian Character Cards**, read the **Riparian Player Character Descriptions** aloud and have the students decide which description matches their card.
2. They will then glue this description to the back of their card and poke a hole through the top. Students will insert a piece of yarn through the hole and make a "necklace." Students will wear their characters for the EXPLORE activity.

PROCEDURE:

1. Students wearing their **Character Cards** will form a circle in the middle of the classroom.
2. The teacher will have a spool of yarn to create a “web” in the circle. Have one student hold the end of the spool tightly and pass the yarn to someone across the circle from them. This student will hold a yarn section and pass the spool across the circle. Repeat this process until every student is holding a piece of the yarn and the class has formed a “web.”
3. The teacher will roll the dice and, starting with the first student (the one holding the end of the yarn), will count the number rolled. For example, if a total of 6 is rolled, the teacher will count to the sixth student in the circle. This student will tell the class their character and read the description on the card. This character has now been taken out of the riparian web. This student should drop their end of the yarn.
4. Once this character is taken out, the characters that depend upon them for survival will also be taken out. Go around the circle and have students explain why they would or would not be eliminated. The eliminated students should also drop their ends of the yarn spool. For example, if a macroinvertebrate were eliminated, fish would also be out of the web, as well as any animals that eat fish. If water were eliminated, every single player would also be eliminated.
5. If another roll is possible, roll the dice and again and keep counting around the circle for the next elimination. Continue to roll until everyone is out of the web.
6. After the first round, have the students switch positions in the circle and create another web.
7. Roll the dice and start the game again.
8. Repeat the process until students can draw the conclusion that the characters in the riparian web rely closely on one another how character relationships effect who gets eliminated.

EXTEND AND APPLY:

Make Food Chain Mobiles. Draw or color pictures of animals that create a food chain. Hang the animals in order, with the predators at the top of the chain. You may use the **Riparian Character Cards** for this activity.

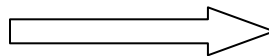
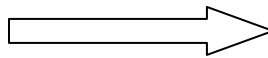
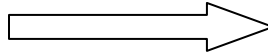
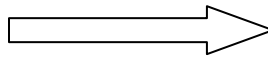
PREDATORS AND PREY

Many animals on earth are food for some other animal. Animals that are **predators** eat other animals that are **prey**.

For example:

Predators

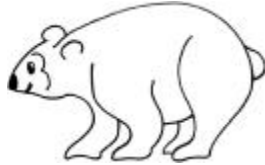
Prey



PREDATORS AND PREY

Name _____

Draw an arrow from a predator to its prey.



Lion



HERBIVORES, CARNIVORES, OMNIVORES

WHAT DO I EAT?

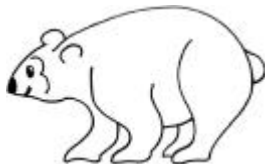
Herbivores are animals that eat only plants.



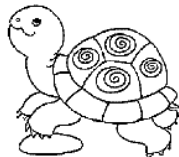
Carnivores are animals that eat only other animals.



Omnivores are animals that eat both plants and meat.

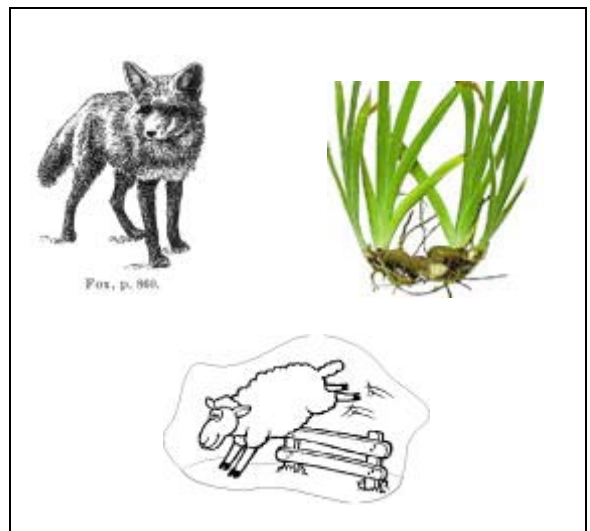
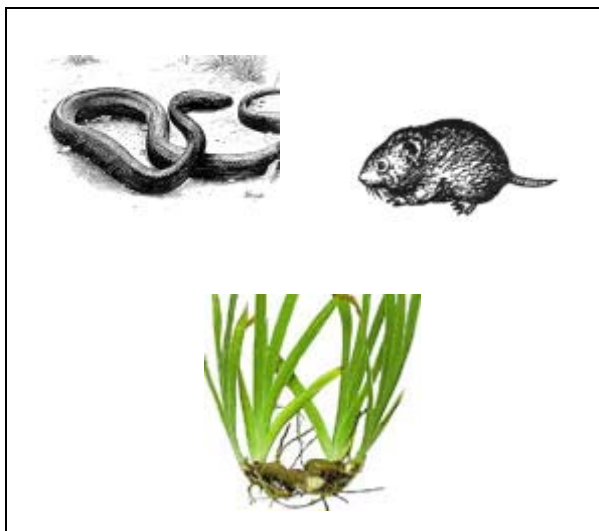
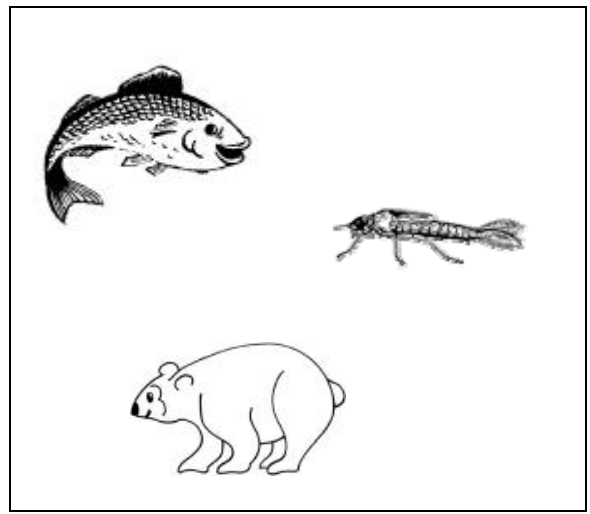
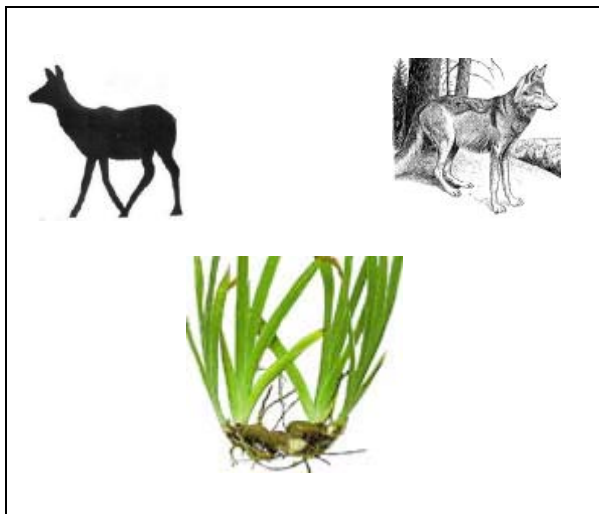
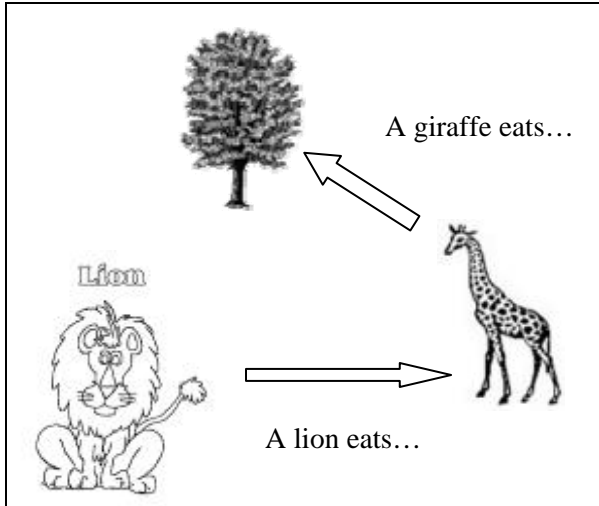


Turtle



Name _____

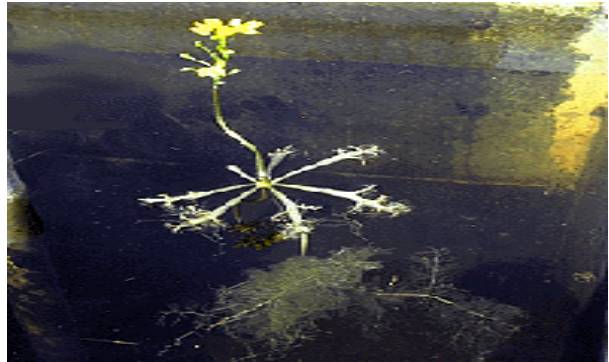
Draw arrows from each animal to the thing that it eats.
Follow the example below:



RIPARIAN PLAYERS CARDS

RIPARIAN PLANTS

Macrophytes—are aquatic plants, growing in or near water. They provide shelter for fish and macroinvertebrates. They are food for some fish and other wildlife, like ducks or moose. An unhealthy riparian system has little or no macrophytes.

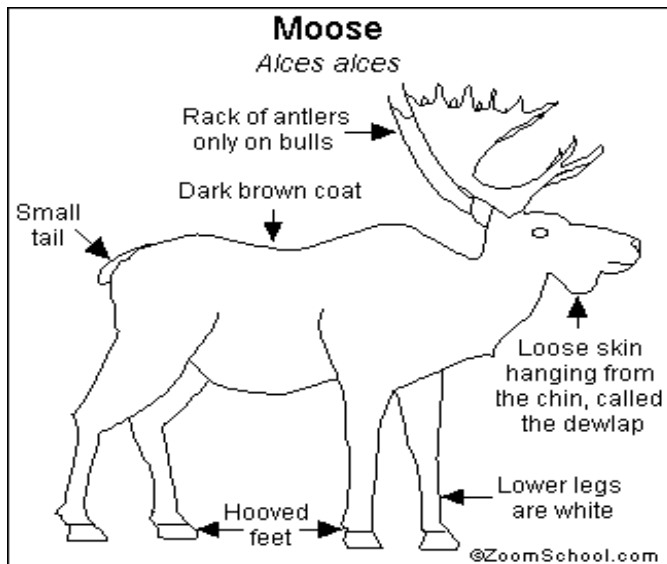


Sedges—are herbs found in most fresh water wetland areas. They look like grasses but are really very different. The easiest way to tell a sedge from a grass is by feel the stem. If the stem is flat or rounded, then you've probably got a grass or a reed. If the stem is clearly triangular, then you got a sedge. Sedges provide shelter for animals and places for birds to build their nests.



Willows—are a family of trees and shrubs that grow along streams and in other moist places. They help to hold stream banks together and provide shelter for animals in and out of the water, like fish and moose. Animals also use willow twigs and sticks to build their nests and homes.

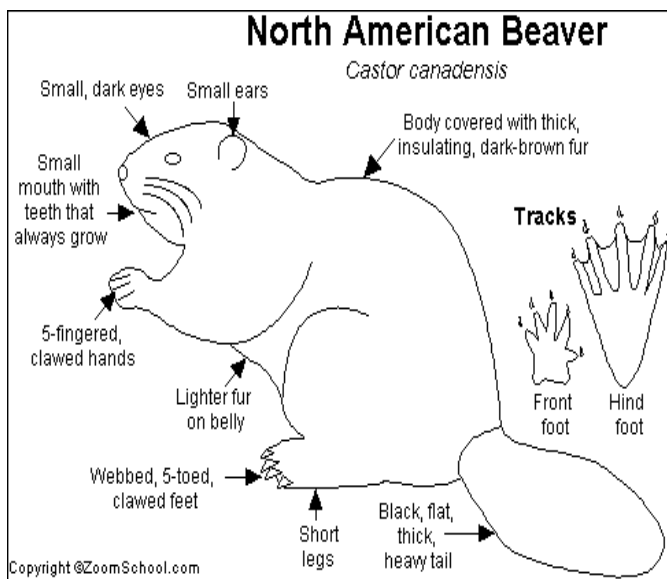
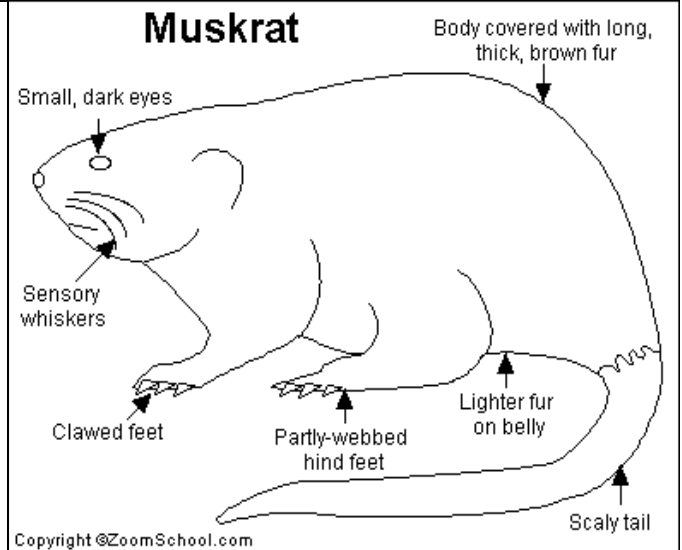




MOOSE—The moose is the largest member of the [deer family](#). Moose are strong runners. The moose is an **herbivore** (a plant-eater) who spends most of the day eating. Moose eat willow, birch, and aspen twigs, horsetail, sedges, roots, pond weeds, and grasses.

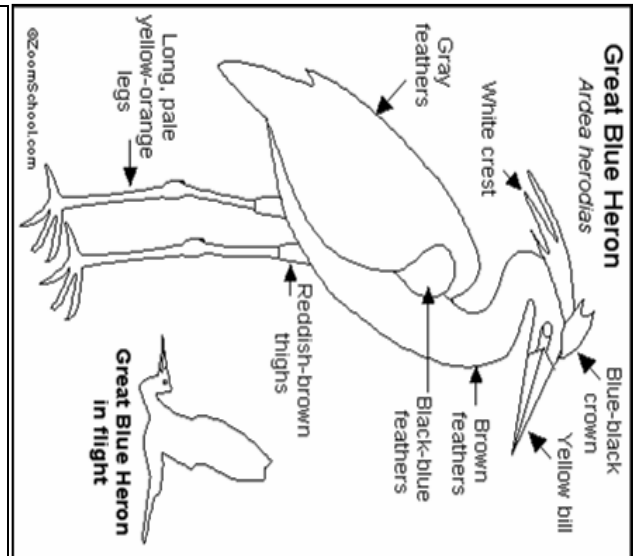
Moose like to rest in wet areas near their food and in the shelter of willows and trees.

MUSKRATS—are rodents that live in marshes, lakes, ponds, and streams. Their houses, made of plants, protect the muskrat from predators, since the only entrance is underwater. Muskrats are excellent swimmers but are slow on land. Muskrats eat water plants and shellfish. : Muskrats are hunted by many animals, including foxes and [raccoons](#). Muskrats cannot move very quickly on land, so their best defense is to retreat into the water or into their house.

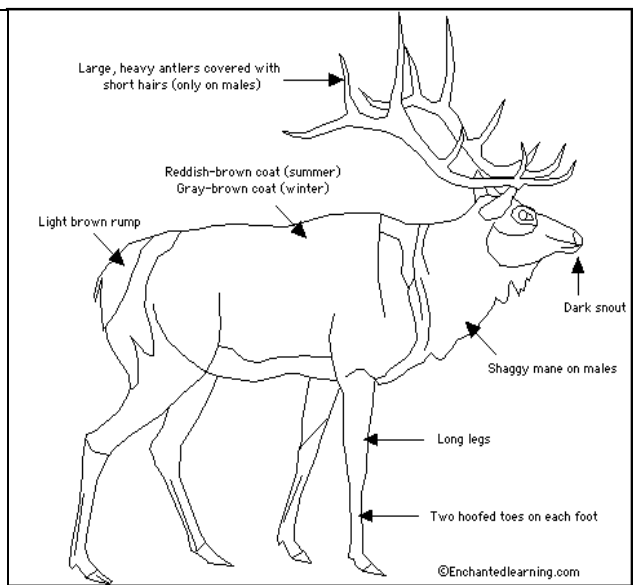


BEAVER—The beaver is a large, rodent with a large, flattened tail. It is a strong swimmer and can swim up to 5 miles per hour can swim underwater for up to 15 minutes. Beavers build lodges out of sticks and mud in the water and their houses have an underwater entrance. Beavers are **herbivores** (plant-eaters). They eat tree bark, leaves, roots, twigs, and water plants. The beaver is hunted by many animals, including coyotes, wolves, and bears.

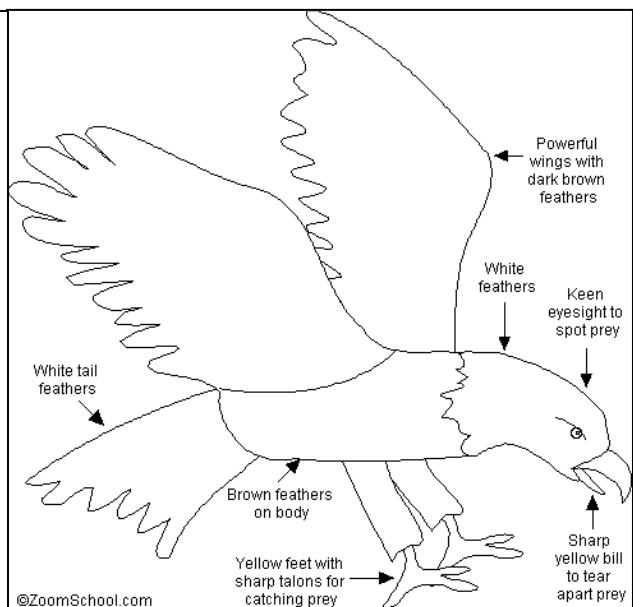
GREAT BLUE HERON—The Great Blue Heron is a majestic wading bird. It lives in swamps, marshes, & on shores. The Great Blue Heron eats fish, lizards, frogs, crawfish, rodents, and insects. It hunts in shallow water, usually piercing its prey on its long, sharp bill. It then tosses the dead prey into the air, and catches it with its mouth. Its nest is a made of twigs and sticks that is built in trees, on cliffs, or on the ground.



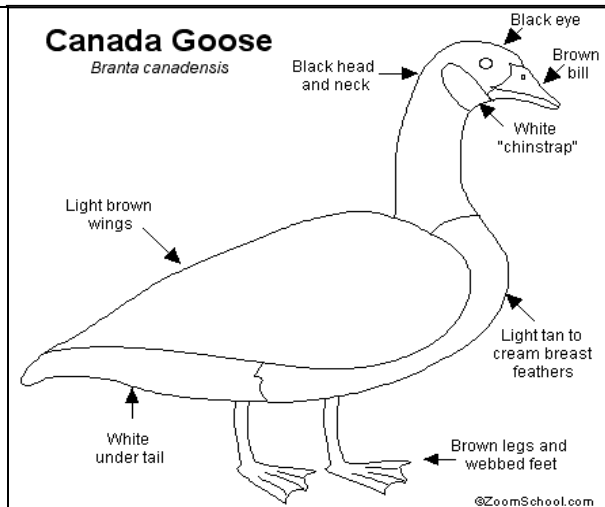
ELK—The elk, is a large, hoofed and noisy member of the deer family. Males are much larger than females. Only **bulls** (males) have antlers) and a shaggy mane. The elk is an **herbivore** (a plant-eater) and a spends a lot of time looking for food. Elk eat grasses, shrubs, tree leaves, and herbs. The grizzly bear, mountain lion, coyote, and man are the main predators of the elk.



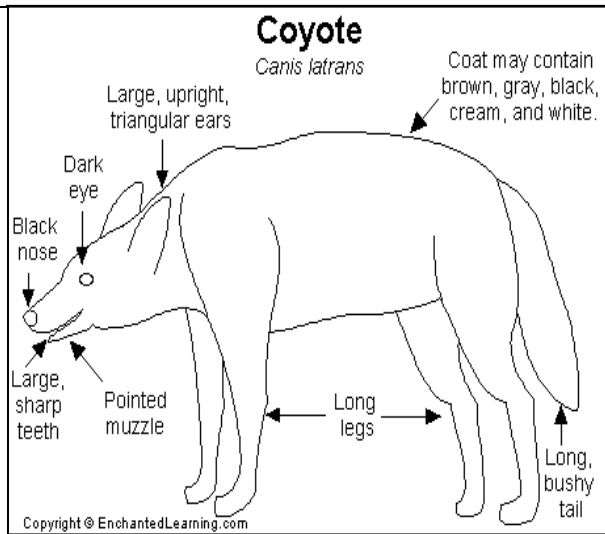
BALD EAGLE—The bald eagle is a bird of prey. They are not really bald; white feathers cover its head. The bald eagle lives near rivers and large lakes, and catches most of its food in the water. Eagles are carnivores (meat-eaters). They eat mostly fish. They also hunt small mammals, snakes, and other birds. Bald eagles build an enormous nest from twigs and leaves. Nests are located high from the ground, either in large trees or on cliffs.



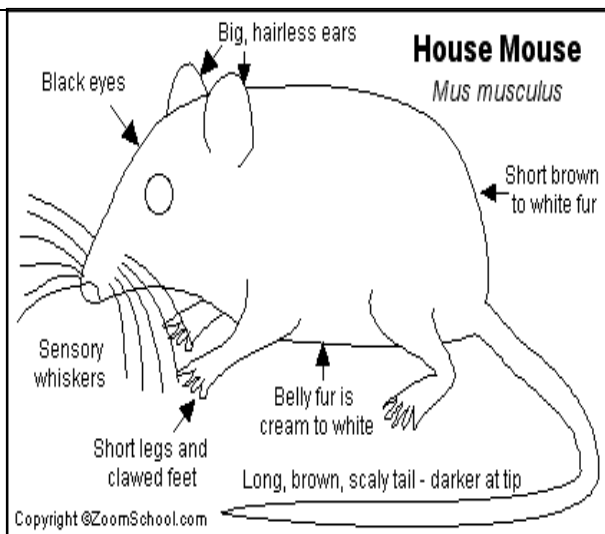
CANADA GOOSE—The Canada Goose is a common North American goose. It makes a loud, honking sound. Groups of Canada Geese fly south in the winter, flying in a V-shaped formation. The diet of the Canada Goose consists mainly of plants. The Canada Goose's nest is a simple depression in the ground that is lined with grass and feathers.



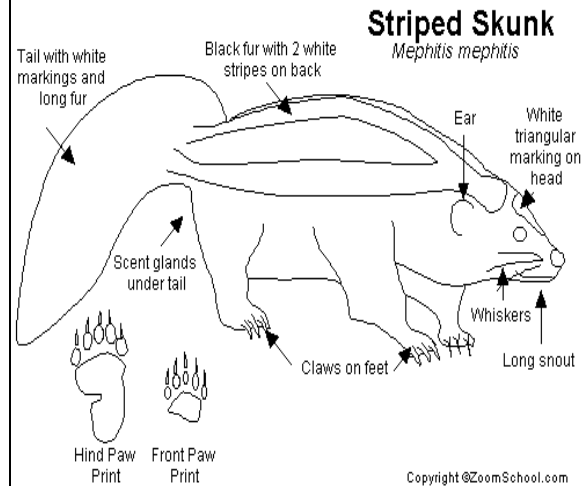
COYOTE—The coyote is a fast-running **carnivore** (meat-eater). The coyote is closely related to the wolf. Coyotes live in forests, prairies, mountains and deserts. While they do not live in a riparian zone, they visit to hunt mice, fish, snakes and lizards. They swallow food in large chunks, barely chewing it.



MOUSE—Most mice build nests in protected places, but some burrow into the ground. Many mice are **nocturnal** (most active at night). The mouse is an **omnivore**; it will eat almost anything. It seeds, grasses, fruit, roots, stems, worms, grasshoppers and insects. Many animals eat mice, including hawks, owls, weasels, raccoons, snakes, and skunks.

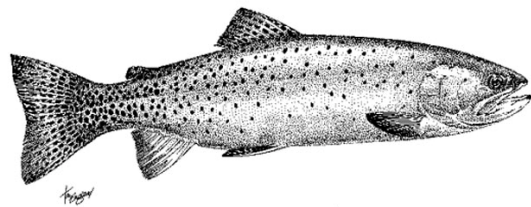


Skunks—Skunks are the smelliest mammals. Skunks produce a very smelly spray that scares away most predators. They can spray up to 10 feet away. The smell is long-lasting and very hard to get rid of. Skunks are **omnivores**; they eat insects, rodents, reptiles, small mammals, worms, eggs, fish, fruit, and plants.

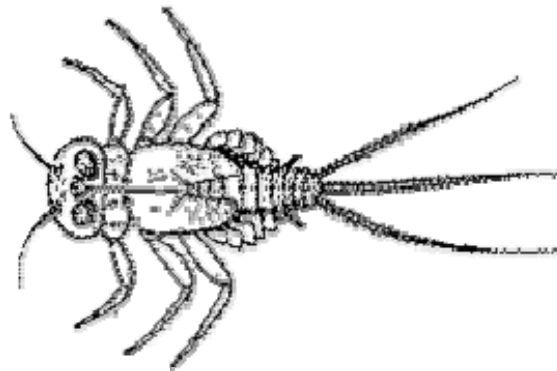


Yellowstone Cutthroat Trout

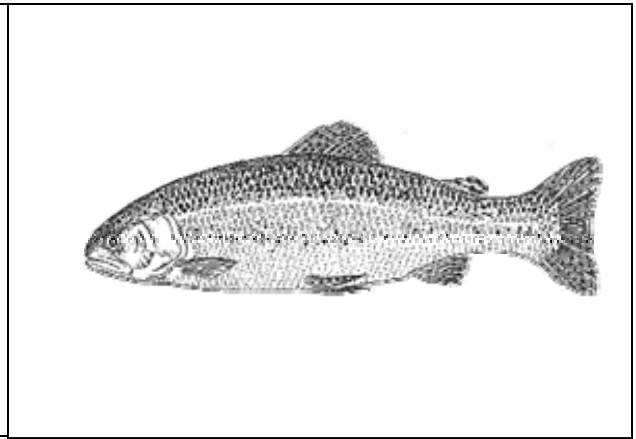
Trout—The Yellowstone cutthroat trout lives in Montana, Wyoming and Idaho. They are a golden color and have large spots on their sides. They like to live in clear, cold streams, rivers and lakes. In the Teton River, there are only a very few Yellowstone cutthroat trout left. They are competition with other trout for their homes. They are in danger of disappearing from this area or going extinct.



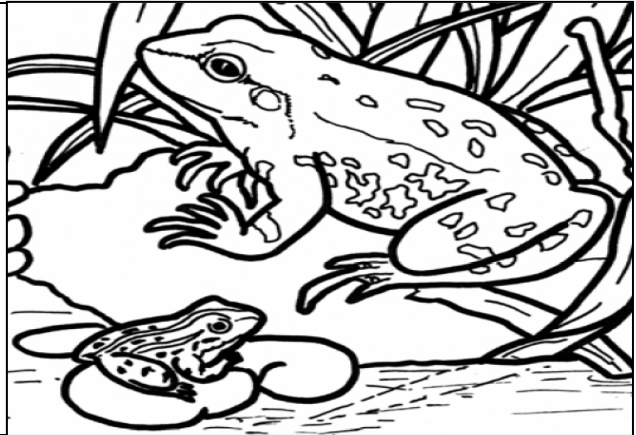
Macroinvertebrates—are bugs that live in streams and provide a food source for fish. They have no backbone and can be seen without a magnifying glass or microscope. The kind of macroinvertebrates found in a stream indicates to scientists how healthy the water is. Some macroinvertebrates are very sensitive to pollution, while others are not as sensitive.



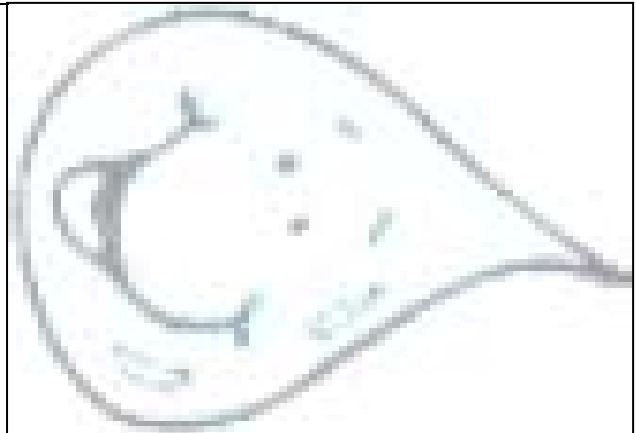
Rainbow Trout—The rainbow trout is a freshwater fish found in many rivers across the Rocky Mountains. They are a fisherman's favorite because they put up a good fight. They eat insects, and as they grow older, other fish. Rainbow trout are not from the Teton Valley area and compete with Yellowstone cutthroat trout for habitat. They will even eat small cutthroats for breakfast!



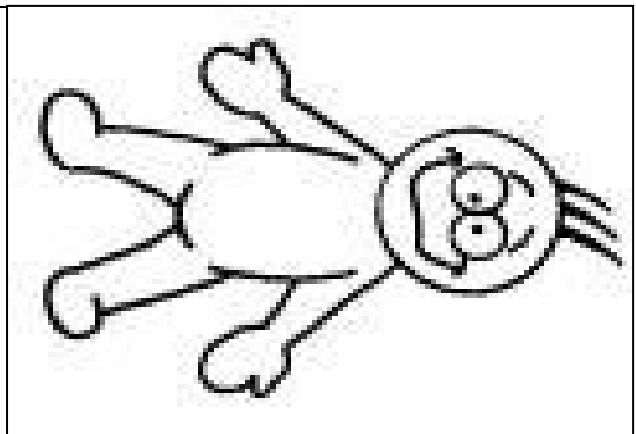
Frogs—Frogs spend their lives near water because they must return to the water to lay their eggs. Frogs and toads begin their lives as tiny eggs laid in, on or very near the water. The eggs hatch into tadpoles that swim in fresh water and breathe with gills. Frogs eat insects and worms. Its predators include large birds of prey, like hawks and eagles.



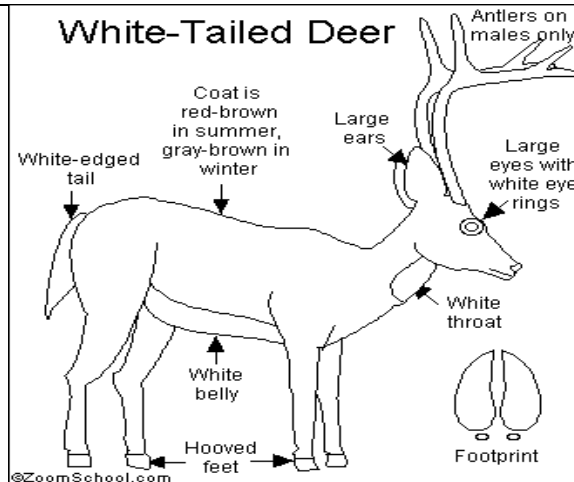
Water—a riparian zone would not even exist without water! The plants and animals that call a riparian zone their home would simply have to move, or would die without their water source! Just think about what would happen if the water in a stream suddenly dried up...what would happen to all the bugs, fish, frogs, and ducks??



Humans—Humans don't need to live in a riparian zone, but we do need clean water to live! Without water, humans would die. Humans also like to spend their time near water. We like to fish, hunt, swim and ride boats on water. Humans like to live near water. Without a river, lake or stream nearby, you won't find many humans.



Deer—are found in many biomes around the world, including forests, rainforests, grasslands, and tundras. Deer are herbivores (plant eaters); most are browsers (eating leaves, shoots, soft vegetation, twigs, etc.), but some are also grazers (eating mostly grass). Deer have many predators; their main defense is running away and hiding. Their predators include large animals like grizzly bears, mountain lions, coyotes, and man.



RIPARIAN FIELD DAY



EXPLORE: RIPARIAN FIELD DAY

Note: This K-2 Field Trip can be used in conjunction with the “Stream Study” field trip for grades 3-5.

FIELD TRIP SET-UP:

LOCATION:

Decide upon a field trip site. Choose an easily accessible creek or stream that students can walk along. Choose sites that are safe (no dangerous obstacles or very swift moving water) and shallow (water level is knee high or below in almost all places). Students should be well-dressed for the weather and location.

GROUP LEADERS:

Recruit teacher or parent volunteers to assist and facilitate each group of 3-6 students on the field trip. Leaders should have an assigned group and the materials for the field trip.

SITE SET-UP:

Measure out a 100-200 meter stream section along the bank and mark it with stakes and flagging. This is the section that the class will work with and they should not wander beyond this section.

ON-SITE:

Demonstrate to the larger group any procedures or data collection techniques that need clarification. (ie; collecting samples, recording what they see). Remind groups of any time constraints. Completing all of the activities in the field can take about an hour. Get to work in the riparian zone!

MATERIALS:

K-2 Wilderness Ethics Intro

Riparian Survey

Colored pencils

Paper bag

Clip board

Rubber boots

PREPARATION:

1. Make copies of the Teton River Riparian Survey and attach to clipboards for the field trip.
2. Assign students to groups and parent leaders.

3. Each group should have a set of colored pencils, a paper bag and rubber boots or appropriate footwear for the field trip.
4. Teachers should give a short talk about wilderness ethics and respecting the field trip site (See **K-2 Wilderness Ethics Intro**).

PROCEDURE:

1. At the field trip site, each group will meander along the bank, answering questions on their **Riparian Survey**. Students will answer questions and draw things they see.
2. Students will use their paper bags to collect some interesting riparian items. These can be anything from plants and leaves to pieces of trash and animal signs.
3. Once the groups have answered all their questions and walked the entire length of the stream section, have them meet as a class.
4. Form and large circle and have the students share what kinds of items they found. Ask questions like: What is the coolest (or weirdest) thing your group found? Did you find something that you haven't seen before?

EXTEND AND APPLY:

1. Display the **Riparian Surveys** from your riparian field day in the hallway or around the classroom.
2. Redraw a larger version of the stream site from the field day and have students label the drawing with things they found and where they found them.
3. As a class, research a riparian system that is in another region. For example, look at a riparian system along a river in a jungle or arid region and identify the wildlife dependent on this system.
4. Make Food Chain Mobiles. Draw or color pictures of animals that create a food chain. Hang the animals in order, with the predators at the top of the chain.

K-2 WILDERNESS ETHICS INTRO:

Before we begin, we want to do 3 things today:

1. Be respectful of the river and each other.
2. Act like scientists.
3. Have fun!

Being Respectful of the river and each other means:

No trash. Pick up your own trash and the trash left behind.

Know the dangers of a river. No pushing or roughhousing on the banks.

Look out for one another.

No throwing anything—you can hurt people and you won't be looking at what's around you.

No splashing—you could scare the wildlife.

Help each other with your projects.

Acting like scientists means:

Scientists use all five senses to make observations—they are constantly observing what is around them. *Ask: What are the five senses?*

Scientists ask questions. Scientists question things they don't know about and also things they do know about.

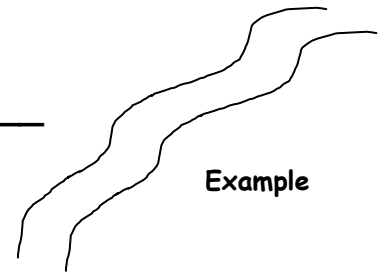
Be gentle with your surroundings. Scientists are gentle with what they are studying. We want this river to be here just like it is and very healthy for a long time. We want to know what's going on in the river, but we want to do it as gently as possible.

Have fun!

Explore Your Riparian Zone!

Name _____ Place _____

Before you begin, draw your stream section (like the one in the EXAMPLE). Then, write or draw your observations on the map of your stream BELOW. Use the checklist on the back of this page to help you.



Example

A large, empty rounded rectangular box intended for drawing a stream section and writing observations.

Use the checklist to help you explore your riparian zone and use the boxes to draw pictures of what you find.

Riparian check-list:

___ Do you see insects? Draw one.

___ Is there grass, trees or shrubs in this area? Draw them.

___ Do you see anything in the stream? (logs, rocks or fish)

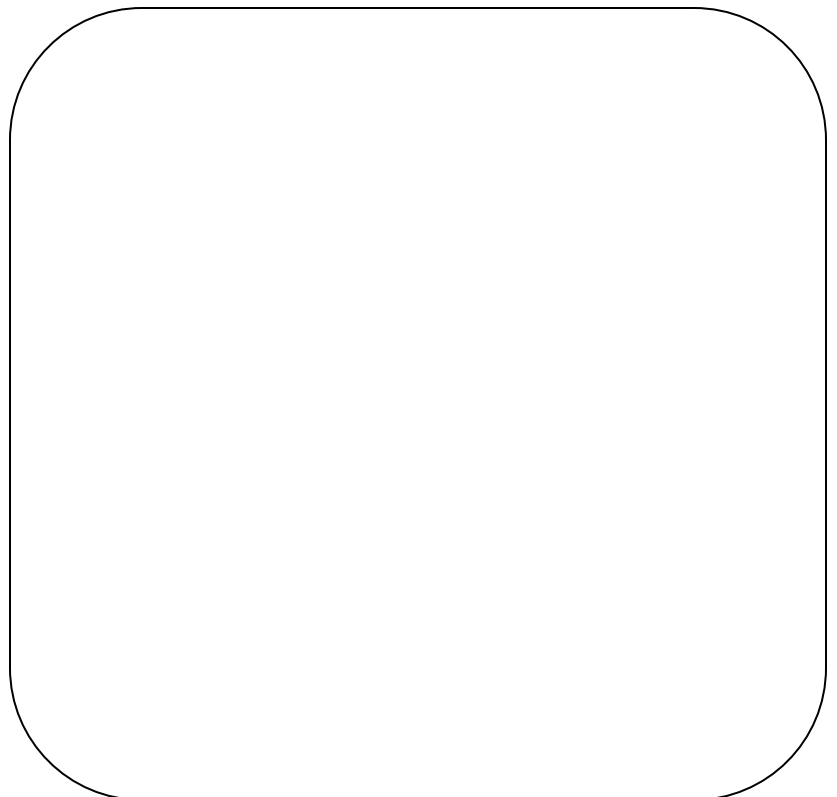
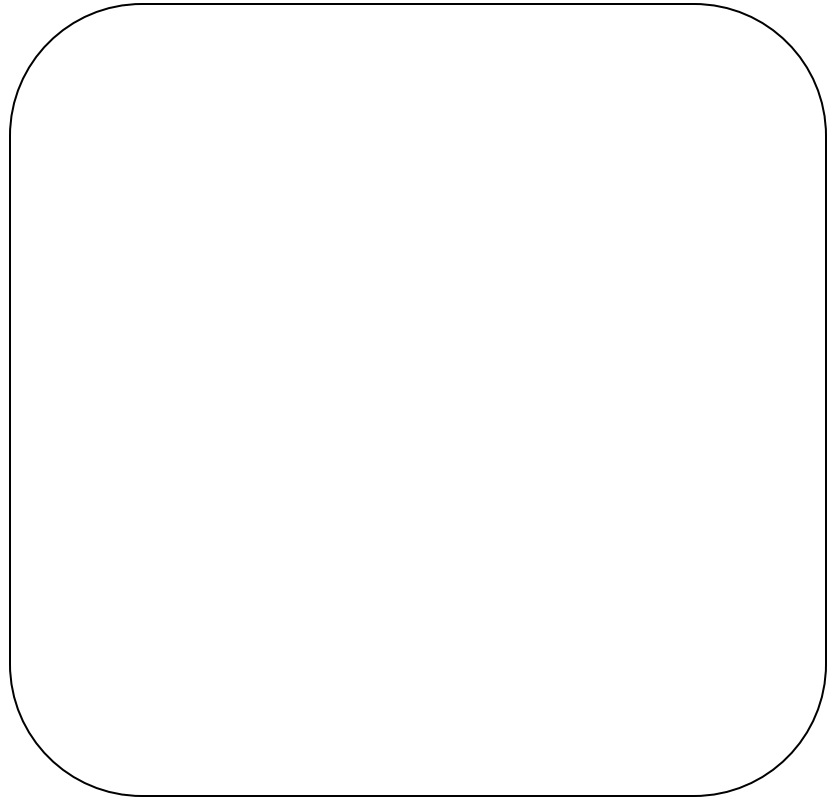
___ Do you see birds?

___ What does the bank of the creek look like? Are there rocks? Is it sandy?

___ Do you see any other animals or animal signs?

___ Do you see signs of humans? (trash, footprints for example)

___ Collect 5 small things to share with the group. Label where you found them.



K-2 WATER GLOSSARY

Carnivore—animals that exclusively rely on eating other animals; meat-eaters.

Condensation—when water vapor in the air gets cold, it changes back into liquid, forming clouds. This is called condensation.

Evaporation—when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor or steam leaves the river, lake or ocean and goes into the air.

Food chain—follows a single path from predators to prey as different creatures eat each other for energy.

Food web—explores how all life is interconnected and dependent upon one another for food, shelter, protection etc;

Herbivore—animals that exclusively eat plants or plant products.

Omnivore—animals that eat both plants and other animals.

Precipitation—the flow or pumping of water from an aquifer; the opposite of recharge.

Predator—animals who eat other animals.

Prey—the animals that are eaten (or preyed upon) by other animals.

Profession—a job; one's life work.

Riparian zone—a zone that is found on the edge of water systems such as rivers and streams, or around lakes and ponds. It includes the plants and animals that are aquatic and terrestrial and supports a unique and diverse array of plant and animal species that may not be found in the surrounding area.

Water cycle—The earth has a limited amount of water. That water keeps going around and around and around in what we call the "Water Cycle". This cycle is made up of: evaporation (and transpiration), condensation, precipitation, and collection.

K-2 TEACHER RESOURCES & ACKNOWLEDGEMENTS

Unit Resources:

Environmental Protection Agency Water Sourcebooks;

EPA Document Numbers

Printed books

EPA/904-R-94-017(a) – K-2

www.epa.gov/safewater/kids/wsb/

Project WET; 2003; Curriculum and Activity Guide; Montana State University—
Bozeman, Culbertson Hall.

Yates, Steve; 1988; Adopting a Stream: A Northwest Handbook; The Adopt-a-Stream
Foundation

Websites:

www.epa.gov/safewater/kids/wsb/

www.usgs.gov

www.projectwet.org

Contacts:

Project WET, Montana State University—Bozeman, MT: (406) 994-5392

Disclaimer:

Although the information in this document has been funded, in part, by the U.S. Environmental Protection Agency under assistance agreement # NE-97077301-0 to Friends of the Teton River, it may not necessarily reflect the views of the Agency and no official endorsement should be inferred.

K-2 IDAHO STATE STANDARDS

LESSON 1—INTRODUCTION TO WATER



Student Worksheet 1-1: Water is Important

Kindergarten

671. Reading. Read a variety of grade-level materials and apply strategies appropriate to various situations.

01. The student will read a variety of traditional and electronic materials for information and understanding.

Concepts About Print

h. Use picture clues to support text.

Grade 1

680. Reading. Read a variety of grade-level materials and apply strategies appropriate to various situations.

01. The student will read a variety of traditional and electronic materials for information and understanding. a. Use decoding and word recognition strategies to fluently read first-grade materials.

q. Predict text/preview text.



Transparency 1-2

Student Worksheet 1-2: Aqua Planet

Kindergarten

378. Geography.

01. The student will understand the spatial organizations of people, places, and environment on the earth's surface.

a. Identify the globe as a model of the earth.

Grade 1

394. Geography.

01. The student will understand the spatial organizations of people, places, and environment on the earth's surface.

a. Explain what maps and globes represent and how they are used.

02. The student will understand that human actions modify the physical environment and how physical systems affect human activity and living conditions.

a. Describe ways people adjust to their environment.

Grade 2

410. Geography.

01. The student will understand the spatial organizations of people, places, and environment on the earth's surface.

a. Identify landforms, bodies of water, and human-made features (cities, dams) on a map and globe.

03. The student will understand that human actions modify the physical environment and how physical systems affect human activity and living conditions.

b. Know that humans depend on the environment to meet their basic needs.



Student Worksheet 1-3: How we use water at school

Student Worksheet 1-4: How we use water at home

Kindergarten

536. Science. Personal and Social Perspectives

02. Understand the importance of natural resources and the need to manage and conserve them.

b. Discuss the conservation of natural resources.

Grade 1

272. Math. Data Analysis, Probability, and Statistics. With society's expanding use of data for prediction and decision-making, it is important that students develop an understanding of the concepts and process used in analyzing data.

(Vocabulary – tally, predict)

01. The student will understand data analysis. a. Interpret information found in simple graphs to answer questions.

Grade 1

551. Science. Personal and Social Perspectives.

02. Understand the importance of natural resources and the need to manage and conserve them.

b. Understand the conservation of natural resources.

Grade 2

282. Math. Data Analysis, Probability, and Statistics. With society's expanding use of data for prediction and decision-making, it is important that students develop an understanding of the concepts and process used in analyzing data. (Vocabulary – row, column)

01. The student will understand data analysis.

a. Interpret information found in simple tables, charts, and graphs.

02. The student will collect, organize, and display data.

a. Gather and display data in tables, charts and graphs in order to answer a question.

Teacher-led group activity.

Grade 2

566. Science. Personal and Social Perspectives.

02. Understand the importance of natural resources and the need to manage and conserve them.

b. Understand the conservation of natural resources.



LESSON 2 –WATER AND THE HUMAN BODY

Explain and Develop Water Bodies Extending Activities

Kindergarten

769. Health. Healthy Lifestyles.

01. Acquire essential skills to lead a healthy lifestyle.

Kindergarten

258. Math. Mathematical Reasoning and Problem Solving

03. Apply appropriate technology and models to find solutions to problems.

a. Select appropriate models to represent mathematical ideas.

Grade 1

778. Health. Healthy Lifestyles.

01. Acquire essential skills to lead a healthy lifestyle.

g. Recognize a nutritional diet is necessary to maintain a healthy body.

Grade 1

268. Math. Mathematical Reasoning and Problem Solving

03. Apply appropriate technology and models to find solutions to problems.

a. Select appropriate models to represent mathematical ideas.

Grade 2

787. Health. Healthy Lifestyles.

01. Acquire essential skills to lead a healthy lifestyle.

f. Explain the reasons for wise food selections.

Grade 2

278. Math. Mathematical Reasoning and Problem Solving

03. Apply appropriate technology and models to find solutions to problems.

a. Select appropriate models to represent mathematical ideas.

04. Communicate results using appropriate terminology and methods.

a. Use a variety of methods such as words, numbers, symbols, charts, graphs, tables, diagrams and models to communicate mathematical information.



LESSON 3—PROFESSIONS

Student Worksheet 3-1

Activity Sheets 3-2: Water Is My Job (page 1 and 2)



Graph 3-2: Water Is My Job

Kindergarten

538. Science. Interdisciplinary Concepts.

01. The student will understand that interpersonal relationships are important in scientific endeavors.

a. Learn appropriate cooperation and interaction skills.

Grade 1

272. Math. Data Analysis, Probability, and Statistics. With society's expanding use of data for prediction and decision-making, it is important that students develop an understanding of the concepts and process used in analyzing data. (Vocabulary – tally, predict)

01. The student will understand data analysis.

a. Interpret information found in simple graphs to answer questions.

02. The student will collect, organize, and display data.

a. Gather and display data in graphs to answer a question. (Teacher-led group activity.)

Grade 1

553. Science. Interdisciplinary Concepts.

01. The student will understand that interpersonal relationships are important in scientific endeavors.

a. Learn appropriate cooperation and interaction skills.

Grade 2

282. Math. Data Analysis, Probability, and Statistics. With society's expanding use of data for prediction and decision-making, it is important that students develop an understanding of the concepts and process used in analyzing data. (Vocabulary – row, column)

01. The student will understand data analysis.

a. Interpret information found in simple tables, charts, and graphs.

02. The student will collect, organize, and display data.

a. Gather and display data in tables, charts and graphs in order to answer a question.

Teacher-led group activity.

Grade 2

567. Science. History of Science.

01. Understand the significance of scientific milestones.

a. Understand contributions of various scientists and researchers.

LESSON 4—THE WATER CYCLE



Transparency 4-1: The Water Cycle

Student Activity: Color the Water Cycle



Transparency 4-3: The Water Cycle in Detail

Student Activity 4-3: Draw the Water Cycle

Grade 2

558. Science. Unifying Concepts of Science.

01. Understand concepts and processes of evidence, models and explanation.

b. explore and use various models.

i. water cycle.

Grade 2

564. Science. Earth and Space Systems.

01. Understand geochemical cycles and energy in the earth system.

a. Explore evaporation and precipitation.



The Magic School Bus: Wet All Over

Transparency 4-2: The Magic School Bus Questions.

The Water Cycle Play

Kindergarten

671. Reading. Read a variety of grade-level materials and apply strategies appropriate to various situations.

01. The student will read a variety of traditional and electronic materials for information and understanding.

Grade 1

680. Reading. Read a variety of grade-level materials and apply strategies appropriate to various situations.

01. The student will read a variety of traditional and electronic materials for information and understanding. a. Use decoding and word recognition strategies to fluently read first-grade materials.

t. Make inferences and draw conclusions.

03. The student will read a variety of traditional, technical, and electronic materials for critical analysis and evaluation.

c. Demonstrate critical listening (answer “who”, “what”, “where”, and “when”). d.

Determine cause/effect (answer “why”, “how”, “what if”).

Grade 2

689. Reading. Read a variety of grade-level materials and apply strategies appropriate to various situations.

03. The student will read a variety of traditional, technical, and electronic materials for critical analysis and evaluation.

e. Draw logical conclusions based on information read.

LESSON 5—WATER AND THE SEASONS



5-1 Weather Sayings

Kindergarten

534. Earth and Space Systems.

01. The student will understand scientific theories of origin and subsequent changes in the universe and earth systems.

- a. Observe and identify the four seasons.
- b. Observe different weather conditions.

Grade 1

549. Science. Earth and Space Systems.

01. The student will understand scientific theories of origin and subsequent changes in the universe and earth systems.

- a. Identify the four seasons and their characteristics.

Grade 2

564. Science. Earth and Space Systems.

01. The student will understand scientific theories of origin and subsequent changes in the universe and earth systems.

- a. Identify the four seasons and their characteristics.



Weather Calendar



Precipitation Calendar



Lab 5-2: Weight of Snow

Kindergarten

260. Math. Concepts and Language of Algebra. Algebra is the language of mathematics and science. Through the use of variables and operations, algebra allows students to form abstract models from contextual information.

01. The student will use algebraic symbolism as a tool to represent mathematical relationships.

- a. Compare sets of objects using vocabulary (less than, greater than, and same as).

Kindergarten

259. Math. Concepts and Principles of Measurement. The first step in scientific investigation is to understand the measurable attributes of objects.
(Vocabulary – days of the week, months of the year, calendar, shortest, longest, smallest, largest)

Kindergarten

527. Science. Unifying concepts of Science

01. Explore concepts of observation and data collection.

03. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.
- a. Understand the concepts of yesterday, today and tomorrow.

Kindergarten

529. Science. Concepts of Scientific Inquiry

01. Understand scientific inquiry and develop critical thinking skills.
- a. Make observations.

Grade 1

272. Math. Data Analysis, Probability, and Statistics. With society's expanding use of data for prediction and decision-making, it is important that students develop an understanding of the concepts and process used in analyzing data. (Vocabulary – tally, predict)

01. The student will understand data analysis.
- a. Interpret information found in simple graphs to answer questions.
02. The student will collect, organize, and display data.
- a. Gather and display data in graphs to answer a question. (Teacher-led group activity.)

Grade 1

543. Science. Unifying Concepts of Science.

01. The student will understand concepts and processes of evidence, models, and explanation.
- a. Explore the concepts of observation and data collection.

Grade 2

282. Math. Data Analysis, Probability, and Statistics. With society's expanding use of data for prediction and decision-making, it is important that students develop an understanding of the concepts and process used in analyzing data. (Vocabulary – row, column)

01. The student will understand data analysis.
- a. Interpret information found in simple tables, charts, and graphs.
02. The student will collect, organize, and display data.
- a. Gather and display data in tables, charts and graphs in order to answer a question.
Teacher-led group activity.

Grade 2

558. Science. Unifying Concepts of Science.

01. The student will understand concepts and processes of evidence, models, and explanation.
- a. Explore the concepts of observation and data collection.



LESSON 6—RIPARIAN LIFE

Transparency 6-1: Predators and Prey

Student worksheet 6-1: Predators and Prey

Transparency 6-2: What Do I Eat?

Student worksheet 6-2: What Do I Eat?

Grade 1

548. Science. Matter, Energy and Organization in Living Systems.

01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.

a. Understand that living things need food to survive.

Grade 2

563. Science. Matter, Energy and Organization in Living Systems.

01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.

a. Understand that living things need food to survive.



Riparian Players

Kindergarten

532. Science. Interdependence of Organisms and Biological Change

01. Understand the theory of biological evolution.

a. Observe and explore the characteristics of plants and animals.

Grade 1

547. Science. Interdependence of Organisms and Biological Change.

01. Understand the theory of biological evolution.

b. Recognize that animals live in different habitats for which they are suited.

Grade 2

562. Science. Interdependence of Organisms and Biological Change.

01. Understand the theory of biological evolution.

b. Recognize that animals live in different habitats for which they are suited.



RIPARIAN FIELD DAY

536. Science. Personal and Social Perspectives.

01. The student will understand common environmental quality issues, both natural and human induced.

a. Observe and discuss characteristics of the local environment.

551. Science. Personal and Social Perspectives.

01. Understand common environmental quality issues, both natural and human induced.

a. Identify the characteristics of the local environment.

566. Science. Personal and Social Perspectives.

01. Understand common environmental quality issues, both natural and human induced.

a. Identify the characteristics of the local environment.