



Lesson 6

Sooke Lake Watershed: Drinking Water Quality



Learning Standards & Assessment



Time



Resources



Activities



Handouts



Video





Physical and Health Education

Big Ideas

- ▶ Learning how to participate and move our bodies in different physical activities helps us develop physical literacy.
- ▶ Having good communication skills and managing our emotions enables us to develop and maintain healthy relationships.

Content

- ▶ Proper technique for fundamental movement skills, including non-locomotor, locomotor, and manipulative skills
- ▶ How to participate in different types of physical activities, including individual and dual activities, rhythmic activities, and games



Educator's Kits, including hardcopy lesson plans and support materials, are available for loan through the CRD. For pickup locations, print-friendly materials and multimedia tools see www.crd.bc.ca/teacher or contact the CRD at 250.360.3133.

Lesson 6d:

Drinking Water Cycle in Motion

Purpose

In this kinesthetic activity, students will practice movement skills and safe and fair behaviours while they assume the perspective of water moving through the water cycle. They will also expand their understanding of the water cycle to include the role of the Sooke Lake Reservoir Watershed, our drains, our habits and how they affect the local marine environment.

Procedure

1. Take students outside.
2. Together set up the water cycle relay according one of the "Drinking Water Cycle Relay Maps" – Basic, Pro or All-Star.
3. Review the game and game rules with the students.

• Stations in the Water Cycle

- » Cloud (if possible on a hill or higher elevation like a bench)
- » Runoff into creek (Sooke Watershed- is an isolated forest- tall trees, home to wild plants and animals. There is no housing, no public roads, no fishing, no camping. It's quiet and clean)
- » Sooke Lake Reservoir, intake tower and dam
- » Drinking water cleaning (disinfection) plant
- » Water mains
- » Tap
- » Indoor drain (connected to sanitary sewer)
- » Wastewater treatment plant
- » Ocean

• Rotation (same as the "Drinking Water Cycle Song")

- » In the Ocean, get salty- pick up some "salt". Roll the dice. Before evaporating, toss the "salt" to another waterdrop in the ocean- be sure they are ready to catch it.
- » In the Cloud, water drops condense- find a partner and roll the dice. Together "fall" as precipitation- rain - clapping and snapping your fingers, snow- silently floating down, or hail - hopping and skipping.
- » Collect a Runoff card to see what you pick up along the way to the creek. Keep this with you as you flow down the stream into Sooke Lake Reservoir.



Teacher Resources

- ▶ Assessment Tool: "Drinking Water Cycle" Answer Key
- ▶ Assessment Tool: "Drinking Water Cycle" Review (1 copy for class)

Student Resources

- ▶ Handout: "Drinking Water Cycle" (1/student or /group)

Lesson Resources

- ▶ "Drinking Water Cycle Relay Maps"- Basic, Pro and All-Star
- ▶ Dice Legend
- ▶ Station Directions
- ▶ Dice x5 (for winter version- at least one die must be a different colour)
- ▶ 13 envelopes for cards
- ▶ Runoff cards (optional)
- ▶ Down the Drain cards (optional)

Suggested materials that could add to your relay setup but are not necessary:

- ▶ Tunnel x3 (drinking water pipes, sanitary sewer, wastewater outfall to ocean)
- ▶ Tent or hoola hoops x3 (drinking water disinfection plant, tap, wastewater treatment)
- ▶ Skipping ropes tied together (1 small circle Sooke Lake Reservoir; 1 large circle ocean)
- ▶ Cones (creeks and rivers)
- ▶ Bench, or table cloth (dam)
- ▶ Beanbags or balls (salt)

- » In the Sooke Lake Reservoir, leaves and soil will sink to the bottom of the lake. Leave these cards here.
- » Roll the dice- will you stay or will you flow through the kapoor tunnel?
- » As you pass through the Disinfection Plant, leave Runoff cards with bacteria, viruses and parasites- things that can make us sick.
- » Go through the water pipelines (mains).
- » As you come out of the tap, roll the dice.
- » Pick up a "Down the Drain?" card and take it with you. Alternatively, prevent pollution by sorting cards into Reduce, Recycle, Compost and Garbage. (NOTE: if playing summer version add instruction for outside water going down the storm drain into a creek then to the ocean)
- » In the Wastewater Plant, leave Down the Drain cards of things that will be caught in the screens. Take all other cards into the ocean.
- » Leave any remaining "Down the Drain?" cards in the ocean.
- » Prepare to catch some salt.
- » Game ends at teacher's discretion- suggest after at least one cycle.

• Rules e.g.

- » **Team Spirit** – Help each other through the cycle, cheer each other on, be understanding if someone has to keep rolling the dice.
- » **Play Safe** – In the ocean, before tossing the salt, make sure the other person is ready; do not push past others who might be slower than you.
- » **Take Turns** – If you roll the dice and it says to stay, allow others to roll the dice before you have another turn. If you roll "stay" again, keep rolling until you can move.

Discussion Points

- ▶ **What is the difference between precipitation in summer and winter, the effects and solutions?** *There is more precipitation in winter, but more water use in the summer (twice as much and mostly used outside). Plant native plants, use rain barrels, let grass go golden- it's dormant not dead, wash cars with water bucket not hose.*
- ▶ **When does water become safe to drink?** *After it has passed through the disinfection plant, not in the creek, in the lake or in the ocean. Note- well water (ground water) is naturally filtered by the Earth, but should be tested regularly.*
- ▶ **What is the difference between stormwater drains and sanitary sewer drains?** *Stormwater is collected outside our homes and is not connected to a wastewater plant, but directly to waterways and the ocean.*
- ▶ **What types of pollutants could pass through the wastewater plant into the ocean?** *Liquids (oil, paint, pesticides, chemicals) and debris smaller than the screens.*
- ▶ **What should we do with the "Down the Drain?" items to reduce pollution?** *Reduce. Recycle. Garbage. Search www.myrecyclopedia.ca*

Assessment Opportunity

Assess for understanding of the water cycle and our drinking water system. Revisit this activity without dice, directions or playing cards. Provide students with strips of paper (e.g. vocabulary, processes, locations, pollution). Have them write their names on one side and go through the water cycle leaving the strips in appropriate envelopes- “Sooke Lake Reservoir, Disinfection Plant, Wastewater Plant, Ocean”.

As a class, make note of where understanding was strong and how to explain misunderstood information another way.

Curricular Competencies

Look for evidence that students are able to:

Physical and Health Education

- ▶ Physical literacy
 - Develop and demonstrate a variety of fundamental movement skills in a variety of physical activities and environments (ex. can throw and catch the “salt”)
 - Develop and demonstrate safety, fair play, and leadership in physical activities
- ▶ Healthy and active living
 - Participate daily in physical activity at moderate to vigorous intensity levels
- ▶ Social and community health
 - Develop and demonstrate respectful behaviour when participating in activities with others

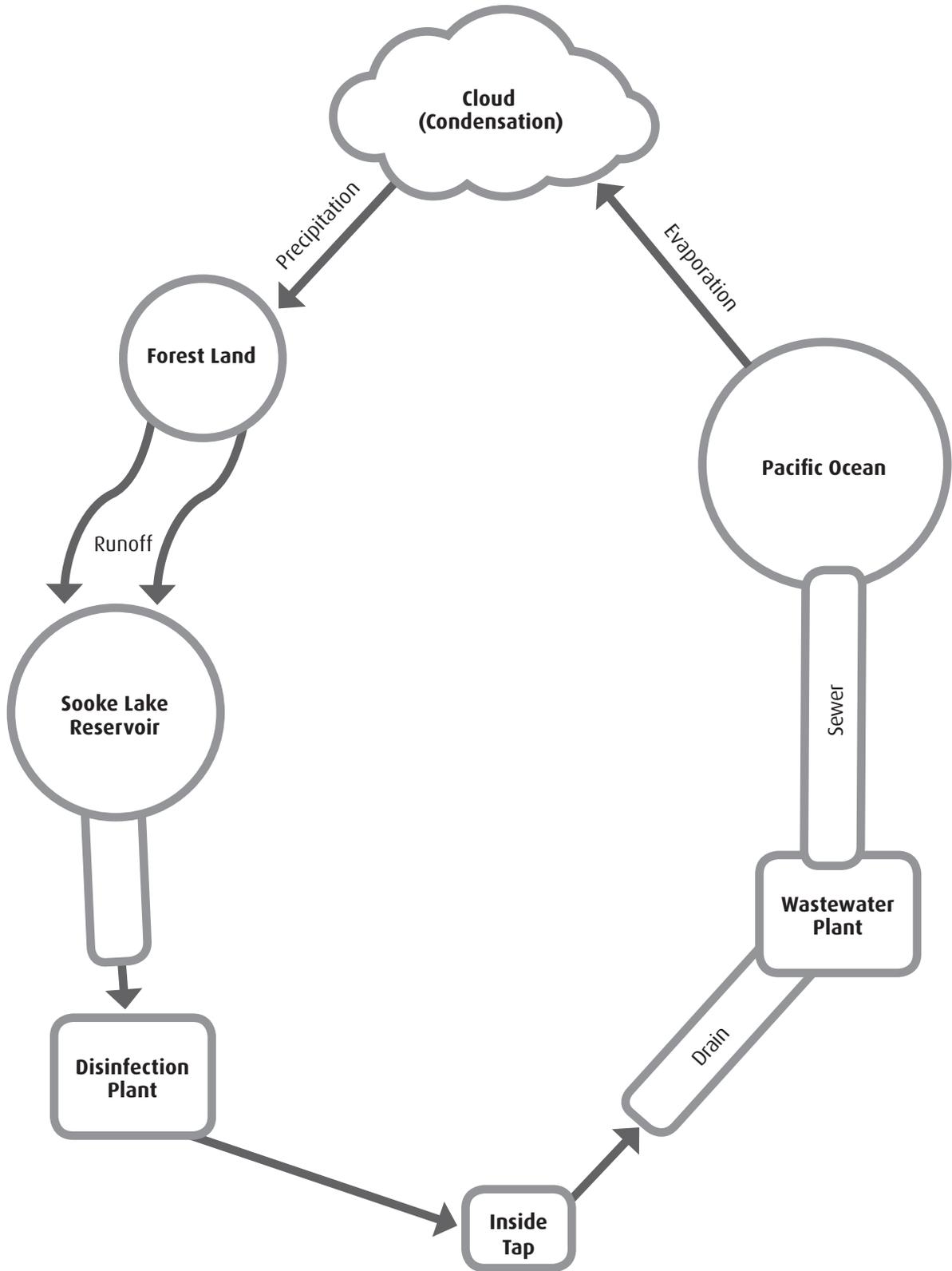
Extensions and Adaptations

- ▶ Replace dice with cards indicating next move or create paper dice with images of destinations.
- ▶ To simplify the game, remove the disinfection and wastewater plants.
- ▶ To add more detail to the activity:
 - While flowing down the creek, take a break and roll another dice- plant (return to cloud via evaporation), sweating animal (return to cloud via evaporation), or continue to Sooke Lake Reservoir)
 - Add a spillway to the reservoir which can overflow into a river and out to the ocean in winter months. Roll a dice at the spillway to continue down the river (x3), or stay (x3)
- ▶ Recreate the activity for your community’s watershed.
 - Identify your local watershed on the Capital Region Watersheds Map
 - Go for a walk and redesign the game according to what you find:
 - » Remove the disinfection plant, drinking water pipes, tap, sanitary sewer drain, wastewater plant and wastewater outfall.
 - » Replace Sooke Lake Reservoir with your local collection creek, lake or the ocean (usually the body of water that the watershed is named after) - All runoff paths will lead to this collection location.
 - » Where does precipitation fall? Roll a dice to find out where you land. (roof, road, garden, tree, ground)
 - » Where does runoff flow? Storm drain, stream, creek, groundwater, and all these lead to the ocean.
 - » What could run off water pick up along the way? Make cards and have them along each path.
 - » What could be done to prevent pollution? Insert these with the pollution cards.

Note: The ground can naturally filter water of some impurities. Water that flows down a storm drain is not treated before flowing into our local waterways and the ocean.

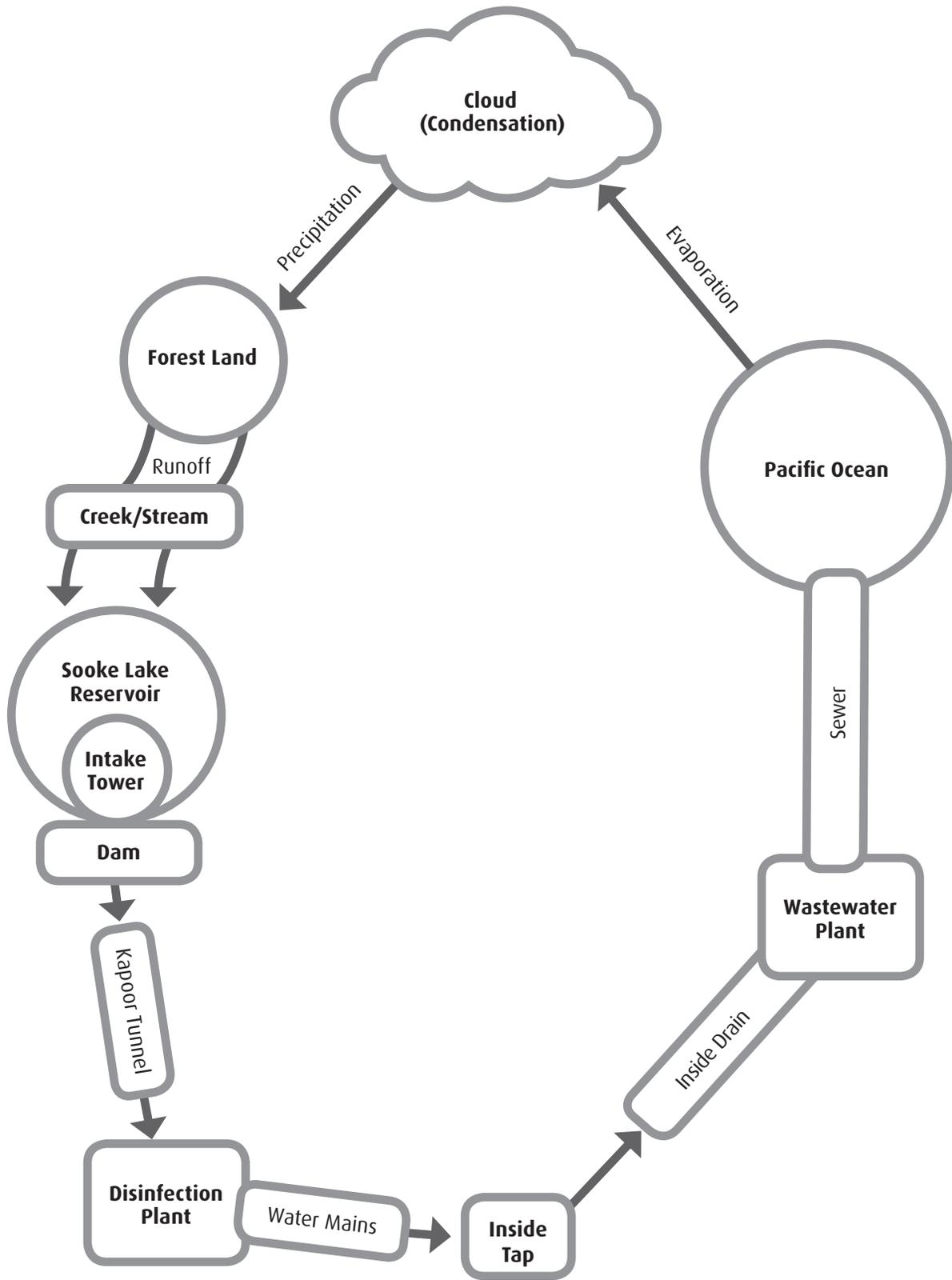


Drinking Water Cycle Relay Maps - Basics



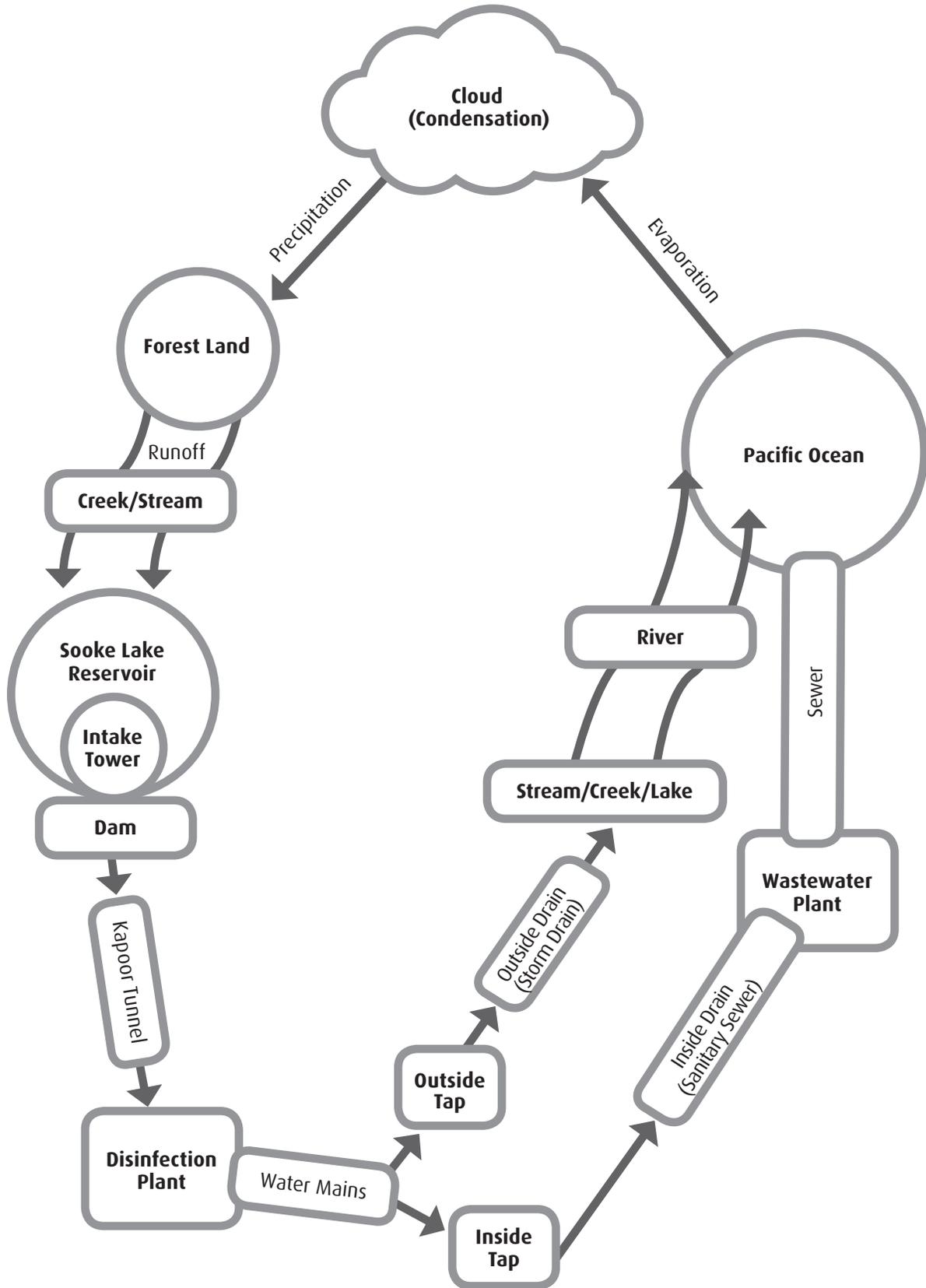


Drinking Water Cycle Relay Maps - Pro



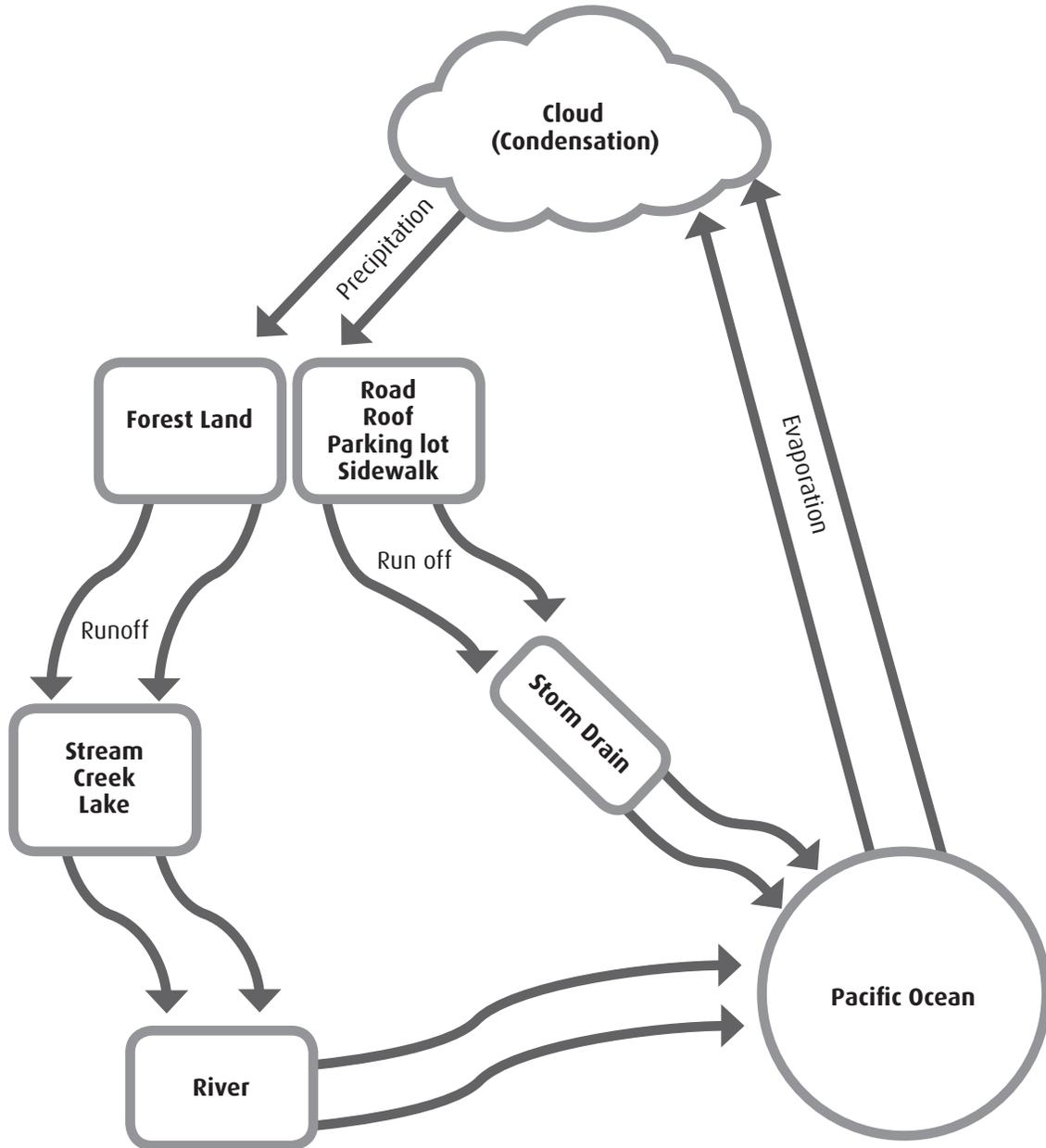


Drinking Water Cycle Relay Maps - All-Star





My Watershed Water Cycle Relay Map - Sample





Station Directions

The following can be enlarged and used as directional signage for each station, if so desired.



Ocean

1. Drop off any cards here.
2. Catch "salt".
3. Roll dice.
4. Evaporating? Pass salt to another water drop in the ocean.

Cloud



1. Brrr...
water

condenses in the cold air - find a partner.

2. Roll the dice.
3. Raindrops- clap and snap on your way down to become runoff.
4. Snowflakes- silently float down to Earth and melt into runoff.
5. Hail- bounce down to Earth and melt into run off.

Forest Runoff



(Drinking Water Watershed)

1. Collect three Runoff cards on your way to the creek.
2. Keep them with you, floating down the creek to the Sooke Lake Reservoir.

Sooke Lake Reservoir



1. Soil
and

leaves sink in the lake.

2. Leave these cards here.
3. Roll dice.



Intake/Dam Tower

1. Don't forget to take any leftover cards with you
2. Remember to crawl through all the pipes.



Disinfection Plant

Drinking Water Cleaning

1. Leave bacteria, viruses and parasites here.
2. Flow to the tap.



Tap

1. Roll the dice.
2. Pick a Down the Drain? card
3. Take it down the drain or sort into reduce, recycle, compost, garbage.



Wastewater Plant

1. Screens catch garbage – leave these Down the Drain? cards
 - bits of food
 - soil/ dirt
 - facial tissue
 - floss
 - Band-Aid
 - hair
 - paint chips
 - leaves
2. Take all other cards with you into the ocean.



Dice Legend

The following can be enlarged and posted on walls at station, if so desired.

Winter

Ocean

1. Evaporate
2. Evaporate
3. Evaporate
4. Evaporate
5. Stay
6. Stay

Cloud

1. Sun- Stay
2. Rain - Snap and clap away
3. Rain- Snap and clap away
4. Snow- Float away
5. Hail- Hop away
6. Sun- Stay

Sooke Lake Reservoir

1. Stay
2. Stay
3. Stay
4. Evaporate
5. Flow
6. Flow

Tap

1. Wash dishes
2. Wash laundry
3. Flush toilet
4. Shower/bath
5. Shower/bath
6. Leaks

Summer

Ocean

1. Evaporate
2. Evaporate
3. Evaporate
4. Stay
5. Stay
6. Stay

Cloud

1. Sun- Stay
2. Rain - Snap and clap away
3. Rain- Snap and clap away
4. Sun- Stay
5. Sun- Stay
6. Sun- Stay

Sooke Lake Reservoir

1. Stay
2. Flow
3. Flow
4. Evaporate
5. Flow
6. Flow

Tap

(Colour) _____ Dice

1. Wash dishes
2. Wash laundry
3. Flush toilet
4. Shower/bath
5. Shower/bath
6. Leaks

Tap

(Colour) _____ Dice

1. Water garden/lawn
2. Water garden/ lawn
3. Water garden/lawn
4. Water garden/ lawn
5. Wash car
6. Power wash

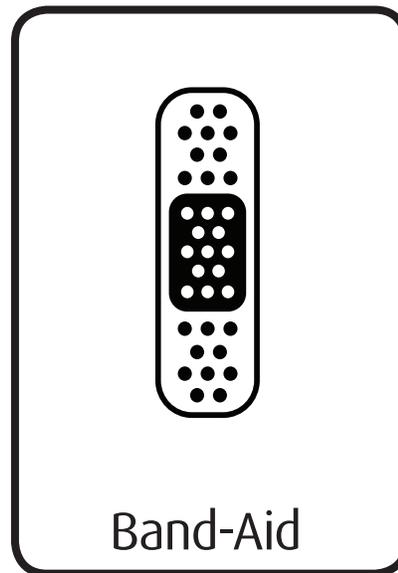


Cards By Station

Create two-sided flash cards as seen below for each of the items in the categories listed.



FRONT



BACK

Run Off Cards

FOREST

- ▶ soil
- ▶ leaves
- ▶ bacteria
- ▶ virus
- ▶ parasite

Down the Drain? Cards

INDOOR DRAIN OPTIONS

Sink

- ▶ bits of food
- ▶ cooking oil
- ▶ soap
- ▶ paint

Laundry

- ▶ soil
- ▶ grease/oil
- ▶ soap

Toilet

- ▶ facial tissue
- ▶ floss
- ▶ Band-Aid

Shower/bath

- ▶ soap
- ▶ hair
- ▶ dirt/soil

OUTDOOR DRAIN OPTIONS

Watering garden

- ▶ pesticides
- ▶ soil

Power washing

- ▶ paint chips
- ▶ oil
- ▶ leaves
- ▶ car oil
- ▶ candy wrappers
- ▶ bottle caps

Washing Car

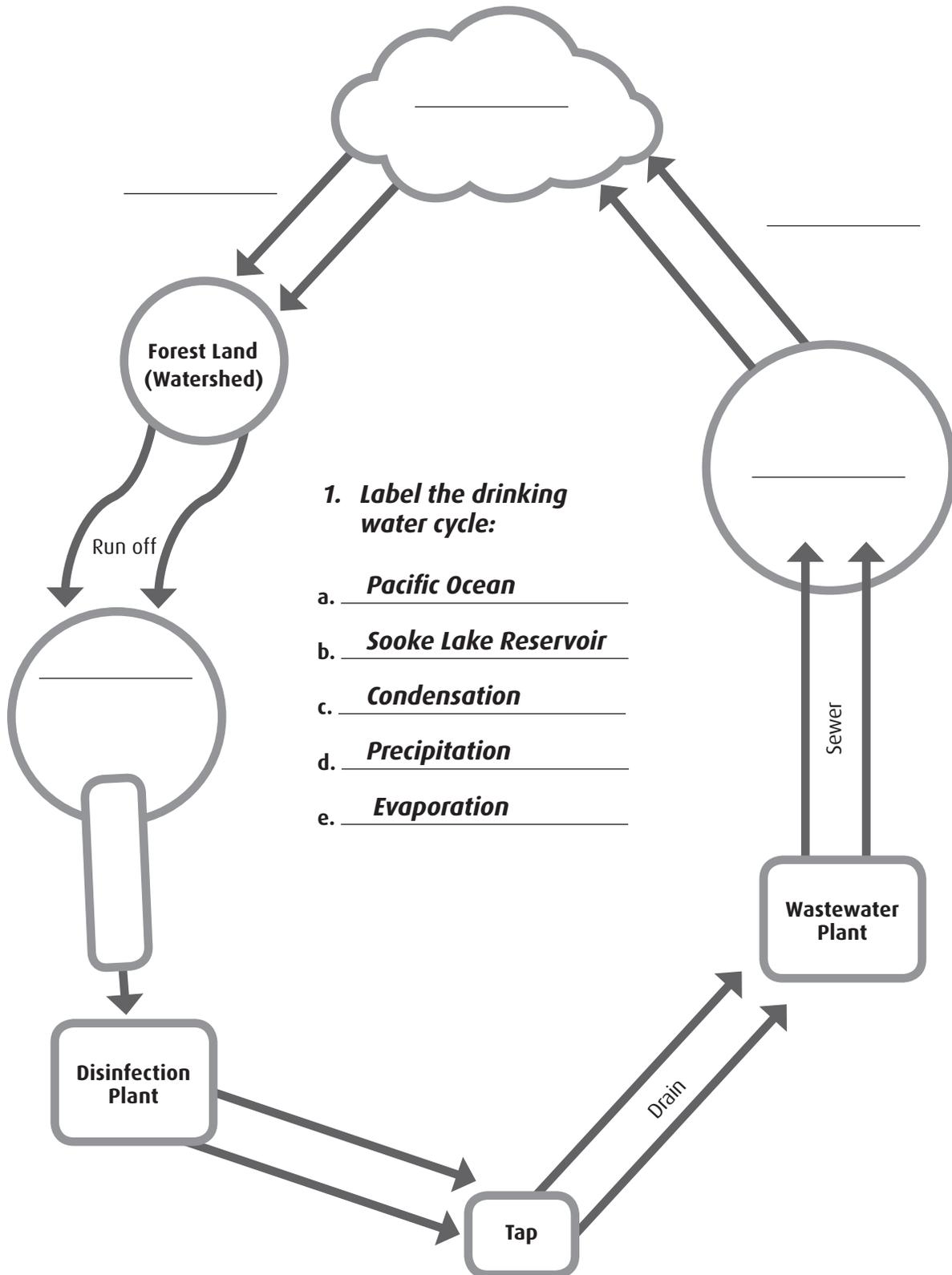
- ▶ soap
- ▶ soil



Drinking Water Cycle

Name: _____ Date: _____

See back side for instructions.





Drinking Water Cycle

2. *Circle the place where bacteria, viruses and parasites (things that could make us sick) are removed from the drinking water?*

3. *What is left behind when water evaporates from the ocean?*

4. *One thing I learned during the drinking water cycle activity was ...*

5. *One thing that surprised me about the drinking water cycle was...*

6. *One question I have is...*

Self-evaluation

7. *Circle what you did well:*

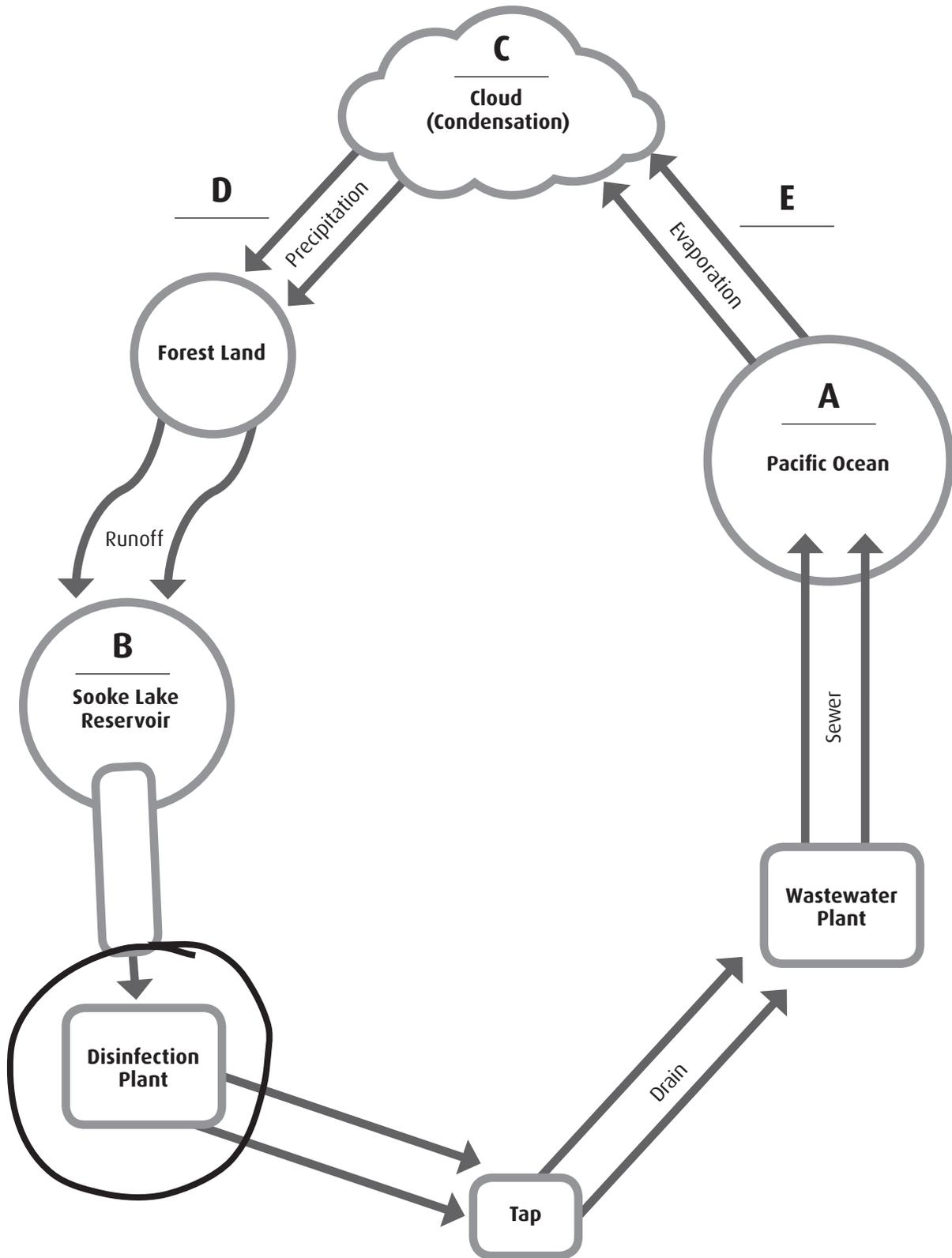
Take turns, pass the salt, catch the salt, play safely, follow directions

8. *Circle what you could work on:*

Take turns, pass the salt, catch the salt, play safely, follow directions



Drinking Water Cycle - Answer Key





Drinking Water Cycle - Answer Key

1. On the map of the drinking water cycle, fill in the blanks
 - a. Pacific Ocean
 - b. Sooke Lake Reservoir
 - c. Cloud
 - d. Precipitation
 - e. Evaporation

2. Circle the place where bacteria, viruses and parasites (things that could make us sick) are removed from the drinking water?
Disinfection Plant

3. What is left behind when water evaporates from the ocean?
Salt



Drinking Water Cycle - Review

Assess for understanding of the Drinking Water Cycle- its processes, locations and states of water.

- ▶ Repeat the “Drinking Water Cycle In Motion” activity without directions or playing cards.
- ▶ Provide students with strips of paper (e.g. vocabulary, processes, locations, pollution) and have them write their names on the opposite side.
- ▶ Have students repeat the activity, leaving the strips in envelopes at appropriate stations, eg. Sooke Lake Reservoir, Disinfection Plant, Wastewater Plant, Ocean.

As a class, make note of where understanding was strong and find ways to explain any misunderstood information another way.



Possible Water Pollutants

Sooke Lake Reservoir

Leaves

Soil

Disinfection Plant

Bacteria

Virus

Parasite

Drinking Water Cycle - Review

Wastewater Plant

Bits of food

Band-Aid

Floss

Facial tissue

Hair

***Ocean (Wastewater)***

Soap

Paint

Cooking oil

Drinking Water Cycle - Review***Ocean (Stormwater)***

Pesticides

Paint chips

Car oil

Candy wrappers

Bottle caps

Soap

Soil

Leaves



Drinking Water Cycle - Review

Processes

Ocean to Cloud

Evaporation

Condensation

Precipitation

Clean Drinking Water

Filter dirty water



Drinking Water Cycle - Review

Locations

Cloud

Sooke Lake Reservoir

Disinfection Plant

Wastewater Plant

Pacific Ocean

Tap

Inside Tap

Outside Plant