



WATER CONSERVATION LESSON PLAN

Mid-Coast Water Conservation Consortium

Fourth Grade

NGSS

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features

4-ESS3-2 Generate and compare multiple solutions to a problem

ESS2.A Earth Materials and Systems

ESS2.D Climate describes the range of an area's typical weather conditions and variation

Common Core State Standards Connections

MP.2 Reason abstractly and quantitatively

4.MD.A.2 Use the four operations to solve word problems involving intervals of time, liquid volumes, etc. including problems involving simple fractions or decimals

SL3.3 Ask and answer questions about information from a speaker

GSI Water Solutions, Inc.

Elementary School Water Conservation Lesson Plan

Objectives

- Students will understand where their water comes from
- Students will be able to diagram the water cycle
- Students will understand household water use
- Students will understand the importance of conservation and be able to list ways to save water

Materials

- Water source pictures
- Water cycle poster or whiteboard
- Markers for poster or dry erase markers for whiteboard
- Water footprint activity sheets (one per student)
- Water conservation sample items
 - Water-efficient showerhead
 - Water-efficient faucet aerator
 - Hose spray nozzle
 - Hose timer
 - Drip irrigation set
- Water waste puzzle sheets (one per student)

Procedure

1. Read a poem about water and ask students if they know where their water comes from.
2. Introduce the idea that there is a lot of water in the ocean, but it is salty. Discuss different possible water sources, such as streams, groundwater, and melting snowpack.
3. Show pictures of their local water source (creek or river) and ask students if they have been there. Teach students about the local water supply and how water gets into the river.
4. Lead the group in labeling the components of the water cycle on a poster or drawn on the whiteboard.
5. Have students think about how they use water. Use the water footprint worksheet activity to discuss water use and water conservation.
6. Pass around the water conservation items and have students think about ways to save water at home and at school. Using the water footprint, have students come up with ideas for how to reduce water use by 10 gallons per day.
7. Conclude with real-world examples of what communities can do to conserve and who works on this problem.
8. Give students the water saving puzzle to take home to think about ways to save water.

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Introduction

1. Where's the water?
 - a. Ocean – too salty
 - b. Groundwater – wells in some places, not much on the Mid-Coast
 - c. Snowpack – melting snow provides water in some places, not much here
 - d. Streams and rivers – main water source here
2. Our water source (customize by location)
 - a. Show pictures and ask students if they have visited or know where it is
 - b. Describe the local water system
 - i. City or water provider's source
 - ii. Piped to a treatment plant to get cleaned up
 - iii. Any reservoirs or water tanks that students might have seen around the area
 - iv. Piped to your home, school, stores, restaurants, etc.
 - c. Our source is a stream that gets water from rainfall
 - i. Lots of rain in the winter, but we need to be careful with water use in the summer

Water Cycle

1. As a group, label a large poster of the water cycle, or draw and label it on the whiteboard.
2. Review process and terminology
 - a. Evaporation is the process of liquid water turning into water vapor.
 - b. Condensation is the process of water vapor in the air turning into liquid water.
 - c. Precipitation is water that falls from clouds as rain or snow.
 - d. Runoff is water that flows over the surface of the earth.
 - e. Infiltration is when water soaks into the ground.
 - f. Transpiration is water that evaporates from plants.
3. Link these processes back to the local area.
 - a. Evaporation – water can evaporate off the surface of the land or off of water bodies like the ocean, streams, and lakes
 - b. Condensation – this is how clouds are formed
 - c. Precipitation – we get a lot of rain in the winter
 - d. Runoff – water flowing across the ground when it rains, collecting in streams and rivers, like [our water source]
 - e. Infiltration – water soaks into the dirt but not into a parking lot (for example)
 - f. Transpiration – all the trees, grass, and plants you see are transpiring water

Water Footprint

1. Have the students brainstorm all the ways they use water each day, and additional ways that other household members may use water (e.g., the student may not water the garden but someone else does)
2. Use the Water Footprint Activity worksheet to have each student add up their water use for a day.
3. Remind students that water needs to be used carefully, especially in the summer, and discuss the idea of water conservation.
4. Pass around the water conservation items and lead a discussion of ways to save water.

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- a. Behavior changes – turning off the water while you brush your teeth, shorter showers, running the dishwasher when full, etc.
 - b. Simple upgrades around the home – conservation items passed around like water-efficient showerhead, faucet aerator, etc.
5. Using the Water Footprint Activity sheets, have students think of ways to conserve a certain amount of water, such as 10 gallons per day

Conclusion

1. Return to the water cycle drawing and ask students why it's important to save water here.
2. Explain that saving water is a team effort and that everyone's help is needed.
 - a. Ask students if they can think of ways for the whole community to save water.
 - b. Describe what cities/utilities are doing: fixing leaks in old pipes, distributing free conservation items, etc.
 - c. Talk about the people involved in these efforts (careers)
3. Independent practice: ask students to complete the water saving puzzle to think about ways to save water.

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Background Information

Mid-Coast Water Sources

The Mid-Coast region of Oregon typically receives about 70 inches of precipitation annually. The majority of this precipitation falls as rain during the winter months of November through January. Snowfall is minimal, and snowpack does not provide a source of water supply. Groundwater is not very plentiful because the rock formations in the region are not very permeable and do not store much water. Instead, communities rely on surface water from streams and rivers, which have low flows in the summer and fall. This can present challenges for balancing the limited supply of water with high summer demands for outdoor irrigation and economic activities such as tourism. One way we are able to meet summer demands is by storing water in tanks or reservoirs, which are filled from rivers and streams during the rainy season. Even with those reservoirs, water conservation is important.

Water Footprint

A water footprint measures the volume of water that a person or household uses over a set amount of time, such as a day or a week. Average daily indoor water use in the United States is approximately 60 gallons per person per day. Although we typically think of water used in the toilet, shower, washing machine, and dishwasher, the water footprint also includes leaks that increase daily water use without providing any benefit. Outdoor water use is often higher than indoor use, particularly during the hot summer months when people are watering lawns and gardens. More complex versions of the water footprint calculator also include the “virtual water” used in the production of the food, clothing, and other items that people use each day.

Installing water-conserving fixtures is an easy way to decrease water use around the home. Water-efficient showerheads use 1.25 – 1.75 gallons per minute (gpm) without reducing water pressure. Faucet aerators mix air into the water stream to reduce the amount of water needed. Models for the bathroom usually use around 1.0 gpm, while kitchen models use about 1.5 gpm and often have a swivel function. Hose spray nozzles let the user turn the water off when walking between plants. Toilet tank displacement devices include bags, jugs, and other containers that are placed in the toilet tank to decrease the amount of water needed to flush the toilet. Water-efficient front-loading clothes washers use only 15 – 30 gallons per load, compared to older top-loading washers that use 29 – 45 gallons. The table below shows the water savings for various types of fixtures in the home. (Note: exact quantities used vary by model. Numbers here represent averages.)

Fixture	Water-Efficient Water Use	Standard Water Use	Water Savings (gallons)	Water Savings (%)
Bathroom faucet	1.0 gpm	2.2 gpm	1.2 gpm	55%
Showerhead	1.5 gpm	2.5 gpm	1.0 gpm	40%
Toilet	1.28 gallons per flush (gpf)	1.6 gpf	0.32 gpf	20%
Dishwasher vs hand-washing dishes	4 gallons	27 gallons	23 gallons	85%
Clothes washer	22.5 gallons	37 gallons	14.5 gallons	39%

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Real-World Conservation

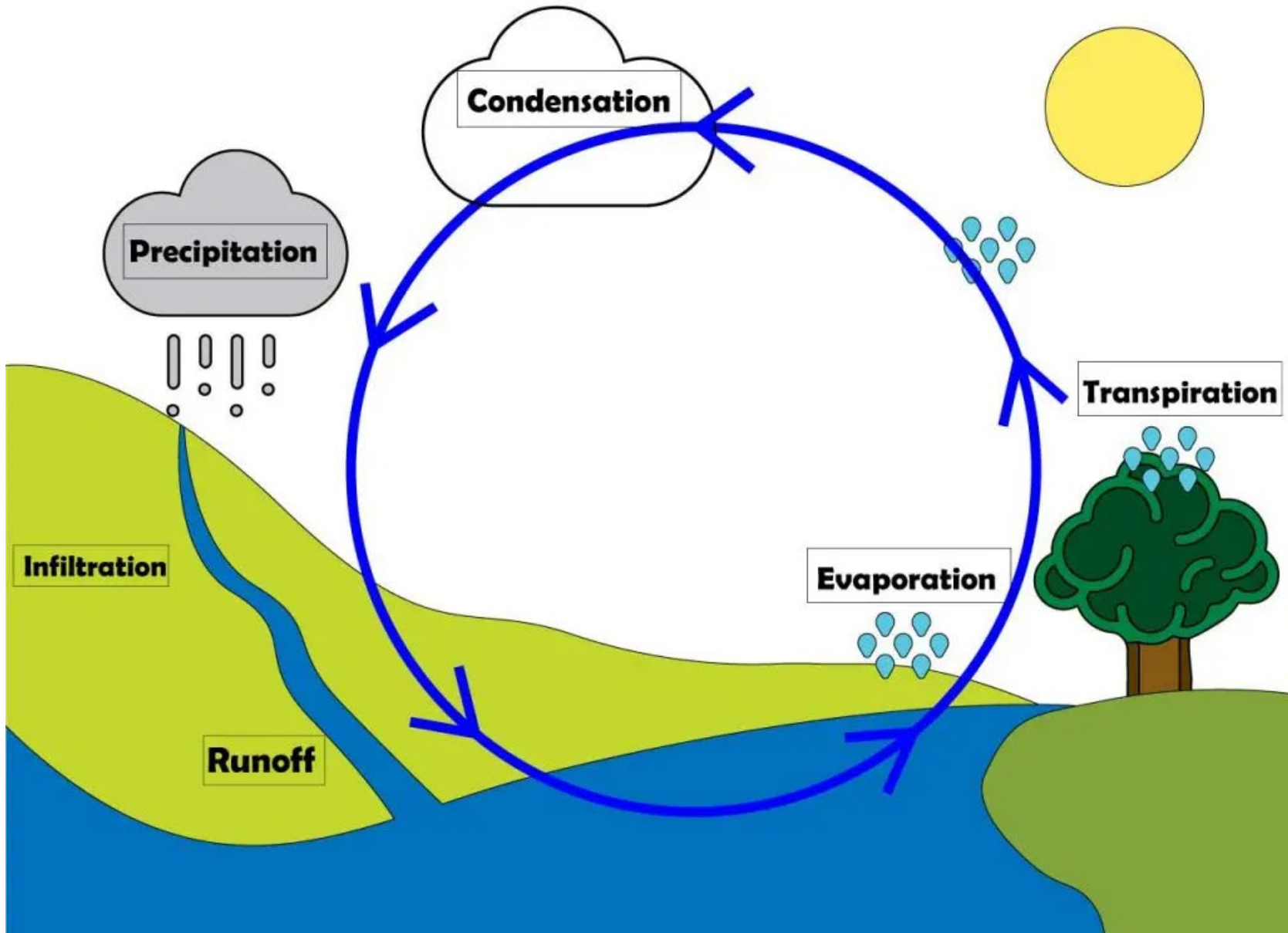
Water providers throughout the Mid-Coast are working to save water every day. They check for leaks in pipes and other equipment and fix them promptly. Meters are installed at each connection to measure how much water customers are using, and part of each water bill is based on the amount used. Water providers can also use meter readings to spot leaks when the volume of water used suddenly increases dramatically. Public education about water conservation is important to make sure that everyone understands their water source, why use of that source needs to be managed wisely, and what they can do to help. Some reasons why conservation is important include:

- Water providers have water rights from the state which only allow them to use a certain amount of water. Being efficient helps us meet more needs without needing more water.
- Conservation enables us to meet demands during summer and during droughts when the water supply is stressed.
- Keeping water use lower means that providers don't need to build expensive new treatment plants and other infrastructure.
- Conservation supports our ability to live, grow, and thrive in a rainfall-dependent environment.
- Fish and wildlife need water, too! Conservation by households and businesses means more can be left in the stream for environmental needs.

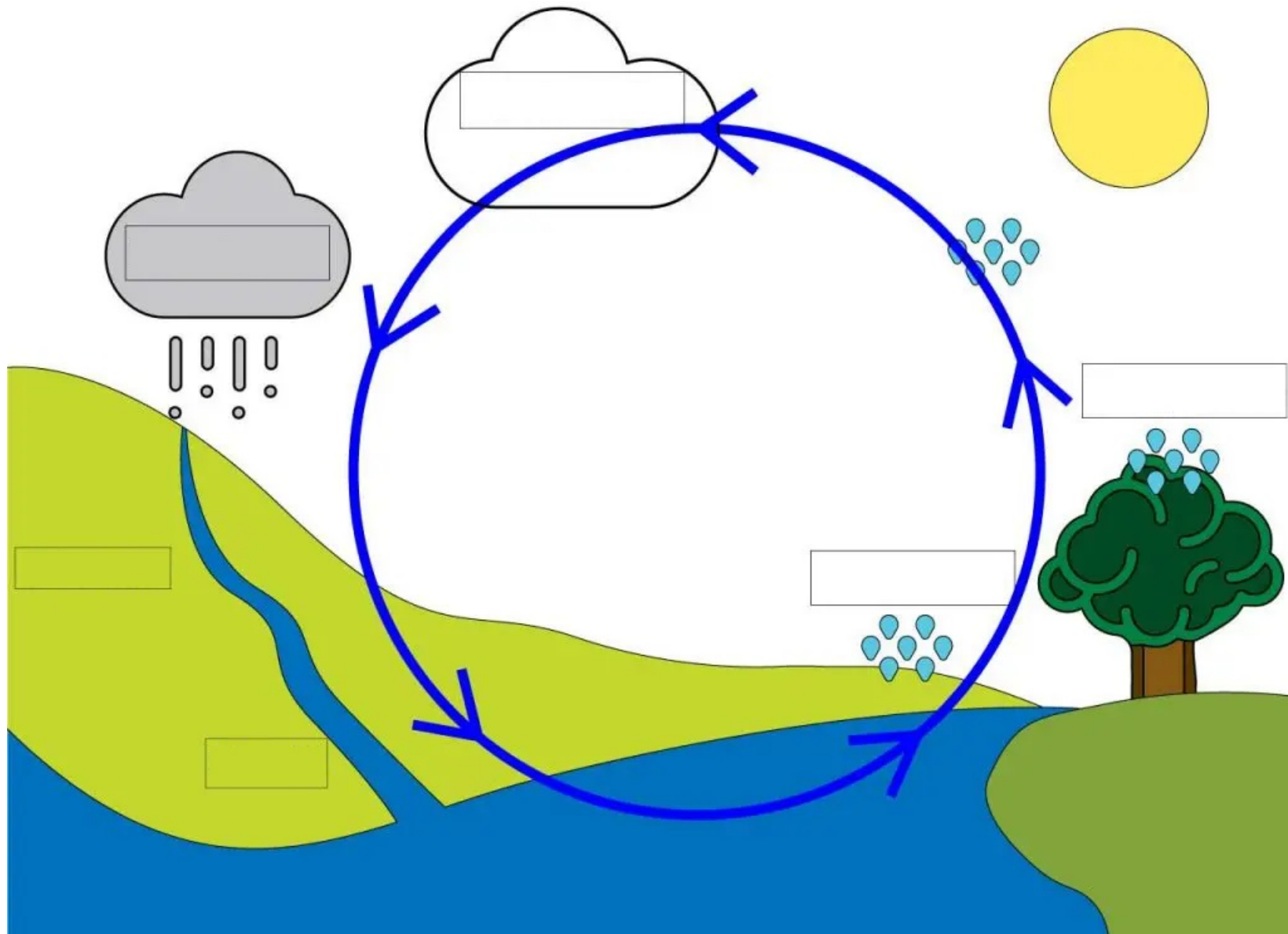
Many people work together to ensure that water gets from the stream to your tap. Workers operate the drinking water treatment plants and water distribution systems, and utility managers track the water supply to make sure there is enough and plan for system improvements. Engineers design new treatment and distribution infrastructure. Electricians and mechanics keep everything running smoothly throughout the system. Lab technicians test the water quality to make sure it is clean and safe.

Several water providers along the Mid-Coast have joined together to form the Mid-Coast Water Conservation Consortium to coordinate their conservation work (like this lesson!). By working together, the Consortium will help water providers the region prepare for drought, growth in the number of people living in and visiting the region, and potential disruptions to the water system, such as a broken pipeline or water tank. We know that people love to visit the coast, and they use water too. The Consortium is working on outreach to hotels, vacation rentals, restaurants, and other businesses in the tourism industry to help promote water conservation and keep our region thriving and resilient.

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Water, water, everywhere

Jillian Harker

We wash in it
and splash in it,
but that's not all —
we pour it on our plants and crops
to make them strong and tall.

We boil it up
and cool it down,
to make ourselves a drink,
but there's much more to water
than you would ever think.

Water rushes, runs and trickles
and it can even freeze.
It can seep and soak and creep
to almost anywhere you please.

And without it your poor body
would be an awful mess.
If there was no such thing as water,
you would all weigh two thirds less.

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Water Footprint Activity

Name: _____

How do you use water? In the first blank column, write the number of times you use water this way in one day. Next, multiply that number by the amount of water the activity uses. Write the answer in the last column. Add up all of the numbers in that column to see how much water you used in a day.

Example: You brush your teeth 2 times a day. Each time you brush, you use about 1 gallon of water. Multiply 2×1 to find the total amount of water used for brushing your teeth each day. That's the same as adding 1 gallon (first brushing) plus 1 gallon (second brushing) = 2 gallons.

Water Use Activity	Number of Times in One Day		Amount of Water Used Each Time		Total Water Used
Brushing teeth (water running)		X	1 gallon	=	
Washing hands		X	1 gallon	=	
Flushing a toilet		X	1.5 gallons	=	
Taking a shower (8 minutes)		X	16 gallons	=	
Taking a bath		X	70 gallons	=	
Washing face		X	1 gallon	=	
Laundry (top loading washer)		X	40 gallons	=	
Laundry (front loading washer)		X	20 gallons	=	
Hand washing dishes		X	27 gallons	=	
Dishwasher		X	4 gallons	=	
Washing car with a hose running		X	150 gallons	=	
Washing car using a bucket		X	40 gallons	=	
Lawn and Garden	Minutes		Amount Used		
Watering with a hose		X	12 gallons	=	
Water Waste	Number of Leaks		Amount Wasted		
Leaky fixture (10 drips per minute)		X	1.5 gallons	=	
Total				=	

- For which activity did you use the most water? _____
- How much water did you use for that activity? _____
- How could you save 10 gallons a day (or more)? _____

- What else do you use water for that isn't on this list? _____
- We still need to use water for things like washing our hands and brushing our teeth. What can you do to save water while staying clean and healthy? _____

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Water Saving Puzzle

Fill in the missing the words, and then write the circled letters at the bottom of the page to find the mystery word.

1. Turn off the _____ ○ _____ while you're brushing your teeth.



2. Take a shorter _____ ○ _____, but still get clean.



3. Use a ○ _____ on the hose to turn off the water.



4. Only water the _____ ○ _____, not the driveway.



5. If you see a drip, fix that _____ ○ _____.



6. Only run the _____ ○ _____ when it's full.



7. What's your favorite way to _____ ○ _____ water?



8. Fill up a _____ ○ _____ to wash the car.



Together, we can ○ ○ ○ ○ ○ ○ ○ ○ water!