Foreword

This is the second edition of this learning resource. It is part of the *Every Drop Counts* resource kit for primary educators designed to promote water stewardship with a focus on the protection, conservation and knowledge of wise use of our local drinking water. The whole kit has been made available to elementary schools, distributed learning schools, homeschool associations and student teachers throughout British Columbia's Capital region. The second edition kit includes the original "Drip Drip Drop" soundtrack as well as new and revised lesson plans, student activity sheets, *Down the Drain and Back Again* video, maps of the Greater Victoria Water Supply System, books and items for distribution to students.

The *Every Drop Counts* resource has been made possible through the co-operative efforts of the Capital Regional District (CRD) Environmental Sustainability Department, in collaboration with School District No. 61 (Victoria), School District No.62 (Sooke) and School District No. 63 (Saanich).

We appreciate the contribution made by school district staff in the development of the second edition as well as the teachers and the many others who contributed to its original production. In its development, those involved worked to link the lessons in ways that support the British Columbia curriculum and the Ministry of Education's Sustainability Education Framework.

Our fresh water is a precious resource. It is important that children learn this important lesson while they are young and that they recognize its importance in our daily lives and that of all living things.

We hope that this resource will help educators add even more value to their lessons with local and meaningful content, in addition to providing some ideas of take home messages for students to share with family and friends. By working together, we can all help our children to be environmental stewards and to use water wisely.

This is one of many CRD programs that support environmental education for regional students. For other programs please visit our website at **www.crd.bc.ca/teacher**

Mervyn Lougher-Goodey

Chair, Regional Water Supply Commission

Preface

Rational

The Capital Regional District (CRD) is committed to sustaining the liveability of Greater Victoria and contributing to its health, safety, and economy by supplying high quality drinking water for current and future users of the drinking water supply service and to encourage effective conservation and stewardship of the drinking water supply and catchment area.

As part of its mandate, the CRD is responsible for demand management programs which have undergone an evolution from the initial focus of providing an adequate supply of water to meet demand, to actively promoting responsible water use and ensuring the sustainability and quality of the existing supply. This is achieved by using a broad range of initiatives to assist residents, businesses, and institutions understand the interconnections between regional climate, drinking water supply and demand, and how they can use water more efficiently. Education and outreach are the foundation of the program.

As part of its ongoing efforts, the CRD wants to help educate school-aged children about the CRD's drinking water supply, water quality and water conservation. Our partnership with School Districts 61, 62 and 63 will ensure this objective is achieved through the use of *Every Drop Counts*, a curriculum supplement with region specific information.

The overall objectives of the project are:

- to raise awareness, instill skills and develop positive attitudes about the CRD's drinking water supply, quality and conservation
- to reach a grade 2 audience with materials that educate, inform and involve students in taking action toward preserving their drinking water supply
- to provide information in a way that stimulates participants to discuss water conservation actions with their peers and families and begin to explore ways of implementing these actions in their everyday lives
- to create a better understanding of the role water plays in life and lifestyle on the West Coast
- to encourage students to view water from an environmental viewpoint as well as exploring its scientific properties
- to achieve these objectives through the use of a region specific teacher-led education curriculum supplement

Acknowledgements

2012 Second Edition Partners

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2003 Teacher Advisory Committee

Bonnie Bonfonti	School District No. 62 (Sooke)
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Liz Jackson	School District No. 62 (Sooke)
Jean Prevost	School District No. 63 (Saanich)
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Thanks are also extended to the teachers in all three school districts in the Capital Region who field tested the original program and provided their constructive feedback.

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Lessons

Appendices

How to use this resource

Navigating The Pages: A guide to the Educator's Guide

Every Drop Counts lesson plans contain the following elements:

Purpose

A brief overview and synopsis of the lesson, outlining key knowledge and skills addressed and the methodology used.

Preparation

A list of specific preparations for the lesson such as setting up experiments and which handouts to print.

Procedure

Suggested step by step instruction on how to conduct the lesson.

Assessment

Suggested strategies and criteria for assessing student learning in relation to the identified curriculum expectations are built into the lesson plan procedures.

Extensions and Adaptations

Includes lesson modifications, new activities that build on learning and resources that link to other environmental topics for more holistic learning.

Curricular Integration

This space identifies ways in which the lesson plan addresses content from other subject areas.

The Side Bar

Quickly find relevant information including:

Learning Standards: While it is understood that lessons at the primary grades are generally taught in an integrated manner, for the purposes of clarity, targeted subject area, big ideas, and content are identified for each lesson. For complete list of subject areas and learning standards refer to the complete BC's Curriculum: **https://curriculum.gov.bc.ca/**

Time: Estimated time required to conduct the lesson

Teacher Resources: A list of materials to enhance and support instruction (e.g. background information)

Student Resources: A list of handouts and student self and peer assessment tools

Lesson Resources: A list of materials used to conduct the lesson activities

At a Glance: Symbols

Look for these symbols in the lessons and on page corners to quickly find:

Handouts: Includes student activity sheets

Assessment tools: An assortment of tools including conference questions, criteria templates and answer keys

Resources: Tools and materials to support instruction, conduct lessons and complete activities

Letters to Parents and Guardians: Several lessons include take home handouts, fact sheets and do-at-home activities to extend learning at home.

Video: Includes *Down the Drain and Back Again*, an animated video about Dylan and Dana who go on a journey through the Greater Victoria water system to learn the importance of water conservation and protection, a sing-a-long video and topical online videos.

Music: *Drip, Drip, Drop* song available in three versions - instrumental, with vocals and with vocals and sound effects.

Support Materials

Every Drop Counts lessons and resources are available online at **www.crd.bc.ca/teacher**

Educator's Kits, including hardcopy lesson plans, multimedia tools and materials are available for loan at SD 61, 62 and 63, and through the CRD. For pick up locations see **www.crd.bc.ca/teacher** or contact the CRD at 250.360.3133

Lesson 1

Water Users and Uses

Learning Standards & Assessment Tools

Time

Resources

Activities

Handouts

Letters to Parents/Guardians

CRD

Lesson 1:
Water Users and Uses

Lessons address a number of curriculum topics and learning standards. Examples of curriculum links are listed below. It is expected that learning stantards will be developed throughout the units.

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.

Content

- Water sources including local watersheds

English Language Arts

Big Ideas

- Through listening and speaking, we connect with others and share our world.
- Curiosity and wonder lead us to new discoveries about ourselves and the world around us.

Content

- Strategies and processes
  - oral language strategies

60 minutes

Purpose

In this lesson, students are introduced to the unit topic of water, water conservation, and the importance of water in their everyday lives. They begin a class Know-Wonder-Learn (KWL) chart that will be developed throughout the unit.

Preparation

- "Water use display" download OR collect items listed under Materials. (**https://www.crd.bc.ca/docs/default-source/Partnerships-PDF/every-drop-counts/water-use-images-.pdf?sfvrsn=a5dc8bc9_0)**
- "KWL" Chart OR Rethink Web - download or prepare your own (can be used throughout unit).
- Computer and projector- prepare if using the electronic "Water use display" and/or electronic KWL chart
- Photocopy "How I Use Water" student activity sheet (1/ student) (double sided blank and interlined for written and visual representation)
- Photocopy Performance Grid (1/ student)
- Prepare materials for Water Portfolios (envelope, folder or cereal box- 1/student)
- Optional: Parent Handout/email: Introduction

Procedure

Warm-Up Activity

"Water use display" - What do you think is the one thing these images/ items have in common? Why?

Explain that students...

- will be put into AB partners (one person is A, the other B)
- then they will see a slideshow of pictures (OR examine all the items you have set up on display)
- will guess (silently) the one thing that all of these items have in common.

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 Resources

- KWL chart (Know Wonder Learn)

Note that this chart will be developed throughout the course of the unit, so it should be created in a format that will last.

- computer and projector (if using electronic version)
- "Water use display" slideshow or collect images and items such as:
  - Map of the Greater Victoria Drinking Water Supply System (included in kit)
  - "I Can Help Save Water" book (included in kit)
  - bodies of water (e.g., ocean, lake, aquifer, river, stream, pond, marsh, wetland)
  - animals using water (e.g., animals at a watering hole, farm animals at a trough, fish swimming in water, ducks floating on water)
  - people using water (e.g., swimming, boating, skiing, washing clothes)
  - a glass of juice or milk
  - an assortment of fresh fruits and vegetables
  - a houseplant
  - an umbrella
  - a bottle of shampoo or dishwashing liquid
- Poster Board- "All living things need water to survive"
- Large paper cloud (or tap) cut out and string (optional)
- "How I Use Water", 1/student
- Performance Grid (optional)
- Portfolio (Folder, envelope, cereal box or other)

- A and then B will have 1 minute each to share "What do you think is the one thing these items have in common? Do you agree?" (it can be helpful to write the question on the board for reference)
- A (or B, or a volunteer) from each group will be invited to share their combined guess and reasons with the class.
- Review listening and speaking strategies for sharing information, then proceed with above steps.
- Did they agree? Did anyone guess the answer was water?

Transition: Explain to students that over the next several weeks they will be engaging in a number of activities to learn about water and that together you will track what they know, what they are curious about and what they learn using a KWL or Rethink Web.

Know Wonder Learn (KWL) chart

Ask students what they know about water and how it is used.

Record their responses in the Know column, even if it is incorrect. Have students revisit these and alter statements as needed, recording changes in the "Learned" column.

Allow discussion of facts suggested; if anyone disagrees with a particular item, record it in the Wonder column with a question mark.

Ask students to suggest what else they want to learn about water and record their responses in the Wonder column.

Transition: After ideas have been exhausted (although more will be generated throughout the unit), read the Know column aloud. Ask students if they can make any generalizations about the information they've gathered. Can the information be grouped into themes? Use prompts ("Who uses water?", "How is water used?", "Can anything living survive without water?") to guide the discussion until students begin to understand that all living things need water to survive.

Write "**Water is essential to all living things**" on a piece of paper or poster board, and post in the classroom.

Throughout the unit, add learned information, answer previous questions, correct misinformation and add new questions.

"How I use water" Activity

(Drawing, simple poem, other representation)

1. Tell the students a story about how you use water.
2. Display the student activity sheet "How I use water" (copy on to the board or display electronically)
3. Fill in the "How I use water" template displayed with the style of representation you would like students to use (drawing, simple poem or other).
4. Using the Performance Grid, set up and demonstrate the steps and criteria for successful completion.
5. Explain that students will "fill in" their own water drop of one way they use water.
6. Ask students to think about the different ways they use water at home, at school, and in the community.

Teacher Resources

- "Did You Know? Facts and stats about water"
- "Questions students ask about water"
- Letter or email "Introduction"

7. Have them talk about some of these water uses with their partner and share some of their responses with the class.
8. Distribute the student handout, "How I Use Water" reminding students to refer to the criteria.

Assessment Opportunity

Students can:

- fill-in the performance grid as a self-assessment or peer-assessment exercise using predetermined criteria
- present their activity sheet by completing the following stem: "All living things need water. One way I use water is..."
- include their activity sheet "How I use water" in their Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

English Language Arts

- Comprehend and connect (reading, listening, viewing)
  - Use sources of information and prior knowledge to make meaning
  - Use developmentally appropriate reading, listening and viewing strategies to make meaning
  - Engage actively as listeners, viewers, and readers, as appropriate, to develop understanding of self, identity, and community
- Create and communicate (writing, speaking, representing)
  - Exchange ideas and perspectives to build shared understanding

Science

- Questioning and predicting
  - Observe objects and events in familiar context
  - Ask questions about familiar objects and events
  - Make simple predictions about familiar objects and events
- Processing and Analyzing
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

Extensions and Adaptations

- Post students' completed "How I Use Water" activity sheets on a bulletin board in the classroom or school hallway. Or cut out a large paper cloud (or tap) and string students' "How I use water" activity sheet raindrops from it.
- Have students group the completed "How I Use Water" activity sheets into categories such as "for survival", "for fun", "for transportation"...
- Student activity "How I use water"- Tailor criteria appropriate to student level. The blank and interlined sheets allow for flexibility of assignment.
- KWL and/or Rethink Webs can be completed individually (graphically or with text)
- Optional: Distribute the parent handout "Introduction" for students to take home or copy and paste into an email.

"KWL" Chart or Rethink Web

Follow same format as above, however, each time you revisit the chart or web, use a different colour pen. Keep a legend of the pen colour relative to the date or lesson to track evolution of learning.

Curricular Integration

English Language Arts: Use this lesson as the basis for developing students' oral presentation skills (i.e. in presenting their completed student handouts).

Science: Have students make connections between how they use water and how plants and animals use water. Discuss how different plants and animals are adapted to living in water.

Facts and Stats About Water

Use the following information to answer students' questions or as daily trivia. Look for these symbols for:

- Regional/Provincial information
- Canadian information
- Global information

Human Water Use

- Each person in the Capital Regional District (CRD) uses an average of 232 litres of water per day (based on 2015-2017 averages).
- The average residential water use for Canada (2013) is 250 litres per day.
  https://www150.statcan.gc.ca/n1/daily-quotidien/170321/dq170321b-eng.htm
- Water makes up about 65% of human bodies.
  www.ec.gc.ca/eau-water/default.asp?lang=En&n=2AE761EC-1
  https://water.usgs.gov/edu/propertyyou.html
- About 83% of our lungs are water.
  https://water.usgs.gov/edu/propertyyou.html
- About 65% of indoor home water use occurs in our bathrooms. Toilets are the single greatest water user inside the home. Showers and baths are the greatest water use in the home - 35% of indoor water use.
  https://www.ec.gc.ca/eau-water/default.asp?lang=en&n=00EEE0E6-1
- A water-efficient toilet uses only 4.8 L or less per flush. BC Building Code requires the installation of 4.8 L/flush toilets or dual-flush toilets in new residential buildings and for renovations involving plumbing fixtures.
  https://www.crd.bc.ca/education/water-conservation/at-home/household-water-use
- A five-minute shower with a standard showerhead (20 L/min) uses 100 L of water. A five-minute shower with a low-flow (7.6 L/min) showerhead uses only 38 L of water.
- Astronauts on the International Space Station use less than 4L of water to bathe.
  https://science.nasa.gov/science-news/science-at-nasa/2000/ast02nov_1
- Five main water users (water that is taken out of rivers, lakes, etc. before use) in Canada are Agriculture 5% , Municipal (including household) 9%, Manufacturing 10%, Mining is 3% and the largest percentage goes to generating electricity - 68%.
  https://www150.statcan.gc.ca/n1/daily-quotidien/170321/dq170321b-eng.htm
- Only 10% of the tap water used at home is used in the kitchen for drinking and cooking purposes. The rest is used for washing ourselves, our dishes, our clothes, our vehicles, and for flushing toilets and watering our gardens.
  https://www.ec.gc.ca/eau-water/default.asp?lang=en&n=00EEE0E6-1
- During the summer, 50% of all treated municipal water is used for watering lawns and gardens.
  https://www.crd.bc.ca/education/water-conservation/at-home/outdoor-water-use
- Half of the water use in Canada is unnecessary and wasteful- commonly caused by leaks and overwatering lawns.
  https://www.ec.gc.ca/eau-water/default.asp?lang=en&n=00EEE0E6-1
- Globally, approximately 3.575 million people die each year from water-related diseases. The majority of these deaths are children.
  http://static.water.org/pdfs/WaterCrisis09.pdf
- 98% of water-related deaths occur in developing countries.
  http://static.water.org/pdfs/WaterCrisis09.pdf
- Globally, one in eight people do not have access to clean drinking water.
  http://static.water.org/pdfs/WaterCrisis09.pdf

Facts and Stats About Water

Plant and Animal Water Use

- Water makes up about 70% of the weight of most plants and animals.
- A cow drinks about 45-136 litres of water a day.
- A chicken is about 75% water.
- A tomato is about 95% water.
- Many carnivorous animals can get all the water they need by drinking the blood of the prey they eat.
- Native plants need little or no watering other than rainfall once they are established.
  https://www.crd.bc.ca/education/natural-gardening

Water in Manufacturing and Agriculture

- Approximately 10 litres of water is required to manufacture 1 litre of gasoline.
- Approximately 140 litres of water is required to grow and process 1kg of potatoes.
  www.smallholder.co.uk/news/8857744.How_much_water_do_potatoes_use_from_growing_to_processing_/
- It takes 10 litres of water to make a sheet of paper. However, there are paper factories that reuse and re-circulate the water used to make paper.
  https://www.theatlantic.com/technology/archive/2012/06/it-takes-more-than-3-gallons-of-water-to-make-a-single-sheet-of-paper/258838/
- Approximately 80,000 litres of water is required to produce 1000kg of steel.

Water and the Environment

- About 75% of the Earth's surface is covered in water. However, 97% of the planet's water is too salty for humans and most animals and plants. Another 2% of the water is held as glacial ice at the north and south poles. Only 1% of the Earth's water is fresh water.
- Although much of coastal BC is considered "rain forest," the Greater Victoria area is a "rain shadow" region thanks to the Olympic mountains which receive the bulk of the precipitation. Victoria receives only half the rainfall annually that Vancouver does.
  www.bing.com/images/search?q=olympic+mountain+rain+shadow&view=detail&id=55CC975DC479BF8B5B2ADA00197B67D84F4709F4&first=31&FORM=IDFRIR
- Approximately 8% of British Columbians rely on private wells (groundwater) as their sole source of drinking water.
  www.ec.gc.ca/Publications/B77CE4D0-80D4-4FEB-AFFA-0201BE6FB37B/2011-Municipal-Water-Use-Report-2009-Stats_Eng.pdf
- The Great Lakes, straddling the Canada-US border, contain 21% of the world's fresh water.
- The highest waterfall in Canada is Della Falls in Strathcona Provincial Park, Vancouver Island, BC at 440 metres.
  https://www.thecanadianencyclopedia.ca/en/article/waterfall/
- Canada has 20% of the world's total freshwater resources. However, less than half of this water is accessible (not underground in aquifiers or frozen in glaciers)
  www.ec.gc.ca/eau-water/default.asp?lang=En&n=1C100657-1#ws46B1DCCC [1]

1 In this resource "accessible" replaces Environment Canada's term "renewable" to describe fresh water that is readily available for consumption. This is to avoid the confusion with "renewable resources" which can be replaced over time through natural processes. Water cannot be grown, made or created.

Facts and Stats About Water

- Canada has 7% of the world's accessible freshwater, with less than 1% of the world's population.
  www.ec.gc.ca/eau-water/default.asp?lang=En&n=1C100657-1#ws46B1DCCC
- Half of the freshwater in Canada flows into the Arctic Ocean and Hudson Bay, and is therefore unavailable to 85% of the population.
  www.ec.gc.ca/eau-water/default.asp?lang=En&n=1C100657-1#ws46B1DCCC
- The wettest place in Canada, on average, is Henderson Lake, BC, almost 6,700 mm precipitation per year. The wettest community is Prince Rupert, BC. Explore Canada's mean annual precipitation:
  https://www.nrcan.gc.ca/earth-sciences/geography/atlas-canada/selected-thematic-maps/16888#distributionofwater
- The driest place in Canada (with the least amount of precipitation) is Arctic Bay, Nunavut, with an average 12.7 mm of precipitation per year.
- The largest lake entirely in Canada is Great Bear Lake in the NWT at 31,328 square kilometres.
  https://www.canadiangeographic.ca/article/infographic-canadas-10-largest-lakes-volume
- The longest Canadian river is the Mackenzie River in the NWT at 4,241 kilometres.
- One drop of oil can contaminate 25 litres of drinking water.

  https://www.canada.ca/en/environment-climate-change/services/water-overview/quality.html
- For additional Canadian water stats and facts visit
  https://www.statcan.gc.ca/eng/dai/smr08/2017/smr08_215_2017

Water Science

- Water boils at 100°C (212°F). Water freezes at 0°C (32°F).
- Water expands when it freezes.
- Once evaporated, a water molecule spends about 10 days in the air.
- Water forms the basis of many metric measurements. 1 ml or 1 cm^3 of water weighs 1 gram. 1 calorie (4.187 joules) is the amount of energy required to raise the temperature of 1 mL of water by 1°C.
- Most water is returned to the atmosphere by evaporation from the oceans, lakes, and ponds. However, water vapour also returns to the atmosphere via the respiration of animals, through the pores of plants, and from soil surfaces by drying winds.
- Water can neither be created nor destroyed. It is reused. The water that we use today has been on Earth since before the time of the dinosaurs.
- Water is the only matter that occurs naturally on Earth in all three physical states - liquid, solid, and gas.

Common Questions Students Ask About Water

HUMANS: Water and our bodies

How much water do we need to replace in our bodies per day? Health Canada does not recommend a specific intake of water. However, people who are very active or exposed to hot environments require more water.
http://hc-sc.gc.ca/fn-an/food-guide-aliment/educ-comm/faq_educat-eng.php#14

Why is water good for you? Flushes toxins out of the body, improves skin texture, helps with headaches and improves stomach and heart health - many more!

How much water is in our bodies? Water makes up about 65% of our bodies.
https://water.usgs.gov/edu/propertyyou.html

How do we get water in our bodies? By drinking water and through foods we eat.

Why are tears salty? Because your body has a lot of salt in it, so therefore things that come out of it, like sweat and tears, tend to be a bit salty too.
www.whyzz.com/why-are-tears-salty

Why does blood come out of your body instead of water? Blood runs through your body and supplies oxygen to your muscles and organs and helps to remove toxins from your body as well as healing wounds. Blood is 83% water.

How does water get out of your body when you sweat? Sweat is mainly water. The brain senses that your body is getting hot and sends a message to your sweat glands which secrete sweat to cool your body down.

HUMANS: Water in our homes

How much water do we use per day? CRD residents uses an average of 232 L/day (2015-2017 averages). Residents of B.C. use 296L/day (3013) down from 312L/day in 2011.
http://www.wpl.scarp.ubc.ca/bc-municipal-water-survey-2016/

The average residential water use for Canada was 251L/day (2011) and down to 223L/day in 2013.
https://www.ec.gc.ca/indicateurs-indicators/default.asp?%20lang=en&n=7E808512-1
https://www150.statcan.gc.ca/n1/pub/12-581-x/2017001/sec-1-eng.htm

At home, where to do we use the most water? The majority of indoor water use occurs in the washroom. Toilets account for 24% of water use while showers account for 20%.
https://www.crd.bc.ca/education/water-conservation/at-home/household-water-use/water-savings-tips

How much water is used using a non-low flow showerhead? 20L/min

Which uses less water, a bath or a shower? A shower. A five minute shower with a low flow (9.5L/min) showerhead uses 47.5L.

How much water does a water efficient toilet use? 4.8 litres (or less) per flush, also BC Building Code requires the installation of 4.8 L/flush toilets or dual-flush toilets in new residential buildings and for renovations involving plumbing fixtures.

How does water get to our homes? In the Greater Victoria area many of us receive our drinking water from the Sooke Reservoir through large underground pipes which are split into many smaller pipes which are then connected to your home. Some homes get their water from their own well.
http://crdatlas.ca/printable-maps/water-service-areas.aspx

How does the water we drink get back into the water cycle? Eventually the water we drink is expelled from our bodies, flushed through wastewater treatment works (sanitary sewer) and into the ocean or groundwater (septic systems) where it evaporates into the air and joins the water cycle. Some water vapour is also expelled through breathing and sweating.

Common Questions Students Ask About Water

How does water make electricity? Water stored in dams is released through a turbine (like an airplane propeller). The water spins the turbine to create electricity, which is then put into power lines that run to your house.

Why do we have a drain in our driveway? To drain water off the driveway and streets. These drains can lead directly into local rivers and streams, that's why it is important not to use harsh chemicals on our property as it could harm fish, plants and wildlife. To help replenish the groundwater and protect our streams from gushes of stormwater, we can replace waterproof driveways and patios (e.g. concrete) with absorbent surfaces (e.g. gravel) which allow water to seep back into the ground.

What would happen if we cooked with ocean water? Your food would be very salty! (Also there is a chance it could be polluted.)

Plant and Animal Water Use

Do all plants and animals need water? Both plants and animals use water to transport nutrition throughout them and regulate their temperatures. Some can go without water for lengthy periods of time but all plants and animals need water to survive.
http://science.howstuffworks.com/environmental/earth/geophysics/h2o5.htm

How do fish breathe in water? Water contains 2 hydrogen atoms and 1 oxygen atom; fish have gills which can absorb the oxygen from water into their bloodstream to keep them alive. Their gills are just like human lungs which absorb oxygen from the air we breathe.

Water and the Environment

Why is the earth mostly water?
https://water.usgs.gov/edu/earthwherewater.html

Why is the sea salty and not the other water? The materials surrounding lakes and oceans dissolve into water making it salty. When water evaporates from the ocean the salt is left behind. Some lakes are salty as well, but in most lakes there is constant addition and removal of water from streams, therefore, limiting the amount of salt contained in them.
http://chemistry.about.com/od/waterchemistry/f/why-is-the-ocean-salty.htm

Where does the salt go when water evaporates? It stays in the water or in the container it is held in. Try an experiment, put some salt in water and put the glass on the window sill until the water is evaporated.

How deep is the ocean? On average is it 4.3km deep or 4300 meters, however the deepest point is approximately 11 km deep.
http://oceanservice.noaa.gov/facts/oceandepth.html

Why is there no water on other planets and the Sun? Some planets are too close to the Sun and, therefore, too hot to contain water and other planets have less magnetic attraction than the Earth, meaning that water can be stripped from them via solar winds from the sun.

How does the water get into streams and rivers? Most water you see flowing in rivers comes from rain or the melting of snow or glaciers. Other sources of water in rivers can be from water held below the surface of land called groundwater; this water seeps out of the land into the river.

Why can't you see the water in the air? Because water in the air is in a gas form and the water molecules are so small you can't see them.

Why does it rain? Warm air turns the water from rivers, lakes, and oceans into water vapor that rises into the air. That water vapor forms clouds, which contain small drops of water or ice crystals (depending on how high the cloud is and how cold it is). As clouds rise higher and higher, the air gets colder and colder. When the water vapor in the cloud becomes too heavy, it falls back to the ground as rain or snow.

Common Questions Students Ask About Water

- *How does water make snow and hail?* When the air is cold like it is in fall and winter, water that would have fallen as rain freezes and falls as snow.
  http://www.abc.net.au/science/articles/2008/09/18/2367819.htm
- *Why are clouds grey?* The colour of the cloud is actually created by the light passing through the water molecules
  www.abc.net.au/science/articles/2011/04/21/3196689.htm
- *Why and how does water freeze?* All molecules, including water molecules (even those in a glassful of still water) are constantly moving. Heat makes them move faster, cooling slows them down. When water gets cool enough, molecular movement is slowed enough that the molecules stick to each other and form ice crystals.
  https://www.sciencelearn.org.nz/resources/1008-water-and-ice
- *How does water evaporate?* When it is heated it turns into water vapour and rises up into the air.
  https://www.nationalgeographic.org/encyclopedia/evaporation/
- *Is rain water clean enough to drink?* When it comes from the sky it is, however once the rains has hit your roof and other surfaces it can pick up contaminants that could harm you if you drink it.
- *How does water move?* (waves, tide, running rivers) Either by gravity pulling water downhill, or wind pushing the water or tides. Tides are periodic rises and falls of large bodies of water. Tides are caused by the gravitational interaction between the Earth and the Moon. The gravitational attraction of the Moon causes the oceans to bulge out in the direction of the moon.
  www.enchantedlearning.com/subjects/ocean/Tides.shtml
- *Where does the water on leaves (dew) come from?* On a clear day, water evaporates from the warm ground into the atmosphere. When night falls, the ground radiates the day's warmth into the skies. The ground becomes much cooler, causing the water vapour to condense. This condensed vapour is dew. On a cloudy night, the clouds send the heat back to the ground so the ground never gets cold enough for the dew to be formed.
- *Why does water foam when it splashes against the rocks?* Sea foam is formed when water containing high amounts of algae collides with the shore and traps air in the form of bubbles which stick to each other forming foam.
- *Why is there not enough water for the summer?* The reason the Sooke Reservoir water levels drop in the summer is because we use more water than is replenished by rainfall that time. In the Greater Victoria area, we receive the majority of our water in the form of rain during the winter. In the summer, we use much more water, often outdoors watering lawns and gardens. We need to be especially careful using tap water during the summer to ensure we have enough to supply everyone in the region with drinking water until the rain falls again.

Water Science

- *What is water made of?* Hydrogen and Oxygen
- *How is water made?* Water can be neither created nor destroyed; therefore it is not a renewable resource. The water that we use today has been on Earth since before the time of the dinosaurs. Water on earth continually moves through the water cycle. eg. It rains onto land, flows down rivers and streams, into the lakes and the ocean and then evaporates back into the air where it condenses and falls again.
- *What does H20 mean?* 2 Hydrogen atoms and one oxygen atom form a water molecule. Why is it clear? When we see colour we are actually seeing the energy of light that bounces off an object. Water is pretty interesting because it doesn't really absorb or reflect much color at all! Light passes through it pretty easily giving it no real colour in a pure form.
  www.whyzz.com/why-is-water-clear

Common Questions Students Ask About Water

Why does water taste so plain? Because it has very few elements in it that give it flavour.

Does water leak through glass? (Condensation on windows or drinking glasses) No, what you are witnessing is condensation. The cooling of the air around the glass causes the water molecules in the air to condense and form water droplets on the glass.

Water and Climate Change

Is "climate" the same as "weather"? No, but they are related. Weather describes moment- to- moment changes (minutes to weeks) in precipitation, sunshine, clouds, temperature etc. Climate describes weather over longer periods of time, the average weather, for a specific area. When we say that today is colder than yesterday, we are talking about a change in the weather. When we say our winters are becoming warmer, we are talking about climate.

How will climate change affect our water? Greenhouse gas (GHG) emissions are impacting the natural way temperatures are controlled on Earth, changing the atmosphere, water cycle and natural ecosystems. We create GHG's when we burn wood, coal, oil and natural gas (to generate electricity, to power vehicles, planes, boats and machines). Our actions are causing our climate to warm up. In our region, it is expected that climate change will lead to:

- more extreme weather (flooding, droughts, storms and erosion)
- changes to when and how much rain, snow and hail falls (e.g. wetter winters and drier summers)
- rising sea levels (which may erode land and seep into freshwater aquifers)
- long-term warming (all seasons will be warmer, river temperatures will increase)
  https://www150.statcan.gc.ca/n1/pub/16-201-x/2007000/10542-eng.htm

  https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-effect.html

Why does taking a shorter shower save energy? By taking shorter showers, you are not only saving water but energy too. It takes energy to heat water and to pump it uphill. You save both by using less.

Will climate change mean we have more or less fresh water? Both. Spring and winter are expected to be wetter, but summer will be longer and drier.

Will there be enough water for plants? Not for all plants. Likely we will see more drought-tolerant plants.

Can drinking tap water from the Sooke Reservoir really make a difference to climate change? Yes, in our region, one bottle of water uses as much energy as 1,333 cups of tap water (gravity rather than electricity moves the drinking water from the Sooke Reservoir through many pipes). Efforts to reduce GHG emissions will help influence long-term climate change and its impacts. However, as a result of our historical emissions the Earth will continue to warm for decades to come.

Common Questions Students Ask About Water

Drinking water in our region

- *Where does our drinking water come from?* The Greater Victoria Drinking Water System is supplied with water primarily from Sooke Lake Reservoir, in the Sooke Hills. Sooke Lake Reservoir land is owned and protected by the Capital Regional District.
  https://www.crd.bc.ca/service/drinking-water/watershed-protection/greater-victoria-water-supply-area
- *What is the maximum water level in the Sooke Lake Reservoir?* The concrete spillway elevation level is 186.75m above sea level.
- *How much water can the reservoir hold?* Sooke Lake Reservoir holds 160.32 million m^3 of water (92.7 million m^3 is accessible for drinking water) .
- *How much water is in the Sooke Lake Reservoir now?* Visit us online for weekly updates.
  https://www.crd.bc.ca/about/data/sooke-lake-reservoir/sooke-lake-reservoir-photos
  https://www.crd.bc.ca/about/data/sooke-lake-reservoir/weekly-water-watch
- *How can I help keep our drinking water clean?* Add a backflow preventer on your hose bib and when filling a swimming or wading pool, keep the nozzle of the hose out of the water filling the pool.
- *How can we conserve drinking water?*
  - Turn off the taps while brushing your teeth
  - Have a 5 minute or less shower instead of a bath
  - Take shorter showers (less than 5 minutes)
  - Wash fruit and veggies in a bowl of water instead of under a running tap
  - If you have a wading pool, place it in the shade to save water from evaporating
  - If having water fights, don't use a hose
  - Only run a dishwasher with a full load. Read more water saving tips
  - Ask your parents/guardians about
  - Replacing old bathroom fixtures to more efficient model
  - Replacing old clothes washing machine for a high-efficiency model
  - Regularly checking your home for leaks.
  - Let the lawn go golden and be water wise outside
  - Plant a native plant garden or drought tolerant garden
  - Install a rain garden
  - Using rainbarrels

  https://www.crd.bc.ca/education/water-conservation/at-home
- *How long will the reservoir last?* That depends on how much water we use. In 2002, the Sooke Lake Reservoir dam was raised by 6 meters, almost doubling its capacity. Earliest projections suggest 2060 or beyond, but the more we save, the longer it will last. The hope is to not draw from the Leech River watershed until 2060 or beyond.
- *Does everyone in the region have drinking water from the Sooke Lake Reservoir?*
  No. Some people in the western communities, Saanich Peninsula and on the Southern Gulf Islands use well water or other reservoirs for their drinking water, with the exception of Piers Island, which does receive drinking water from the Sooke Lake Reservoir.
- *How many homes use wells for drinking water?* More than 9% of British Columbians use groundwater as their main drinking source.
  https://www150.statcan.gc.ca/n1/pub/11-526-x/2007001/5100146-eng.htm

Common Questions Students Ask About Water

Why should we conserve drinking water?

- To enhance drinking water quality by maintaining water levels in the Sooke Lake Reservoir.
- To reduce the environmental impact by deferring the need to supply drinking water from new sources.
- To differ and save costs related to the expansion of the infrastructure (pipes and plants) needed to supply more drinking water and discharge extra wastewater.
- To reduce the energy and materials required to treat and deliver water, lower water and energy bills and to ensure there is enough for everyone during times of drought. (two (2) years out of ten (10) the Sooke Lake Reservoir is not filled).
  https://www.crd.bc.ca/education/water-conservation/at-home/water-conservation-faq

When reservoir is full and overflowing, why should we conserve?

- Two (2) years out of ten (10) we run the risk of drought.
- Less negative environmental impact
- To preserve the habitats for fish, animals and plants downstream from Sooke Lake which also rely on this fresh water.
- To preserve the fisheries and traditional and cultural customs of the T'souke First Nations that rely on the Sooke River.

How I Use Water

Name: _____ Date: _____

All living things need water.

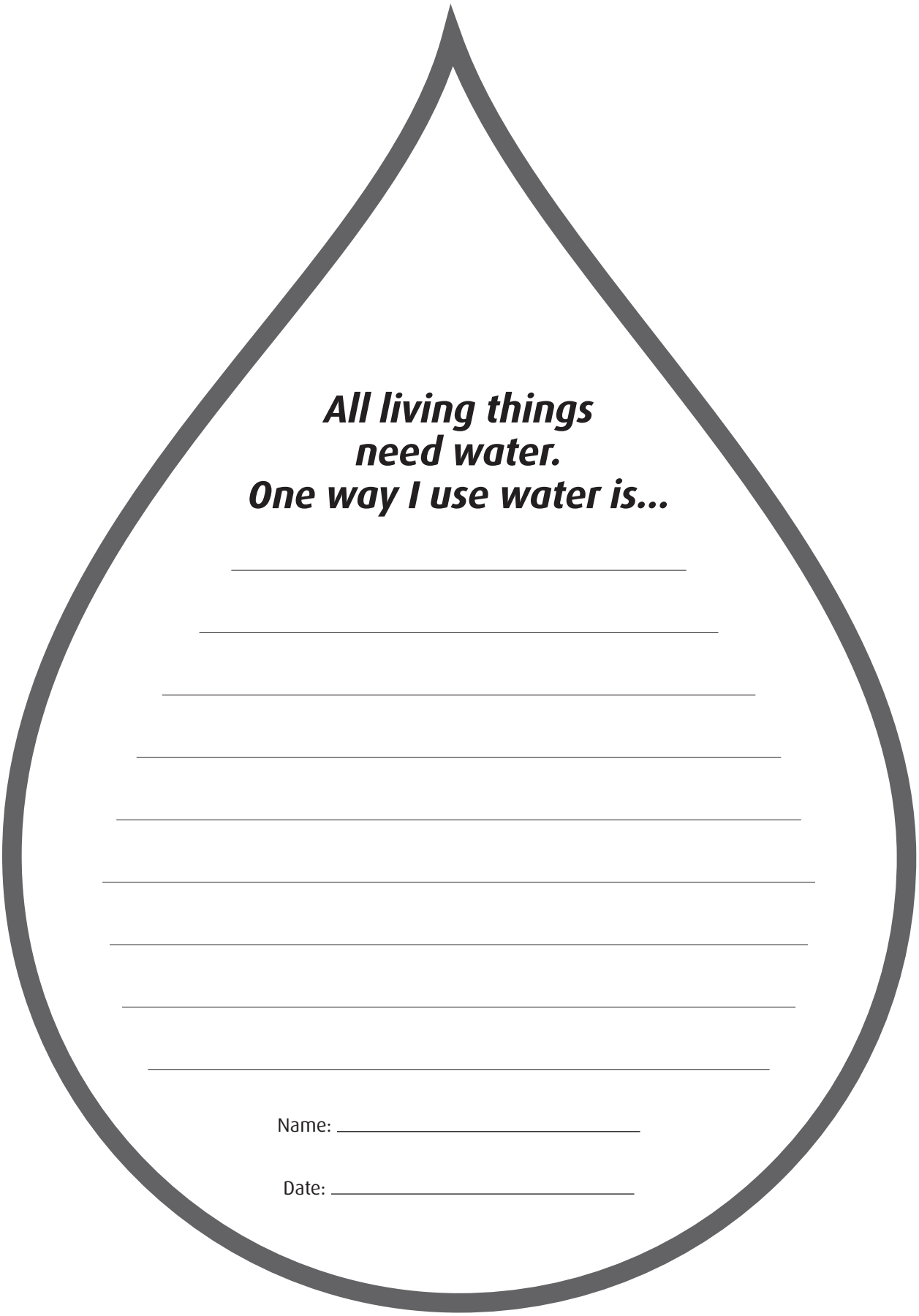
One way I use water is...

Name: _____

Date: _____

How I Use Water

Name: _____ Date: _____



All living things need water. One way I use water is...

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____

Date: _____

"How I Use Water" Performance Grid

Name: _____ Date: _____

CRITERIA	I show this in my work		
	Yes	Sometimes	No

"How I Use Water" Performance Grid

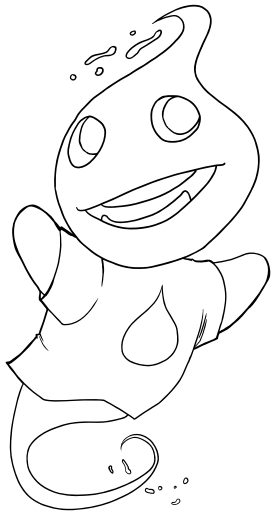
Name: _____ Date: _____

CRITERIA	I show this in my work		
	Yes	Sometimes	No

Learning and sharing knowledge at home.

Here are some ways that your family can explore water at home and in your community:

- Join a CRD Parks event.
  https://www.crd.bc.ca/parks-recreation-culture/parks-trails/crd-regional-parks/events
- Visit the public library to find books, films or music about water and water conservation.
- Watch television programs that address water conservation and environmental issues.
- Collect water-related pictures from magazines and the internet, and talk about them as a family.
- Clip articles from the newspaper and create a water scrapbook.



FACTOID: ***About 75% of the Earth's surface is covered in water. However, 97% of the planet's water is too salty for humans and most animals and plants. Another 2% of the water is held as glacial ice at the north and south poles. Only 1% of the Earth's water is fresh water.***

Introduction

Dear Parent or Guardian:

Today your child's class began a water unit called Every Drop Counts. The unit focuses on the importance of freshwater for all living things and the need to use it wisely.

Through this unit students will:

- discover the properties of water in science experiments
- investigate and calculate who and how freshwater is used
- learn about the water cycle and the Sooke drinking water reservoir
- identify actions to help save and protect our precious freshwater resource

This is a newly revised version of the unit developed by the Capital Regional District (CRD), in co-operation with School District No. 61 (Victoria), School District No. 62 (Sooke), and School District No. 63 (Saanich). The CRD is committed to sustaining the health and lifestyles of the residents of Greater Victoria by providing an adequate quantity of safe, clean drinking water.

Over the course of this unit, your child will be bringing home a number of resources to share. These resources are designed to help your child extend her or his learning at home.

Would you like to learn and share your water knowledge as a family at home? Attached is a schedule of topics to be covered in class and a list of local events and resources to help your child build on what he or she has learned in class.

Please feel free to contact me if you have any questions.

Lesson 2

Down the Drain and Back Again

Learning Standards & Assessment

Time

Resources

Activities

Handouts

Video

Lesson 2:

Down the Drain and Back Again

Science

Big Ideas

- Materials can be changed through physical and chemical processes.
- Water is essential to all living things, and it cycles through the environment.

Content

- Water sources including local watersheds
- Water conservation
- The water cycle

English Language Arts

Big Ideas

- Stories and other texts connect us to ourselves, our families, and our communities.

Content

- Strategies and processes
  - oral language strategies

45-60 minutes

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.

Purpose

In this lesson, students are introduced to the unit video: *Down the Drain and Back Again*. Students engage in a number of prediction and discussion activities about the content of the video, and have opportunities to reflect on what they have learned.

Preparation

- Preview the *Down the Drain and Back Again* video
- To review the video script (Appendix C), which contains approximate time indices for each scene and suggested discussion topics.
- Photocopy student activity sheet: *Down the Drain and Back Again* (1/student)
- Photocopy Vocabulary Graphic Organizer (5/student)
- Assessment tool "What Did I Learn About Water?"

Procedure

Warm-Up Activity

1. Tell students to close their eyes, listen to the sound clip and to imagine what is happening. (Use a sound clip of water going down the drain)
2. Have students turn and talk to a partner and then share with the class.
3. Direct discussion to where is the water going? Answer: Down the drain.

Transition: Tell students that the title of the video they are about to watch is Down the Drain and Back Again. Write the title on the board. Ask students if anyone knows what a drain is or what one looks like.

Teacher Resources

- Assessment Tool: *Down the Drain and Back Again*

Student Resources

- Handout: *Word Maps (see Lesson 3)*
- Handout: *Down the Drain and Back Again*

Lesson Resources

- Video: Down the Drain and Back Again (15 mins)
- Computer and projector or TV and DVD player
- KWL chart (from Lesson 1)
- Board or screen
- Crayons, pencil crayons, etc.

Vocabulary and Word Maps

1. Project a word map and complete as a class to define drain- pipes that remove dirty water (wastewater) from our homes, buildings, roads and sidewalks.

Background information:

- ***Sanitary sewer drains- start inside our homes and buildings.***
- ***Stormwater drains- start outside collecting rainwater that flows over our roads, roofs, sidewalks and other surfaces.***

2. On the board, write the vocabulary listed below or choose from the glossary in APPENDIX B. Explain that these words will be in the video. Review and define as needed. Have students create word maps for each (see Lesson 3 handouts). Note: These can be made into a water words book at the end of the unit.
    - Conserve - the action of stopping something from being wasted- like water.
    - Evaporate - the action of changing from liquid water into water vapour when heated.
    - Raindrop - the liquid form of water that falls from clouds.
    - Creek- a stream of water that flows into a river or lake.

Predictions Previewing Activity

1. Post images of Dana, Dylan and Sprinkle. Explain that these are characters from the video.
2. Review the clues: video title, vocabulary and characters.
3. Distribute the *Down the Drain and Back Again* student handout.
4. Review prediction strategies and explain that students are to complete the prediction section only.

Video – Down the Drain and Back Again

1. Screen Video- Sprinkle teaches Dylan and Dana how to conserve water by turning them into water drops. They go down the drain and flow out into the ocean. There, the sun heats them up and they evaporate into the clouds. They then transform into raindrops and fall from the sky in to a creek that flows into the Sooke Lake Reservoir, where our drinking water is stored.
2. Have students review their predictions and mark which were right and wrong, and review answers to their questions.
3. Ask all students to stand. Have standing students share briefly with the class.
    - Sit if your prediction came true.
    - Everyone stand again. Sit if a prediction did not come true.
    - Everyone stand again. Sit if your questions were not answered.
    - Everyone stand again. Sit if all your questions were answered.

4. Know-Wonder-Learn (KWL) chart
    - Add unanswered questions to the KWL chart.
5. Complete remainder of handout - What I learned.
    - Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from the video.
    - Have students add their completed sheets to their Water Portfolios

Assessment Opportunity

Collect students' completed *Down the Drain and Back Again* sheets, and invite them to talk about their responses in a conference approach, using questions and prompts such as:

- What did you learn today about water?
- How does your work (predictions, answers and drawing) show what you have learned about water?
- What do you want to learn more about?

Curricular Competencies

Look for evidence that students are able to:

English Language Arts

- Comprehend and connect (reading, listening, viewing)
    - Use sources of information and prior knowledge to make meaning
    - Use developmentally appropriate reading, listening and viewing strategies to make meaning
    - Engage actively as listeners, viewers, and readers, as appropriate, to develop understanding of self, identity, and community
- Create and communicate (writing, speaking, representing)
    - Exchange ideas and perspectives to build shared understanding

Science

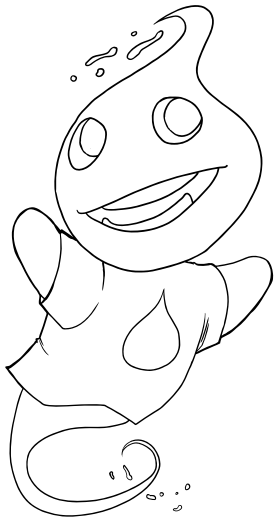
- Questioning and predicting
    - Observe objects and events in familiar context
    - Make simple predictions about familiar objects and events
- Processing and Analyzing
    - Compare observations with predictions through discussion
    - Identify simple patterns and connections
- Evaluating
    - Compare observations with those of others
    - Consider some environmental consequences of their actions
- Communicating
    - Communicate observations and ideas using oral or written language, drawing, or role-play
    - Express and reflect on personal experiences of place

Extensions and Adaptations

- Word Map templates available for different levels- pictorial only, mixed text and images, and added detail for further challenge. Choose the map that best suits students.
- To extend the prediction activity, pause the video in a few places and challenge students to predict what will happen next. Provide opportunities for them to explain their reasoning. NOTE: Suggested opportunities for predictions, discussions and background information are identified in the video script in Appendix C.

Curricular Integration

Social Studies: Use this lesson as the basis for discussing relationships between people and the environment; rights and responsibilities of individuals; roles and resposibilities of regional governments etc.



FACTOID: ***Once evaporated, a water molecule spends about 10 days in the air***

Down the Drain and Back Again

Name: _____ Date: _____

My Predictions

Draw and/or write your ideas below.

BEFORE	**AFTER**
• ***I think this video will be about...*** • ***I wonder...***	• ***My predictions were right*** ✓ • ***My predictions were wrong*** X**.**

What I Learned About Water

Use the lines to write three things you learned about water

1. _____

_____

2. _____

_____

3. _____

_____

Draw what you learned about water.

Down the Drain and Back Again

Name: _____ Date: _____

		Emerging	Developing	Proficient	Extending
English Language Arts	Use sources of information and prior knowledge to make meaning				
	Use listening and viewing strategies (including making predictions, connections, inferences etc) to make meaning				
	Exchange ideas and perspectives to build shared understanding				

Lesson 3

The Water Story

Learning Standards & Assessment

Time

Resources

Activities

Handouts

Video

Lesson 3:
The Water Story

English Language Arts

Big Ideas

- Stories and other texts connect us to ourselves, our families, and our communities.
- Playing with language helps us discover how language works.

Content

- Story/text
  - elements of story
- Strategies and processes
  - reading strategies
- Language features, structures, and conventions
  - word patterns, word families
  - conventions (punctuation, capitalization etc.)

60-120 minutes

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.

Purpose

This lesson uses the story from the video: '*Down the Drain and Back Again*', to help students build reading comprehension skills. The emphasis is on organizing information in chronological order. The lesson also includes a co-operative group activity that helps students build their collaborative and problem-solving skills.

Preparation

1. Photocopy at least two copies of the teacher resource, 'The Water Story', and cut each one into 10 strips.
2. Photocopy the Student Handout: The Water Story and Water Word Map (1/student).
3. Cut a piece of string 10 metres long.
4. Post chart paper.

Procedure

Video - Down the Drain and Back Again

1. Screen the video *'Down the Drain and Back Again'*. If you are conducting this lesson immediately after Lesson 2, you may choose to eliminate this step.

Vocabulary and Word Maps

2. Write the following vocabulary on the board and have students create a word map for
   - **Wastewater** — used water that goes down indoor drains
   - **Pollute** — the action of making something unclean

Note: Stormwater is used water that goes down outdoor drains

Teacher Resources

- *'The Water Story'*
- Assessment Tool: *'The Water Story'*
- Optional Assessment Tool: Conferencing - '*The Water Story'*

Student Resources

- Handout *'The Water Story'* (1/student/or group)
- Group activity option-*Our Water Story Comic* (1/students or group)
- Water Word Maps (2/student)
- Adapted Activity: Video Reel

Lesson Resources

- Video: *Down the Drain and Back Again* (15 mins)
- Computer and projector or TV and DVD player
- Chart paper and tape
- String approximately 10 metres long
- *'The Water Story'*

Retelling stories

3. Review the elements of stories - characters, setting, structure (beginning, middle, and end). Select a familiar story (e.g., a fairy tale), and ask students to identify the elements of that story.
4. Reviewing the story from the video, ask students to identify the beginning, middle, and end of that story. For example:
    - beginning - Dana and Dylan are wasting and polluting water in the bathroom when they meet Sprinkle, who tries to tell them why it is important not to waste or pollute water
    - middle - turned into water drops, Dana and Dylan go on a journey through the water cycle
    - end - returned to their bathroom and turned back into children, Dana and Dylan tell Sprinkle that they have learned their lesson.
5. Divide the class into 10 groups, and give one of the story strips (from the teacher resource) to each group in random order. Have one student from each group read her or his strip aloud to the class; assist as necessary.
6. Explain to students that their task is to re-create the story from the video by putting the 10 strips in the correct order. Once they have agreed on the correct order, they should use the string to line themselves up from beginning to end.
7. Review the guidelines for co-operative work, and facilitate the process as necessary.
8. Tape the strips in order on the chart paper.
9. Distribute the student handout, *'The Water Story'*, and read it as a class. Compare this correct version to the version students created in the group activity. Were they right? Make changes as necessary.
10. Encourage students to use the extra space on the handout to make notes or draw sketches related to the story.

Assessment Opportunity

- Observe students as they complete the task
- Use *'The Water Story Assessment Tool'*, as a checklist or rating scale to assess their co-operative group work.
- If using SmartBoard technology, have students create a silent video. They may use the comic strip handout to draft a storyboard.

Curricular Competencies

Look for evidence that students are able to:

English Language Arts

- Comprehend and connect (reading, listening, viewing)
  - Read fluently at grade level
  - Use sources of information and prior knowledge to make meaning
  - Use developmentally appropriate reading, listening and viewing strategies to make meaning
  - Recognize the structure and elements of story
- Create and communicate (writing, speaking, representing)
  - Exchange ideas and perspectives to build shared understanding

Extensions and Adaptations

Venn Diagram

Reinforce viewing and reading strategies by highlighting self-text, text-text, and text-world connections, such as:

- a magical creature like Sprinkle
- beginning and ending at the same place
- an adventurous journey/trip
- a brother and sister sharing the adventure

Have students create a Venn diagram or web to illustrate the similarities and differences between *Down the Drain and Back Again* and another familiar story.

W5

Use a W5 approach (who, what, where, when, why) to have students analyse the story of *Down the Drain and Back Again*. Write these five categories on the board, and ask students to define each. For example:

- who — Dylan and Dana, as well as Sprinkle and several water drops
- what — a trip through the water cycle
- where — Greater Victoria
- when — now/any time
- why — to learn why it is important to conserve water and avoid pollution

Video Reel

As an alternative to reading exercises have students place images taken from the video in order.

Curricular Integration

Arts Education (Visual arts): Have students draw their own pictures to illustrate the 10 story points as outlined in the student handout, *The Water Story*, creating a storybook or cartoon strip. Students may work in groups to complete this task, with each taking responsibility for drawing one or two scenes.

The Water Story

Dylan and Dana are wasting water in their bathroom and Dana flushes garbage down the drain.

Sprinkle tells Dana and Dylan that it is important not to pollute or waste water.

Sprinkle turns Dylan and Dana into water drops and they fall down the drain.

Dana and Dylan travel through the drains with some litter.

Dylan and Dana flow through the wastewater screens and out into the ocean. The litter is captured by the screens.

Dana and Dylan see people down below them who are using water wisely.

Dylan and Dana condense into raindrops and land in a creek.

Dana and Dylan float down the creek into the Sooke Lake Reservoir.

Dylan and Dana go through the Intake Tower and end up back in their own bathroom.

Dana and Dylan tell Sprinkle that they know it is important to protect and conserve water.

Our Water Story Comic

Name(s): _____ Date: _____

Draw your comic to tell the water story.

Dylan and Dana are wasting water in their bathroom and Dana flushes garbage down the drain.

Sprinkle tells Dana and Dylan that it is important not to pollute or waste water.

Sprinkle turns Dylan and Dana into water drops and they fall down the drain.

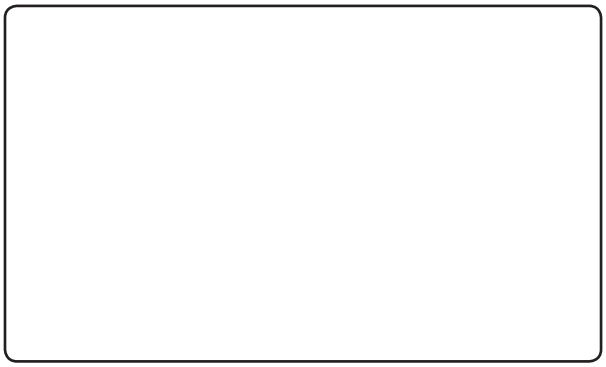
Dana and Dylan travel through the drains. They flow through the wastewater screens and out into the ocean.

Dylan and Dana evaporate and turn into clouds.

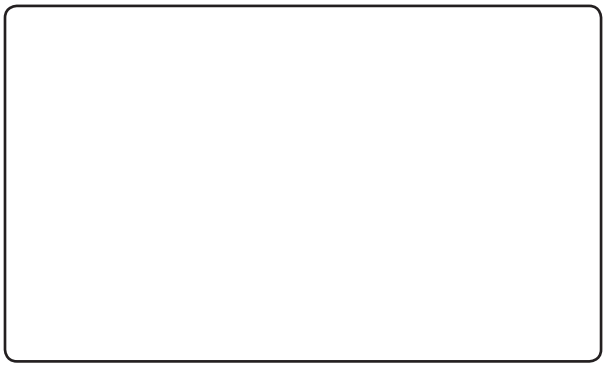
Dana and Dylan see people down below them who are using water wisely.

Our Water Story Comic

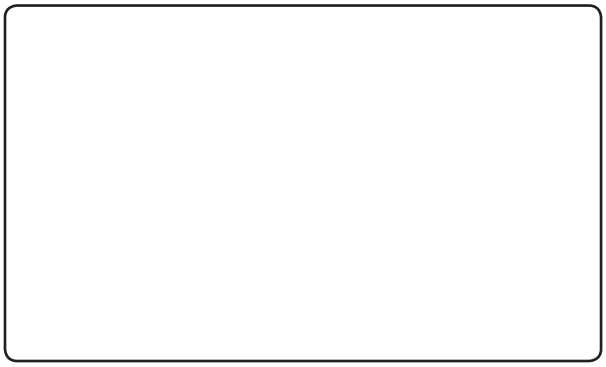
Dylan and Dana condense into raindrops and land in a creek.



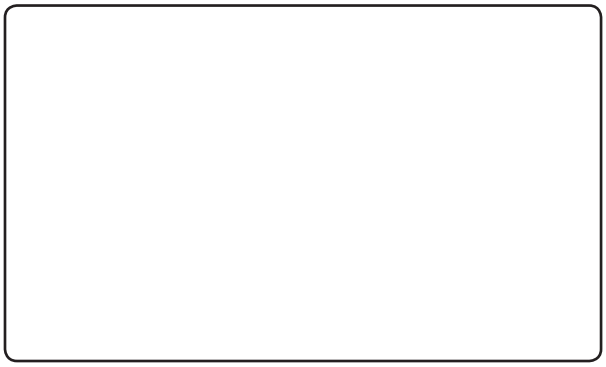
Dana and Dylan float down the creek into the Sooke Lake Reservoir.



Dylan and Dana go through the Intake Tower and end up back in their own bathroom.



Dana and Dylan tell Sprinkle that they know it is important to protect and conserve water.



The Water Story - Answer Key

Dylan and Dana are wasting water in their bathroom and Dana flushes garbage down the drain.

Sprinkle tells Dana and Dylan that it is important not to pollute or waste water.

Sprinkle turns Dylan and Dana into water drops and they fall down the drain.

Dana and Dylan travel through the drains with some litter.

Dylan and Dana flow through the wastewater screens and out into the ocean.
The litter is captured by the screens.

Dylan and Dana evaporate and turn into clouds.

Dana and Dylan see people down below them who are using water wisely.

Dylan and Dana condense into raindrops and land in a creek.

Dana and Dylan float down the creek into the Sooke Lake Reservoir.

Dylan and Dana go through the Intake Tower and end up back in their own bathroom.

Dana and Dylan tell Sprinkle that they know it is important to protect and conserve water.

Assessment - The Water Story

Students Name																																
Learning Standards: English Language Arts																																
Read fluently at grade level																																
Make connections and use background knowledge to show understanding																																
Use decoding skills and reading strategies to decipher text																																
Understand beginning, middle, and end of story/ text																																
Make connections with self, text, and world																																
Exchange ideas and perspectives to build shared understanding																																
Scale: 1= emerging 2= developing 3=proficient 4=extending																																

Conferencing - The Water Story

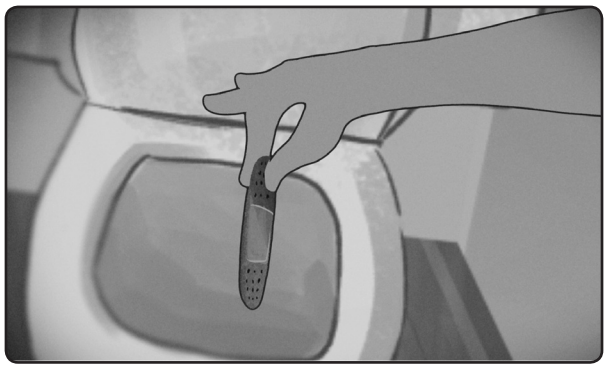
1. *Select 5 or 6 of the sentence strips from the teacher resource 'The Water Story' (the first, the last, and three or four from the middle).*
2. *Lay the six strips in random order, and ask students to put them in the correct order. To help guide students, you may choose to prepare a sheet with column headings (Beginning, Middle, and End) and have students sort the sentences into the correct columns.*
3. *Use prompts such as the following to encourage students to explain their choices:*
   - *In the beginning of the story...*
   - *In the middle of the story...*
   - *At the end of the story...*
   - _____ *happened after* _____*happened.*
   - _____ *happened before* _____ *happened.*

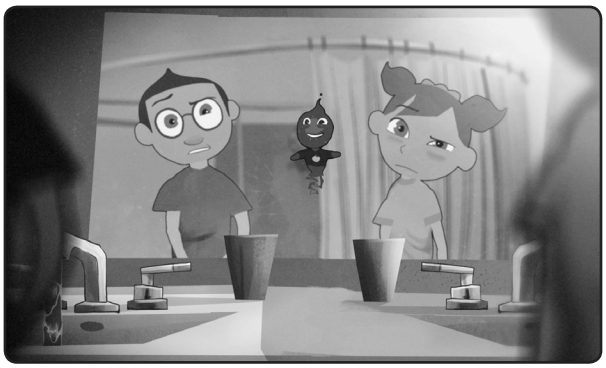
Use criteria such as those outlined in the assessment tool, *'The Water Story'*, as a checklist or rating scale to assess students' work.

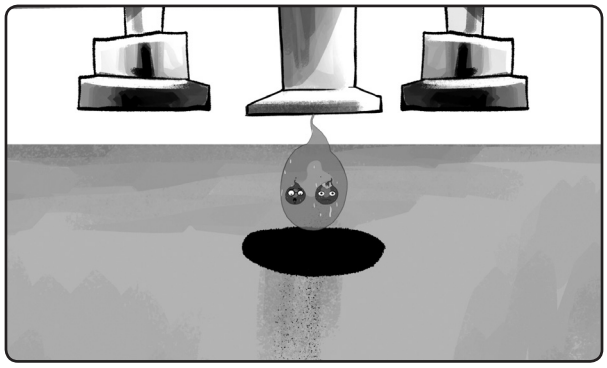
Alternately to criterion scale above, refer to BC Ministry of Education's Performance Standards for detailed criterion.

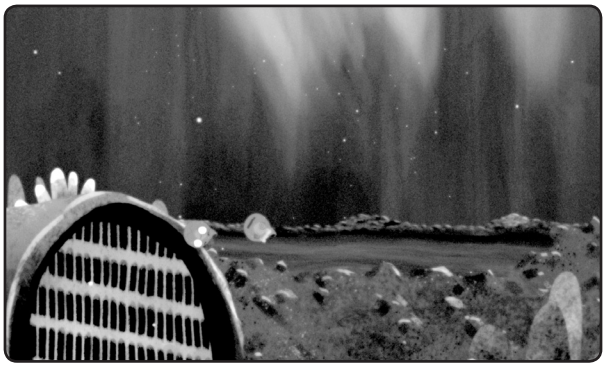
Video Reel

Put the images in the same order as the video.

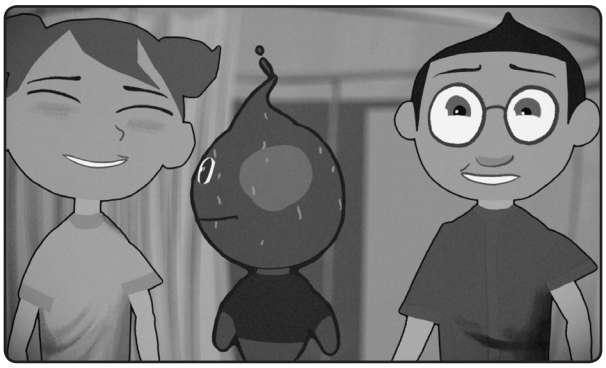






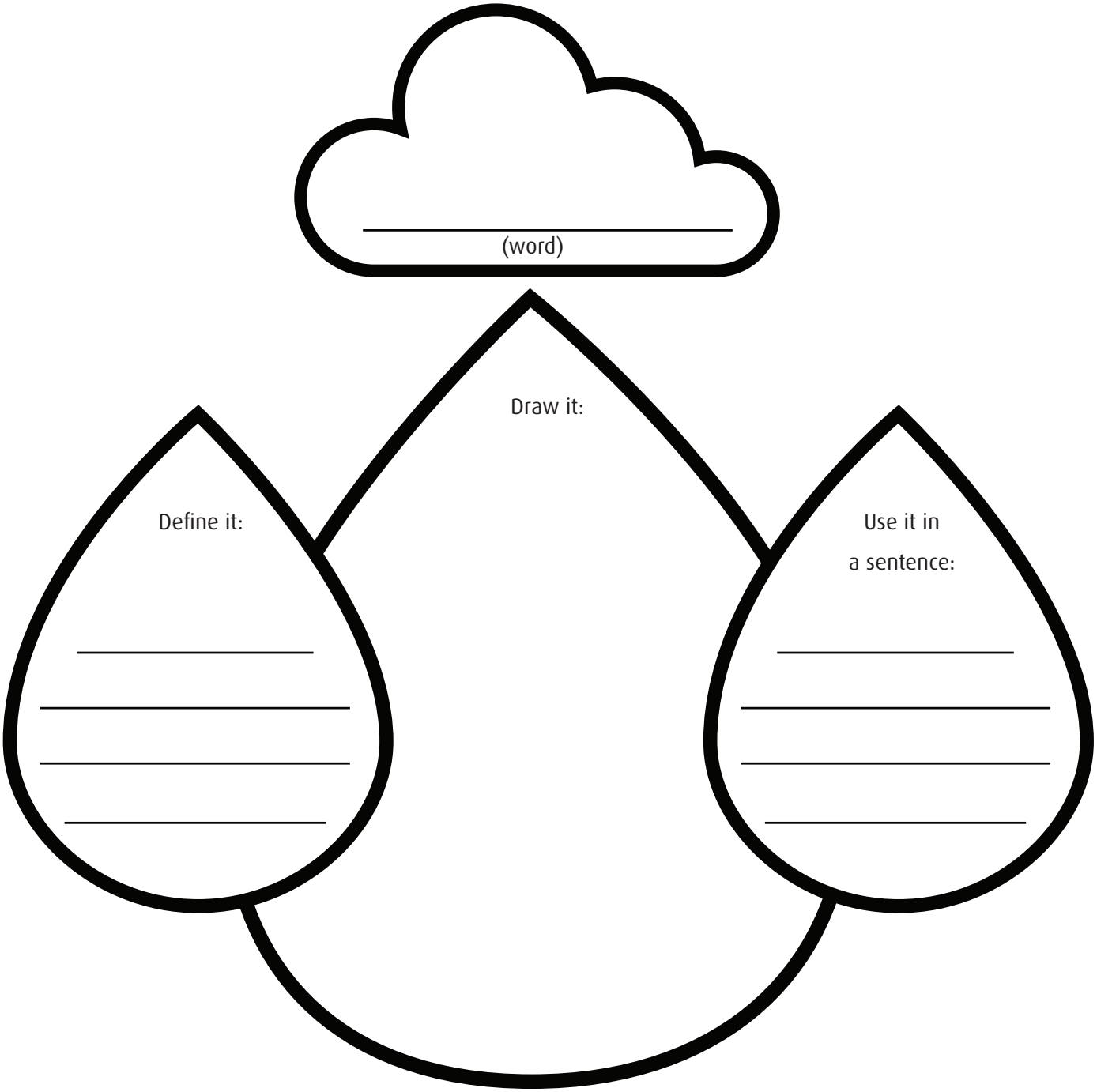


Video Reel



Water Word Map

Name: _____ Date: _____



Lesson 4

Dylan and Dana's Water Adventure

Learning Standards & Assessment

Time

Resources

Activities

Handouts

Video

CRD

every drop counts

Lesson 4:
Dylan and Dana's Water Adventure

Arts Education (Drama)

Big Ideas

- Creative expression develops our unique identity and voice.
- Dance, drama, music, and visual arts are each unique languages for creating and communicating

Content

- Elements in the arts:
  - Drama: character, time, place, plot, tension
- A variety of dramatic forms
- Personal and collective responsibility associated with creating, experiencing, or sharing in a safe learning environment

60-120 minutes

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.

Purpose

In this lesson, students use drama to explore the characters, relationships, and dialogues presented in the video story, *Down the Drain and Back Again*.

Preparation

- This lesson involves a repeat viewing of the video, *Down the Drain and Back Again*, to remind students of the story; however, if you are conducting this lesson immediately after Lesson 2 or 3, you may choose to eliminate this step (procedure 2).
- Create overhead transparencies using the student handout, Characters. Alternatively, create charts on the board or chart paper using the six character names (see procedure step 3).
- Photocopy:
  - Student handout Characters (1/student; if making puppets- 2/student)
  - Student handout - Dylan and Dana's Water Adventure
  - Assessment tool - Dylan and Dana's Water Adventure
  - Assessment tool - Self Assessment

Procedure

Warm-Up Activity

1. Begin by writing the word 'Adventure' on the board or overhead. Ask students to take a few moments to think about this word and what it means to them. Have them share their responses with a partner.
2. Invite students to share their responses, and create a class brainstorming web to record their responses.

Teacher Resources

- Assessment Tool: Dylan and Dana's Water Adventure

Student Resources

- Handout: Characters
- Handout: Character Masks (optional)
- Assessment Tool: Self-Assessment

Lesson Resources

- KWL chart (begun in Lesson 1)
- Computer and projector or TV and video player
- Video: *Down the Drain and Back Again*
- *Frog Girl*, by Paul Owen Lewis
- Crayons, colouring pencils
- Sticks or pencils for making puppets (6/student)

Video - Down the Drain and Back Again

1. Screen the video. Ask students questions such as the following:
   - Is this an adventure?
   - Where does this story take place?
   - Who are the characters in this story?
2. Distribute the student handout, "Characters". Read each character's name, one at a time, and ask students to say what they know about this character. What does this character do during the story? What does this character think and feel? Record their responses on the overhead transparencies or chart paper. Students should use their handouts to record their own notes about each character.

Skits

1. Divide the class into small groups of 3-5. Assign one scene from the video to each group, or have groups select their favourite scenes. Suggested scenes and characters include:
   - Sprinkle, Dana, and Dylan: in the bathroom at the beginning wasting and polluting water
   - Dylan (as water drop), Dana (as water drop), and the other water drops (for larger groups of students, additional characters could include the people seen wasting water): looking down on Victoria, seeing water being wasted and polluted and seeing water being used wisely.
   - Dylan (as water drop), Dana (as water drop), and the other water drops: falling into Rithet Creek and floating into the Sooke Lake Reservoir, the Intake Tower and through the disinfection plant.
   - Sprinkle, Dana, and Dylan: back in the bathroom at the end, with Dana and Dylan telling Sprinkle what they have learned
2. Explain to students that they should work in their groups to create a short drama (e.g., 2-3 minutes) based on their assigned scene. Students may choose to present their scene as a puppet show (using the pictures from the handout "Characters", coloured, cut out, and attached to sticks), a role play, a mime, an oral retelling, etc. (or, you may assign this yourself). Advise students that they should use the video as a starting point for their story, but they can adapt the characters and the story as they wish to tell their own story.
3. Discuss with students the criteria that will be used to assess their work (suggested criteria are outlined in the Assessment Tool, Dylan and Dana's Water Adventure).

4. Provide time for students to prepare their dramas. Facilitate group work as required. Use the video script (Appendix C) to offer suggested dialogue if students need assistance. Offer additional prompts such as:
   - What kind of story is your drama?
   - What is your character thinking?
   - What is your character feeling?
   - What happens at the beginning of this story? In the middle? At the end?
5. Have groups present their dramas to the rest of the class. Allow time for brief discussion at the end of each presentation before continuing to the next one.

Assessment Opportunity

- Observe students as they work in their groups to prepare their dramas.
- Use the Assessment Tool, Dylan and Dana's Water Adventure, to assess students' work in relation to both their preparatory work and their completed presentations.
- Distribute the Self-Assessment handout, to each student. Read as a class, ensuring students understand the assessment questions. Have them place their completed assessments in their Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

Arts Education (Drama)

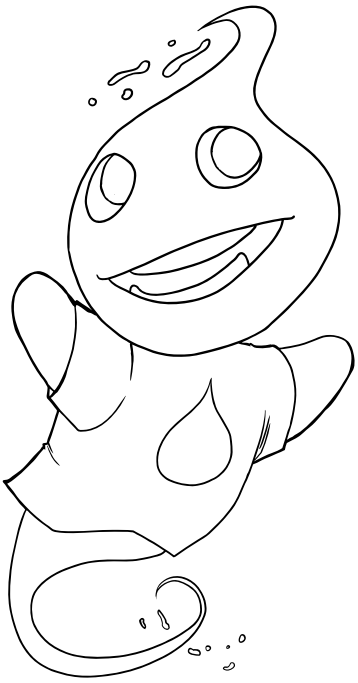
- Exploring and creating
  - Explore elements, processes, materials, movements, technologies, tools, and techniques of the arts
  - Create artistic works collaboratively and as an individual using ideas inspired by imagination, inquiry, experimentation, and purposeful play
- Reasoning and reflecting
  - Develop processes and technical skills in a variety of art forms to refine artistic abilities

Extensions and Adaptations

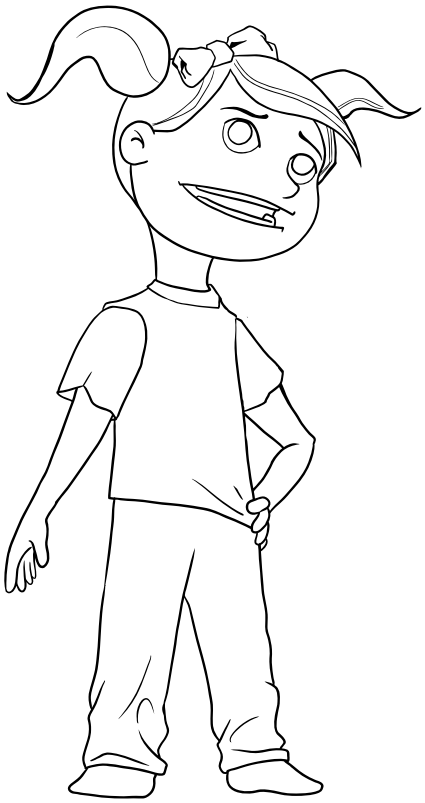
- To address learning a variety of dramatic forms, have students mime scenes involving the characters while you read aloud sections from the script (Appendix C) or create a tableau of their favorite scence.
- Photocopy 'Character Masks' and attach rubber bands so students can embody their characters.
- You may also wish to use the instrumental version of the song, Drip, Drip, Drop to help inspire students' movements.

Characters

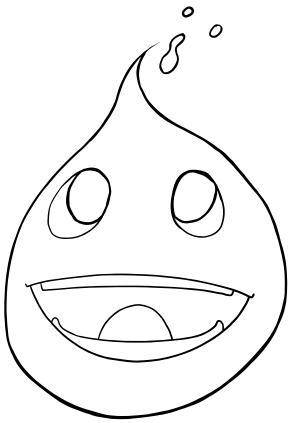
Dylan



Sprinkle



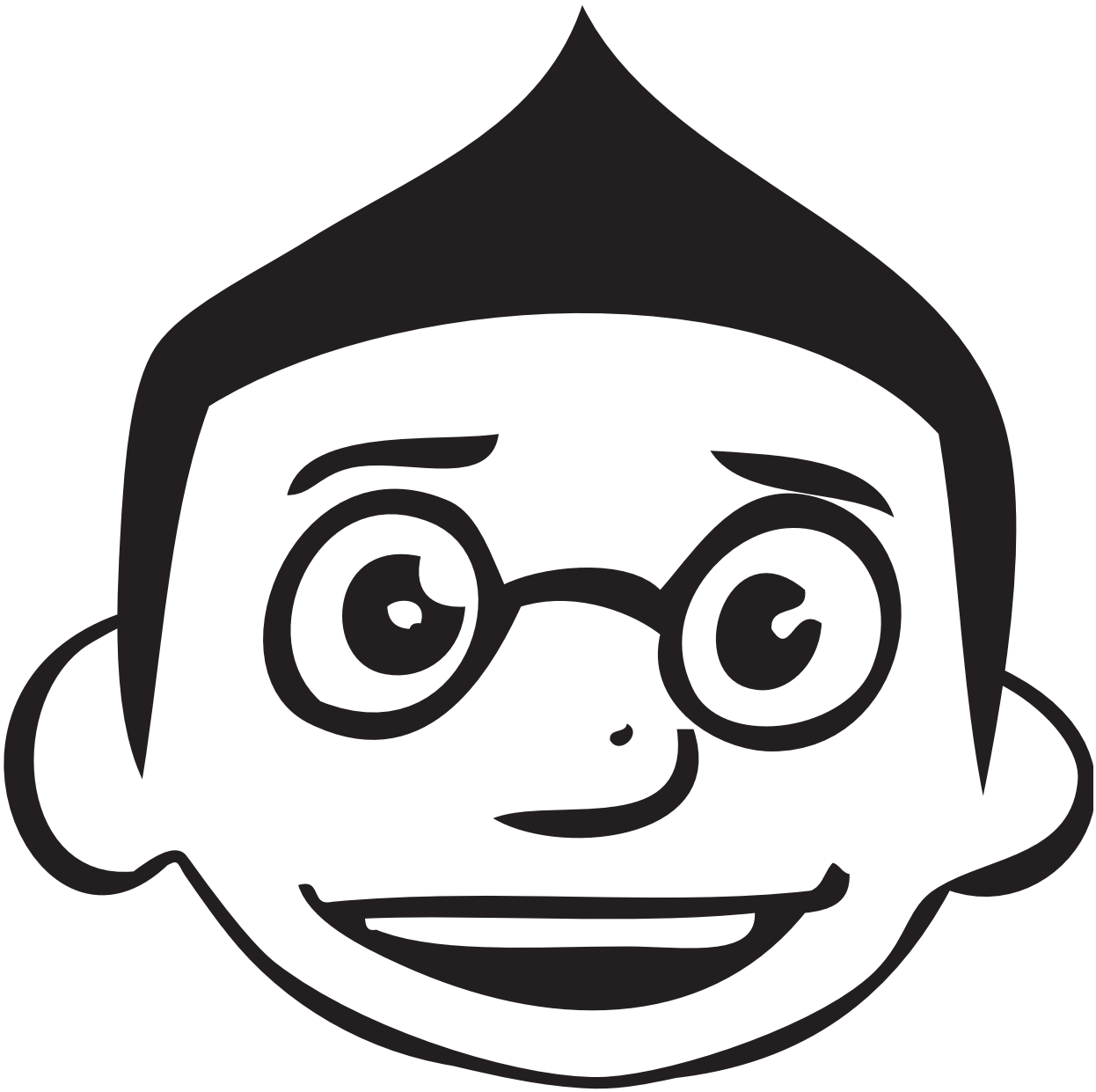
Dana



Other Water Drops

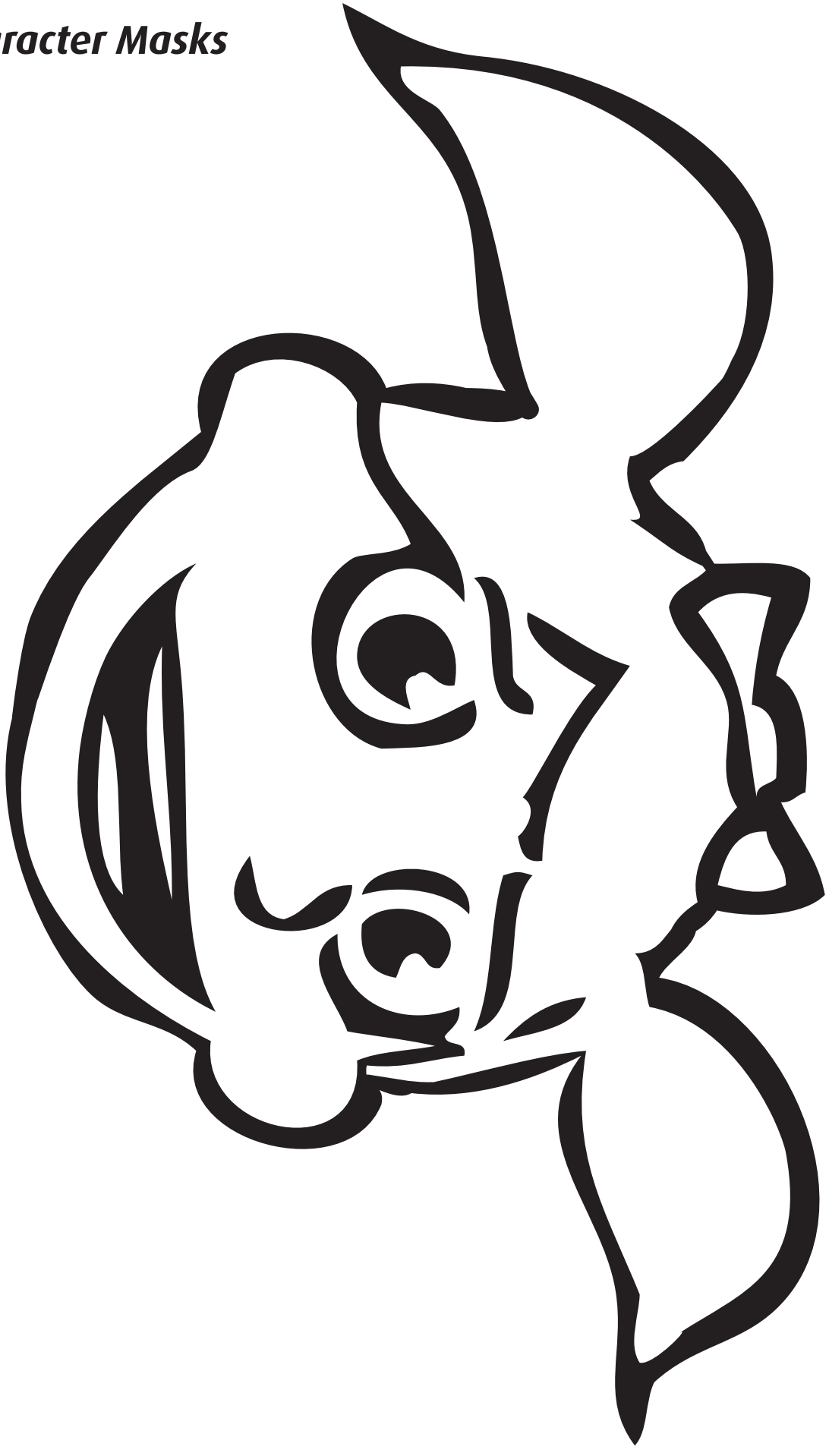
Character Masks

Dylan



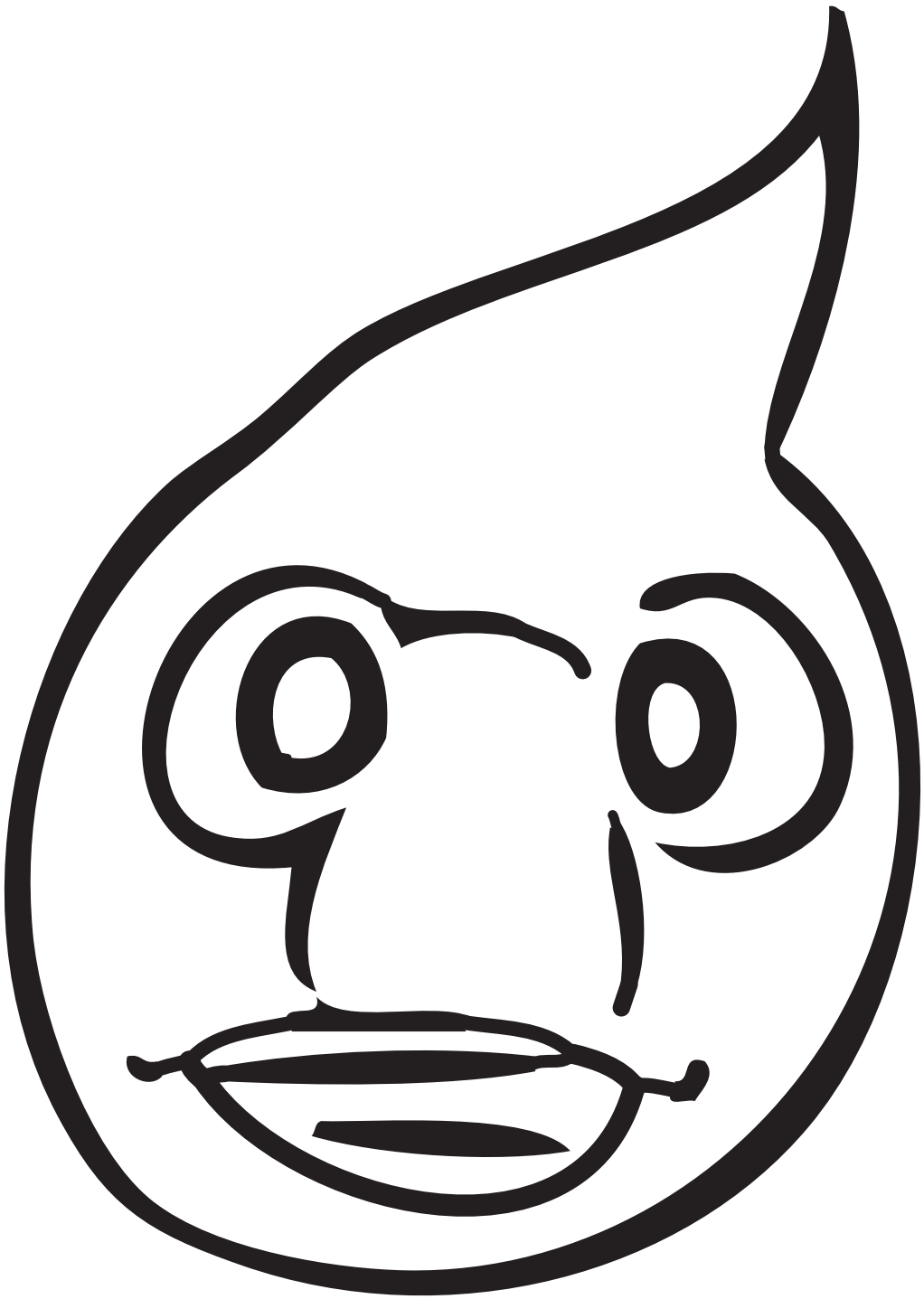
Character Masks

Dana



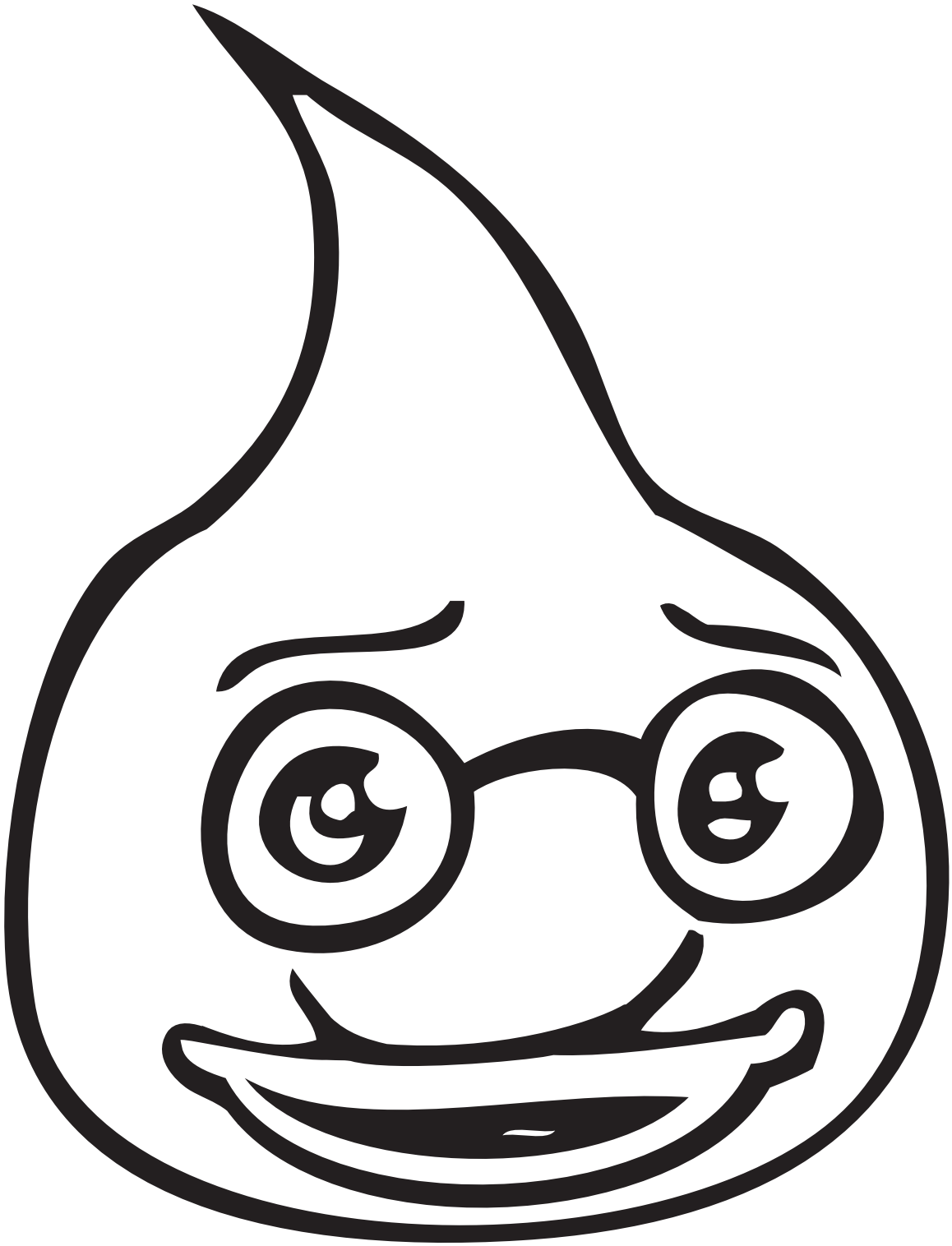
Character Masks

Sprinkle



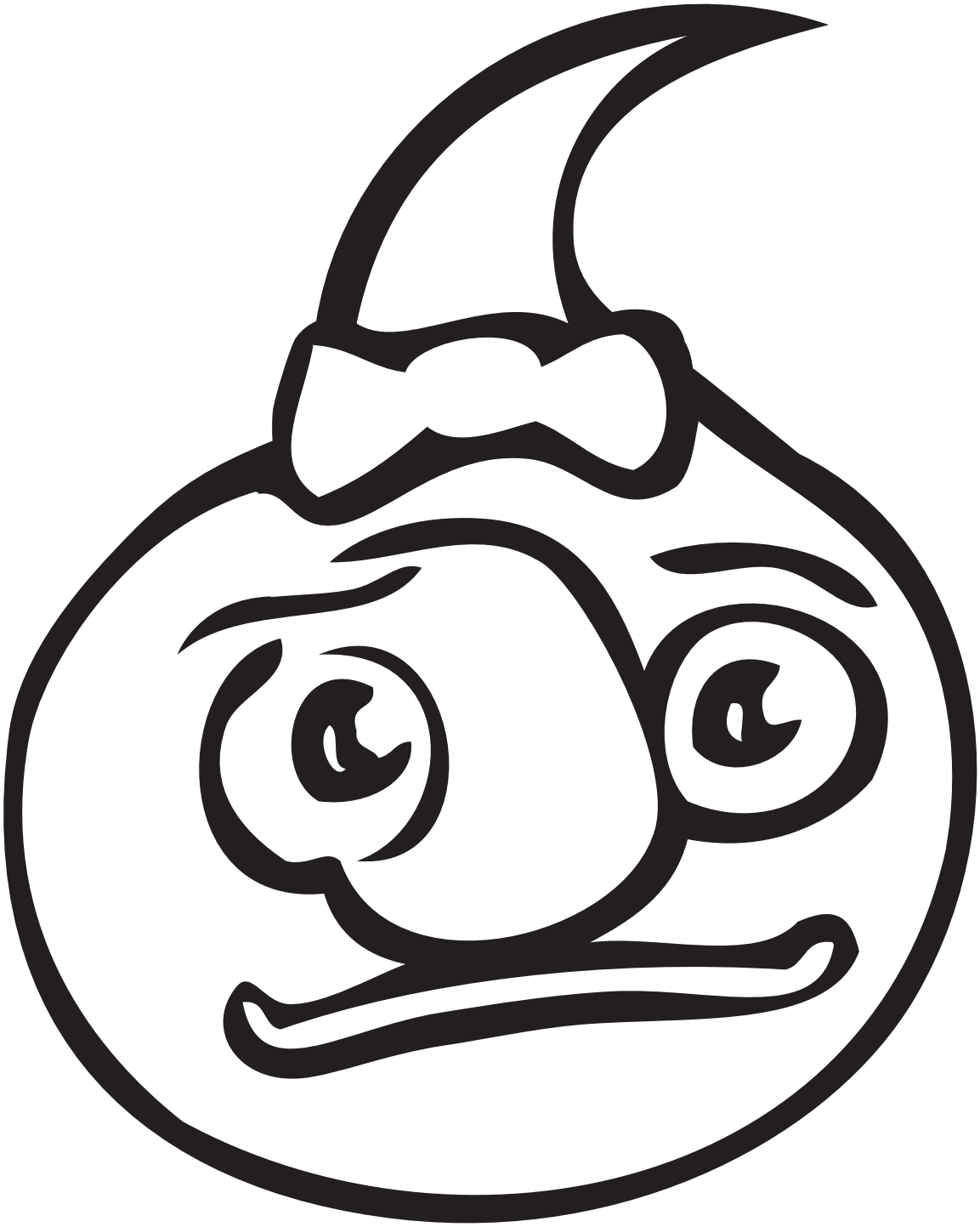
Character Masks

Dylan as Water Drop



Character Masks

Dana as Water Drop



Self-Assessment

Name: _____ Date: _____

Names of others in my group:

_____ _____

_____ _____

_____ _____

_____ _____

Criteria	Yes	Sometimes	No
I shared ideas with my group.			
I asked questions and listened to my group.			
Everyone in our group contributed.			
Our group worked well together.			
Our drama told a story.			
Our drama had a beginning, middle, and end.			
I used my voice to show feelings.			

My character was feeling and thinking about:

I am proud of:

I could do better next time by:

Self-Assessment

Name: _____ Date: _____

Names of others in my group:

_____ _____

_____ _____

_____ _____

_____ _____

Criteria	Yes	Sometimes	No

My character was feeling and thinking about:

I am proud of:

I could do better next time by:

Dylan and Dana's Water Adventure

Student Names	Learning Standards: Arts (Drama)					
	Share ideas	Demonstrate cooperative effort	Use voice to express a range of ideas and feelings	Use movement and their bodies to express a range of ideas and feelings	Demonstrate ability to present drama work	Participate safely in drama environments

Scale: 1= emerging 2= developing 3=proficient 4=extending

Lesson 5

Introduction – Water We Talking About?

Learning Standards & Assessment

Time

Resources

Activities

Handouts

Video

Lesson 5a:

Introduction – Water We Talking About?

Purpose

This is the first of seven lessons exploring the physical properties of water. This brief lesson introduces students to the topic. Subsequent lessons are:

- Lesson 5b: Forms of Water
  - Part One: Liquid and Solid
  - Part Two: Vapour
- Lesson 5c: Water Actions
  - Part One: Evaporation and Condensation
  - Part Two: Precipitation
- Lesson 5d: Water Cycle

Note: this series of lessons requires particular planning and scheduling to allow for set up and observation time of experiments.

Preparation

- Photocopy student handout What is Water (1/student) blank or lined.

Procedure

1. Begin with a brainstorming session on the question "What is water?" Record student responses on the board.
2. Guide their responses until they have identified words such as liquid, solid, ice, snow, fog, and cloud. Point out that these words describe the states or properties of water. All of these things equal water, just in different forms.
3. Identify some of the outstanding questions in the KWL chart under the Wonder column. Explain to students that over the next little while they will be engaging in a variety of experiments to help them answer these and other questions.
4. Distribute the student handout, "What Is Water?" Have students use this handout to write or draw about something they thought about during the discussion of "What is Water."
5. Have students add their completed handouts to their Water Portfolios.

Science

Big Ideas

- Materials can be changed through physical and chemical processes.
- Water is essential to all living things, and it cycles through the environment.

Content

- The water cycle
- Physical ways of changing materials

30-45 minutes

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.

Teacher Resources

- Assessment Tool: "What is Water"

Student Resources

- Handout: "What is Water" (1/student)

Lesson Resources

- KWL chart (begun in Lesson 1)

Assessment Opportunity

Use the assessment tool, "What Is Water?", to note students' abilities to make observations, form conclusions, and record details. Use this same assessment tool for lessons 5a through 5d.

Curricular Competencies

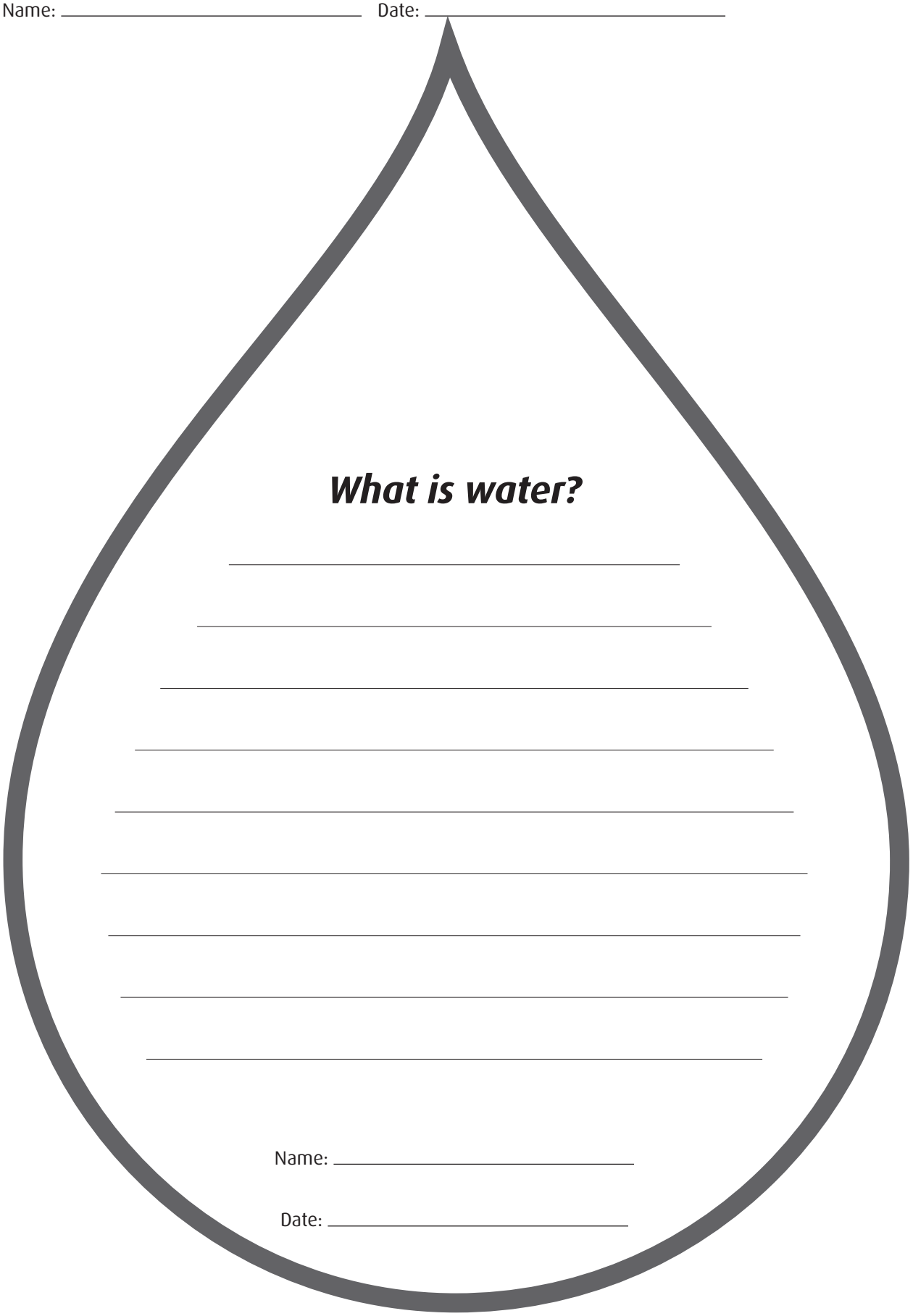
Look for evidence that students are able to:

Science

- Questioning and predicting
  - Make simple predictions about familiar objects and events
- Processing and Analyzing
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

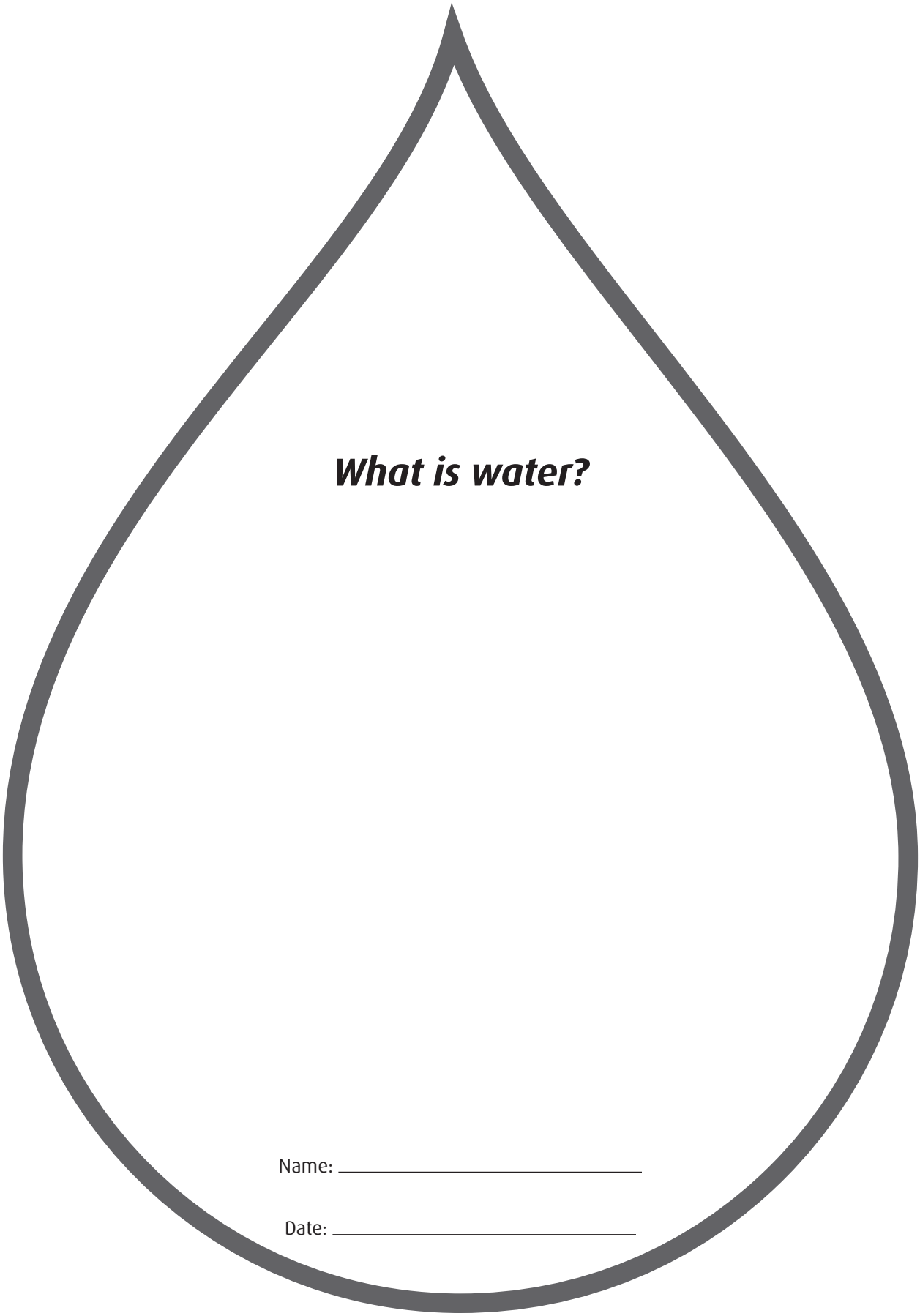
What Is Water?

Name: _____ Date: _____



What Is Water?

Name: _____ Date: _____



Assessment Tool: What Is Water?

	Questioning			Procedures and Evidence		Analysis		Commu-nicate
Student Names	Makes and records observations about objects and events in familiar contexts	Uses observations and curiosity to form their own questions	Makes predictions based on their observations	Safely uses materials to test their predictions	Gathers and organizes simple data	Sorts and classifies data and identifies simple patterns	Uses simple data to establish a relationship between their predictions and results	Communicates observations and ideas reflecting personal experience of place

LESSONS 5A-5D Date: ____________________________

Notes:

		Meets
		Exceeds
		In Progress

Lesson 5b:

Forms of Water: Solid, Liquid and Vapour

Science

Big Ideas

- Materials can be changed through physical and chemical processes.
- Water is essential to all living things, and it cycles through the environment.

Content

- The water cycle
- Physical ways of changing materials

50-75 minutes
Part 1: 30-45 minutes
Part 2: 20-30 minutes

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Purpose

As part of the exploration of the physical properties of water, this lesson furthers student learning about the concept of the three states of matter (liquid, solid, and gas). The following experiments can be taught together or separately (Solid and Liquid Experiment; Water Vapour Experiment).

Note that some of the procedures in this lesson use teacher demonstration rather than group experiments for safety reasons (e.g., activities requiring hot or boiling water).

Preparation

You may wish to enlist the help of parent volunteers or older students in the school to help facilitate group experimentation work.

- Photocopy either Liquid and Solid Water OR Liquid, Solid Water and Vapour graphic organizer (1/student)

Procedure

PART A: SOLID AND LIQUID WATER

Warm Up- Magic Trick

Turn water into ice instantly.

1. Before you start, place a sponge in the bottom of a mug and place some ice cubes on top. Prepare a glass of water.
2. Pour some water into the cup, give it a swirl and turn upside down, making sure to empty the cup towards yourself, as not to expose the sponge.
3. Tadaaa- you have successfully turned water into ice. Demonstration video here: **www.youtube.com/watch?v=dq93nAVSRnk&feature=related**

Transition: Tell students that this lesson will be all about these two forms of water.

Teacher Resources

- Assessment Tool: *What is Water?* (provided with Lesson 5a)
- Assessment Tool:'Solid, Liquid and Vapour: Answer Key' Demonstration video, search *Cloud in a bottle* online**s**

Student Resources

- Handout options of:
  - Solid and Liquid Water OR
  - Solid, Liquid and Vapour Water (1/student)
  - My Conclucions
- Water Portfolio
- Optional- Water Word Map

Lesson Resources

- KWL chart
- Part A Magic Trick
  - Cup, sponge, glass of water and ice cube(s)
- Part A Experiments (1/group)
  - glass of water
  - same sized glass of ice cubes
  - two small bowls
  - Optional- piece of string (1/student/group) and salt (1/2 tsp in individual pots or share a shaker among class)
- Part B Demonstration (teacher only)
  - Two litre plastic bottle with lid and a bit of water in the bottom
  - Match or splint
- Part B Experiments
  - Spoon (1/student)
  - Kettle (teacher only)
  - Flashlight (teacher only)

Assessment Opportunity

Throughout the following activities, use the assessment tool, **What Is Water** (provided with Lesson 5a), to note students' abilities to make observations, form conclusions, and record details.

Experiment - Ice and glass of water (Solid/liquid)

1. Distribute the student handout, **Solid and Liquid Water Venn Diagram and Comparison** OR **Solid, Liquid and Vapour Water Comparison and Venn Diagram**. Explain that students will use this to record their observations during the experiment.
2. Distribute a glass of water and a glass of ice to each group.
3. Discuss, post or handout the instructions. Ask students to observe and discuss how these items are the same and how they are different. To prompt discussion, ask questions such as:
   - How do they look the same? Different?
   - How do they feel the same? Different?
   - Which is liquid?
   - Which is solid?
   - How does a liquid become a solid?
   - How does a solid become a liquid?
   - What will happen if you leave the ice out in a warm room?
   - What will happen if you put the glass of water in the freezer?
4. Have students pour the glass of water into one of the small dishes, and the ice cubes into the other dish. What do they notice? What happens to the shape of the water? What happens to the shape of the ice cubes? Can they use this information to help them define solid and liquid?
5. Ask students to brainstorm as many forms of solid water as they can, and as many forms of liquid water as they can. For example:
   - liquid: tap water, river, creek, ocean, lake, pond, marsh
   - solid: ice cubes, ice on a pond, glacier, iceberg, snow, hail, frost, skating rink
6. As a class, read the student handout questions **My Conclusions**. Have students complete and place in their Water Portfolios.
7. Optional- have students complete Word Maps for the words Solid and Liquid.

Experiment - Lift an ice cube without touching it (optional)

1. As students complete their handouts, challenge them to pick up an ice cube from their previous experiment without touching the ice or its container.
2. Provide them with a piece of string and some salt.
3. Discuss solution- Place the piece of string across one side of the ice cube. Sprinkle some salt on top of the string and ice cube. Wait 1-2 minutes. Gently lift the string.
4. What happened? The salt melted some of the ice into liquid water. Then the liquid water refroze forming ice on top of the string, holding it in place.
   www.youtube.com/watch?v=u9slVq87czg&feature=relmfu
   www.stevespanglerscience.com/experiment/ice-cube-rope-sick-science

KWL Know-Wonder-Learn (KWL) Chart

As a class, revise the class KWL chart - answer questions, add new details and questions.

NOTE: If wanting to separate this lesson into two components, stop here and continue Water Vapour another day.

PART B: WATER VAPOUR

Warm Up - Picture this.

1. Talk students through a visualization exercise in which they imagine a cloud. You are in class. Everyone is busy cleaning up finished experiments. You put the last pencil away when you hear the recess bell ring. Do you need your coat to go outside and play today? You look out the window. In the sky you see a cloud. What colour is the cloud? Grey, white, pink, blue purple. Describe the cloud they imagined to a partner.
   - Alternately, display a picture of an interestingly shaped cloud. What do they see? What do they think it is made of?

Demonstration- Cloud in a Bottle (Vapour)

1. To illustrate the third form of water, water vapour, create a cloud in a plastic bottle.
2. Present the closed 2 L bottle with a bit of water inside; and squeeze it a few times.
3. Light a match or splint, blow it out and hold over the bottle nozzle and squeeze a few times, pulling the smoke into the bottle.
4. Seal the lid, shake the bottle and squeeze it. This represents the high pressure that forms clouds. A cloud will form inside the bottle as water molecules condense on the smoke particles.
5. Ask students if they recall what happened to Dylan and Dana when they became water vapour and joined the cloud in the video the *Down the Drain and Back Again*. (optional - can replay this section of the video).

   Demonstration video, search Cloud in a bottle, to find a video like:
   https://www.youtube.com/watch?v=cXpuo3YHOn0
   www.youtube.com/watch?v=E8AvfXar9zs

Discourage students from attempting to replicate the activity themselves.

Transition: Explain that clouds are made of water vapour, the third form of water. Distribute student handout Vapour or have students continue to complete their Liquid, Solid Water and Vapour handouts.

Experiment- Breath (Vapour)

1. Distribute a spoon to each student. Ask them to breathe gently on the back of the spoon. Have them record their observations on their handout.
2. Where did this water come from? We give off water vapour every time we breathe out. On a cold day when they can see their breath, what they are seeing is actually water vapour condensing as it hits the cold air turning into tiny water droplets.

While students are engaged in this activity, prepare the next experiment.

Experiment- Kettle (Vapour)

1. Draw students' attention to your demonstration area.
2. Bring water to a boil until it is steaming. Darken the room and shine a flashlight on the steam to help students see it.
3. Ask students:
   - Is this water?
   - What form of water is it?
   - Where did it come from?
   - What are other examples of water vapour? Examples include clouds, fog, mist, steam from hot springs, steam from a shower, etc.
4. Read through the handouts for Part B: Solid, Liquid and Vapour Water with students for comprehension, then ask students to complete and add the handout to their Water Portfolios.
5. Optional- have students complete Word Maps for the word vapour.

Assessment Opportunity

Review students' completed handouts **My Conclusions**; **Part A: Solid and Liquid Water Venn Diagram**; **Part A: Solid and Liquid Water Comparison**; **Part B: Solid, Liquid and Vapour Water: Venn Diagram**; **Part B: Solid, Liquid and Vapour Water Comparison** collected in the Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Demonstrate curiosity and a sense of wonder about the world
  - Observe objects and events in familiar context
  - Ask questions about familiar objects and events
  - Make simple predictions about familiar objects and events
- Planning and conducting
  - Make and record observations
  - Safely manipulate materials to test ideas and predictions
- Processing and Analyzing
  - Compare observations with predictions through discussion
  - Identify simple patterns and connections

- Evaluating
  - Compare observations with those of others
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

Extensions and Adaptations

- Breakdown the Venn Diagram steps or create visual separation of ideas using the Comparison charts student handout.
- Adapt Experiment Instructions: Solid and Liquid questions to increase or decrease difficulty. Include temperature measurement and discussion of Fahrenheit and Celsius.
- Adjust reading requirement increasing or decreasing written instruction, supporting with verbal and visual demonstration.
- Extend the concept of solid, liquid, and gas for all matter by creating a game that requires students to categorize common objects - either the objects themselves or pictures of them (e.g., books, juice, the air we breathe). Students can categorize the objects by placing them in labelled boxes, or by labelling items in the classroom with removable sticky notes.
- On a cold day, take students outside to discover the water vapour from their breath. Explain to students that we give off water vapour every time we breathe out. On a cold day when they can see their breath, what they are seeing is actually water vapour condensing as it hits the cold air turning into tiny water droplets.

Online Resources

Online Game

- Water we doing- a conveyor belt bring objects that need water in one of three states. The player uses the up arrow to boil water, the down arrow to cool it and freeze it, and the space bar to release the water to water plants, steam rice or freeze ice for a glass of juice.
  pbskids.org/fetch/games/water/game.html

Experiment

- Does water expand or contract as it cools? Fill one cup with water and lightly cover the top with tin foil. Repeat with an empty cup. Place both in the freezer. After 24 hours, carefully open the freezer and observe the foil lids. The lid on the water filled cup will have moved. Water expanded. Can also be completed with a plastic bottle- feel the difference in air pressure of the bottle before and after freezing. Connect this to why we turn off our outdoor water pipes in the winter - Bursting water pipes science video demonstration and explanation
  www.youtube.com/watch?v=HFMJp2xaKCk

Videos

- Flash frozen or super cooled water. Freezes when disturbed, shaken or poured on to a cold surface. Experiment by High School Students
  www.youtube.com/watch?v=Fot3m7kyLn4&feature=related
- Anecdotal report and demonstration by Ontarian.
  www.youtube.com/watch?v=047-QOWRTrk
- Hot water freezes faster. Mr. Herbert- a science teacher, explains and demonstrates why hot water freezes faster than cold water in freezing weather.
  www.youtube.com/watch?v=xOVZV6DxaRs

Experiment Instructions

PART A: SOLID AND LIQUID WATER

The Experiment

Feel and look at the water in the glass.

Feel and look at the ice cube.

Write and Draw

- How do they **feel** the same? Different?
- How do they **look** the same? Different?
- Which one is a **liquid**?
- Which one is a **solid**?
- What are they **made of**?

Talk About & Write and Draw

- How does a **liquid** become a **solid**?
- How does a **solid** become a **liquid**?
- What will happen if you leave the ice out **in a warm room**?
- What will happen if you put the glass of water **in the freezer**?
- What else is **made of ice**?
- What else is **made of liquid water**?

PART B : WATER VAPOUR

Write and Draw

- Ask the teacher, how does it **feel**?
- How does it **look**?
- What is it **made of**?
- What **form** of water is it?
- How is it the **same or different** to a solid or liquid?

Talk About & Write and Draw

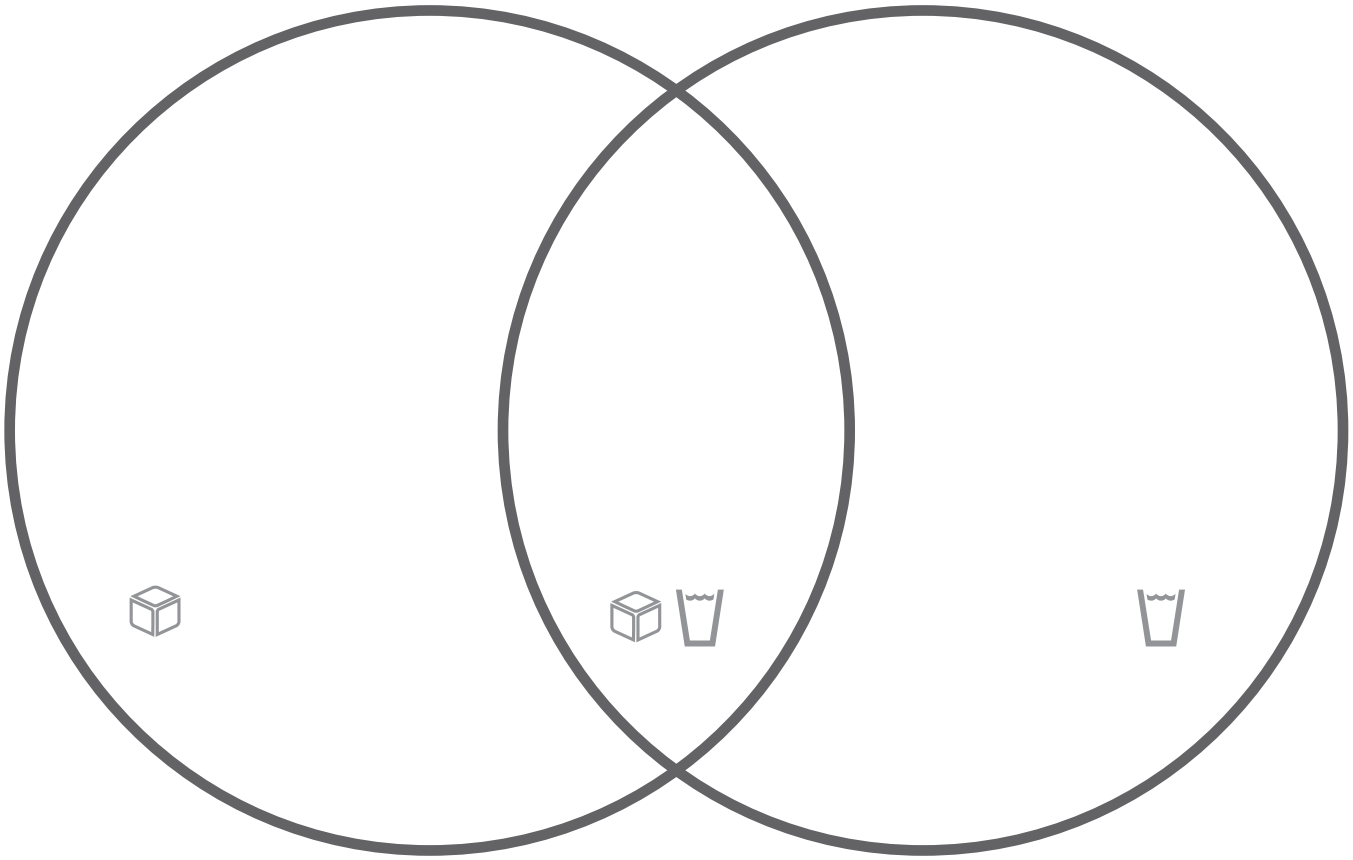
- How does a **liquid** become **vapour**?
- What will happen if you leave the touches a **cold surface**?
- What else is **made of vapour**

Part A: Solid and Liquid Water VENN DIAGRAM

Name: _____ Date: _____

My Observations

See ***Hear*** ***Feel***



Part A: Solid and Liquid Water COMPARISON

Name: _____ Date: _____

My Observations: 

See *Hear* *Feel*

1. ***Look, listen, feel.***
2. ***Write or draw what you see, hear and feel.***
3. ***Are any observations the same? Draw a line between them.***

Ice cube	Glass of water

My Conclusions

1. ***An ice cube is a _____.***
   (solid or liquid)

2. ***When I drink a glass of water, it is _____.***
   (solid or liquid)

3. ***When I pour a liquid into a bowl, the shape _____.***
   (stays the same, changes)

4. ***If an ice cube is left in a warm room, it will _____.***
   (melt, freeze)

5. ***If a glass of water is left in a very cold place, the water will _____.***
   (melt, freeze)

6. ***Examples of liquid water are:***

- _____
- _____
- _____

7. ***Examples of solid or frozen water are:***

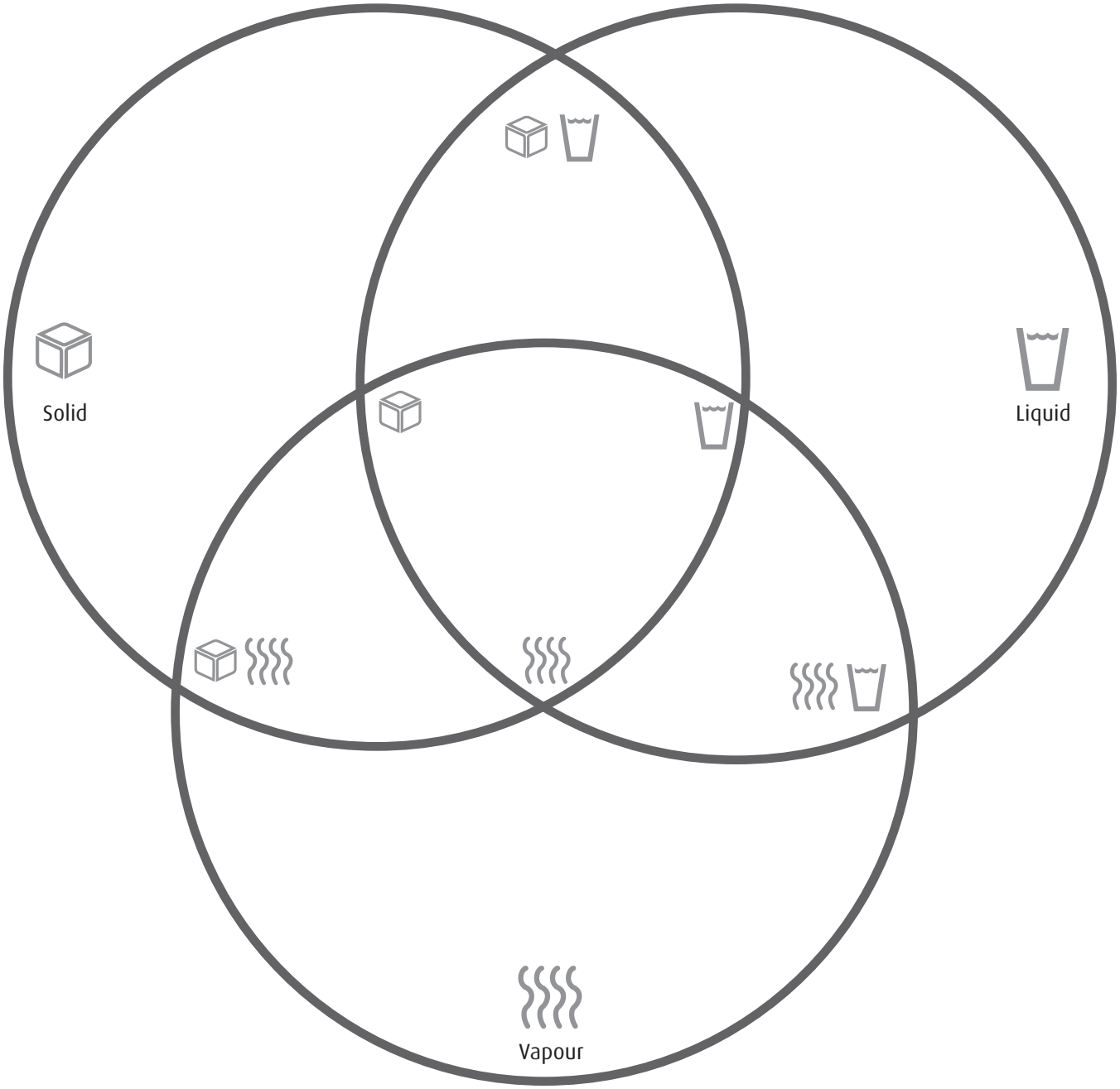
- _____
- _____
- _____

Part B: Solid, Liquid and Vapour Water: VENN DIAGRAM

Name: _____ Date: _____

My Observations

See *Hear* *Feel*



Part B: Solid, Liquid and Vapour Water COMPARISON

Name: _____ Date: _____

My Observations:

See *Hear* *Feel*

PART A- SOLID AND LIQUID

Ice cube	Glass of water

Part B- VAPOUR

Ice cube

My Conclusions

1. **An ice cube is a** _____.
   (solid or liquid)

2. **When I drink a glass of water, it is** _____.
   (solid or liquid)

3. **When I pour a liquid into a bowl, the shape** _____.
   (stays the same, changes)

4. **If an ice cube is left in a warm room, it will** _____.
   (melt, freeze)

5. **If a glass of water is left in a very cold place, the water will** _____.
   (melt, freeze)

6. **If liquid water is heated, it becomes** _____.
   (melt, freeze)

7. **Examples of liquid water are :**

- _____
- _____
- _____

8. **Examples of solid or frozen water are:**

- _____
- _____
- _____

9. **Examples of water vapour are:**

- _____
- _____
- _____

Part A and Part B - Answer Key

My Observations

Answers could include:

Ice cube

- Solid
- Very cold
- Not see through (opaque)
- Objects stay on the surface
- Melts in at room temperature (over 0˚ Celsius)
- Made of water

Glass of water

- Hot, cold, warm
- Clear
- Objects go into the water
- Liquid
- Made of water

Vapour

- Very hot
- Goes around objects
- Evaporates (over 100˚C)
- Made of water
- Gas

Same (ice cube and glass of water)

- Made of water

Same (ice cube, glass of water, vapour)

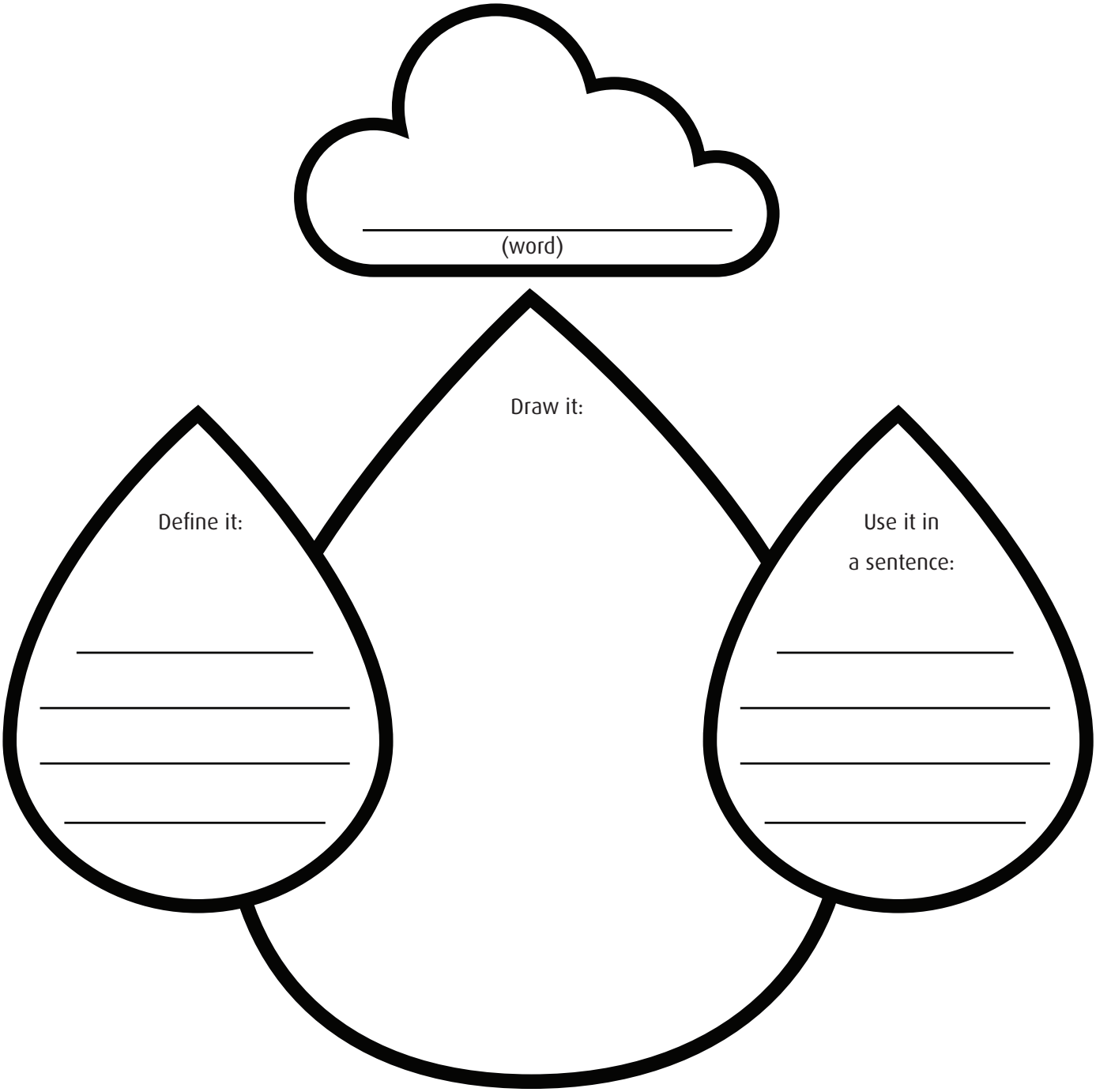
- Made of water

My Conclusions

1. An ice cube is a **solid**.
2. When I drink a glass of water, it is **liquid**.
3. When I pour a liquid into a bowl, the shape **changes**.
4. If an ice cube is left in a warm room, it will **melt**.
5. If a glass of water is left in a very cold place, the water will **freeze**.
6. If liquid water is heated, it becomes **vapour**.
7. Examples of liquid water are : **Rain, lake, river, tears, glass of water**
8. Examples of solid or frozen water are: **Snow, hail, icicle, ice cube**
9. Examples of water vapour are: **Breath, cloud, steam from shower**

Water Word Map

Name: _____ Date: _____



Lesson 5c:

Water Actions: Evaporation, Condensation and Precipitation

Science

Big Ideas

- Materials can be changed through physical and chemical processes.
- Water is essential to all living things, and it cycles through the environment.

Content

- The water cycle
- Physical ways of changing materials

Arts Education (Music)

Big Ideas

- Dance, drama, music, and visual arts are each unique languages for creating an communicating.

Content

- Elements in the arts
  - Music: beat/pulse, duration, rhythm, tempo, pitch, timbre, dynamics, form, texture
- Symbolism as a means of expressing specific meaning
- Personal and collective responsibility associated with creating, experiencing, or sharing in a safe learning environment

60-75 minutes, spread over approximately 5 days for observation purposes

As part of the exploration of the properties of water, this lesson builds on student knowledge of water states focusing on the processes that allow water to move from liquid to gas and vice versa. Instruction and activities may be separated into two parts and days.

NOTE: An evaporation experiment in Part 2 is designed to be conducted over 5 consecutive days; if you choose to use a different methodology, the corresponding student handout will also have to be modified.

Preparation

1. (optional) Chill the spoons (1/student). Spoons should be as cold as possible. If you don't have easy access to a refrigerator, use a cooler to keep them cold.
2. Photocopy student handout 'Water Changes' (1/student).
3. Prepare ice.
4. On each cup, affix a piece of masking tape vertically from rim to the bottom (for measuring level of water).

Procedure

PART A: Evaporation and Condensation

Video- Down the Drain and Back Again

1. Explain that there are names for the changes water goes through. In the video *Down the Drain and Back Again*, Dylan and Dana learned these words on their water adventure.
2. Tell students to listen for two words-
   - **Evaporate** - the change from liquid water (ocean) to water vapour (floating up to the sky)
   - **Condense** - the change from water vapour (floating up to the sky) to water droplets (in the cloud).
3. Replay the portion of the video where Dylan and Dana turned into vapour and join a cloud.
4. Discuss the terms and/or create Word Maps for 'evaporation' and 'condensation'.

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.

Teacher Resources

- Assessment Tool: 'What is Water?' (provided with Lesson 5a)
- Assessment Tool: Answer Key'Water Actions'
- Sounds of a Rainstorm

Student Resources

- Handout 'Water Actions' (1/student)

Lesson Resources

- Water Portfolio
- KWL chart
- Video, *'Down the Drain and Back Again'* (optional)
- Condensation Experiments 1 and 2
  - metal spoon, chilled in refrigerator (1/student)
  - clear cups of ice water (1/group)
- Evaporation Experiment 3
  - clear cups of water (1/group)
  - masking tape and felt marker
- Precipitation Experiment 4 (teacher only)
  - Kettle
  - Plate

Experiment 1 - Cold Spoon (Condensation)

1. Remind students of the spoon experiment from lesson 5b or repeat the experiment with chilled spoons.
2. Distribute the "Water Changes" handout. Have students draw what they see and discuss as a class- What happens? Can they see water droplets on the spoon? This is called CONDENSATION – when water vapour changes into liquid water.

Experiment 2 - Cup of Ice Water (Condensation)

1. Distribute a clear cup of ice water to each student or group. Have students observe the cup and record any changes on their "Water Changes" handout.
2. Discuss - What do they see? Is the cup leaking? Where is the water coming from? What is the name of this change? *This is another example of condensation. If the room is warm enough, water vapour in the air will condense on the side of the cold cup, forming little droplets of water.*

Visualization - Dew (Condensation)

1. Ask students to close their eyes (if they feel comfortable doing so), and imagine the following scenario: *You go outside early in the morning. It's a beautiful day, and it hasn't rained for days, but still the ground is damp. There's water on all the grass, the flowers, cars, patio furniture, and everything else.*
2. Discuss- Where did this water come from? What this form of water called? What is the name of this change? *Water vapour in the air condenses at night when it's cool, and becomes the dew that we find in the early morning. It is another example of condensation.*

Transition- Ask students if they can think of another time that condensation occurs? E.g. after they take a hot shower, or when they breathe on a cold window.

Conclusion One

Is there a pattern? How are the water drops made from water vapour? Together draw a picture to show the steps to condensation. Have students add this to their handouts.
Water vapour — cold — condensation — tiny water drops (cloud)

Experiment 3 - Cup of Water (Evaporation)

1. Have students remove any ice from their cups of ice water and mark the level of the water with a felt pen, then place their cup on a sunny windowsill or near a source of heat.

2. Distribute the student handout, "Evaporation". Have them observe the water over 5 days, recording the level each time.
3. Discuss the results: What happened to the water? Why? Did the water go down faster some days? Why? Compare with another group, did the water go down the same? Why or why not?

Demonstration - Kettle (Evaporation)

1. Draw students' attention to your demonstration area.
2. Bring water to a boil until it is steaming. Darken the room and shine a flashlight on the steam to help students see it.

NOTE: If wanting to separate this lesson into two components, stop here and continue "Water Changes- Precipitation" another day. Save the cups of water.

PART B: PRECIPITATION AND RUN OFF

Warm Up- Sounds of a Rainstorm

1. Tell students that you are going to give them a clue about the next change in water, but you need their help to make it work. Without speaking, just listening, have them follow your lead through the stages on the "Sounds of a Rainstorm" teacher resource.
2. What is the clue? Rain.

Experiment 4 - Kettle and Plate (Precipitation)

1. Boil a kettle of water. Hold a metal tray or plate over the steam (be careful of the hot steam). The water vapour will condense into water drops. Eventually, these will fall—precipitation. Note: can put ice on top of the plate to speed up condensation.
2. Discuss what happened and compare kettle with water evaporating from a lake forming a cloud and raining. All types of water falling to Earth—rain, snow, or hail—is 'precipitation.'

Have students complete their handout "Water Changes".
vapour — cool — condensation — liquid or solid — precipitation

Word Map

1. Have students create a word map for "Precipitation".

Assessment Opportunity

Use the assessment tool provided with Lesson 5a to note students' abilities to make observations, form conclusions, and record details.

Have students add their completed handouts to their Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Demonstrate curiosity and a sense of wonder about the world
  - Observe objects and events in familiar context
  - Make simple predictions about familiar objects and events

- Planning and conducting
  - Make and record observations
  - Safely manipulate materials to test ideas and predictions
  - Make and record simple measurements using informal or non-standard methods
- Processing and Analyzing
  - Compare observations with predictions through discussion
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

Arts Education

- Exploring and creating
  - Explore elements, processes, material, movements, technologies, tools, and techniques of the arts
  - Create artistic works collaboratively and as an individual using ideas inspired by imagination, inquiry, experimentation, and purposeful play

Extensions and Adaptations

- **Cups of water** - cover the tops of the cups, or use sealable containers (note condensation and precipitation could take a few hours)
- **Water Art** - On a sunny day, have students "paint" with water on the pavement outside. Ask them to predict how long it will take for the water to evaporate.
- **The Great Water Odyssey** - online game. 'Help Hydro form water molecules to make a cloud and then make it rain. This game takes eye/hand coordination and speed to intercept the water molecules and form a cloud before the sun evaporates the molecules. This game is based on the water cycle and is a fun way to reinforce the concepts of evaporation, condensation and precipitation.' by Floridaswater.com **www.sjrwmd.com/odyssey/flash/cloudGame.swf**

Curricular Integration

Mathematics

- Have students chart the temperature throughout the experiment. At the end of the experiment, have students measure the amount of water left in the cup. Have them fill to the next mark and measure again. Repeat until they have charted measurements for each day.
- Have students use a rain gauge to measure the amount of precipitation over a period of time. Students can create a chart of the results. Challenge them with simple arithmetic problems based on this data.

Water Actions

Name: _____ Date: _____

Experiment 1: Breath on a cold spoon.

Draw what you see.

Experiment 2: Cup of ice water

Draw what you see.

1. ***How does water vapour change into tiny liquid water drops? Write or draw the steps.***

2. ***This is called _____.***

Name: _____ Date: _____

Experiment 3: Cup of water

1. How full is your cup?

Draw a line each day to show how much water is in the cup..

2. What was the weather like?

Day				
1				
2				
3				
4				
5				

3. How much water is in the cup?

Day	Amount of water
1	
2	
3	
4	
5	

4. Where did the water go?

_____

5. How does liquid water turn into water vapour? Draw or write the steps.

6. This is called _____.

7. How much water is left?

8. How much water is gone?

Name: _____ Date: _____

Experiment 4: Kettle and Plate

Draw what you see.

1. How does water vapour change into raindrops, hail or snow? Draw or write the steps.

2. When raindrops, hail or snow fall to the Earth, this is called _____.

Water Actions - Answer Key

Part A Experiments 1 and 2 (Condensation)

1. How does water vapour become water drops? Write or draw the steps.
   Water vapour — cold — condensation — tiny water drops
2. This is called *condensation*

Part B Experiment 3 (Evaporation)

3. Where did the water go? *into the air*
4. How does liquid water turn into water vapour? Draw or write the steps.
   Liquid water — heat — evaporation — water vapour (steam)
5. This is called *evaporation.*

Experiment 4 (Precipitation)

1. How does water vapour change into raindrops, hail or snow? Draw or write the steps.
   water vapour — cold — condensation — liquid or solid — precipitation
2. When raindrops, hail or snow fall to the Earth, this is called *precipitation*.

Sounds of a Rainstorm

To imitate the sounds of a rainstorm from beginning to end:

1. Silence. (sun shining, clouds forming)
2. Rub hands together (rain in the distance)
3. Keeping palms together, lightly clap fingers together (pitter-patter rain)
4. Snap fingers (raindrops are becoming larger)
5. Clap hands together (large raindrops)
6. Slap desktops (rain is really coming down now)
7. REVERSE
8. Clap hands together (rain is passing)
9. Snap fingers (raindrops are further away)
10. Keeping palms together, lightly clap fingers together (further still)
11. Rub hands together (rain in the distance, and stopping)
12. Silence.
13. Palms still together, raise hands over head (sun shining)
14. Slowly drop arms to sides.

See it in action at 0:00-0:55
www.youtube.com/watch?v=qHsvG3VQ_PU

Lesson 5d:
Water Cycle

Arts Education (Music)

Big Ideas

- Dance, drama, music, and visual arts are each unique languages for creating an communicating.

Content

- Elements in the arts
  - Music: beat/pulse, duration, rhythm, tempo, pitch, timbre, dynamics, form, texture
- Symbolism as a means of expressing specific meaning
- Personal and collective responsibiltiy associated with creating, experiencing, or sharing in a safe learning environment

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.

Content

- The water cycle

30-45 minutes

Purpose

As part of the exploration of the physical properties of water, this lesson applies and summarizes knowledge of the states of matter (liquid, solid, and gas) and processes (evaporation, precipitation, condensation) through exploration of the water cycle.

Preparation

1. Bring in a bicycle (optional), or a picture of a familiar lifecycle.
2. Set up the audio equipment and the song *Drop, Drip, Drop*, and arrange the room so that students have space to move.
3. Photocopy "Water Cycle Song Lyrics" with or without gestures and a "Cycle" Word Map (one each per student or group).

Procedure

Warm up

1. If animal life cycles have already been studied, post a familiar cycle; alternately, turn a bicycle on its seat, or show a picture of a bicycle.
2. Lead a short discussion to determine what a bicycle is (e.g. what does bicycle mean? two cycles. What are the two bicycles? the wheels. What do they do? Go around and around. What other cycles do you know? seasons, moon, merry-go-round, rides at a fair etc.
3. If they don't guess, suggest water has a cycle too.

Water Cycle Song

1. Optional - watch a video of students performing the "Water Cycle Song."
2. Distribute and read the lyrics together. Stop after each line to confirm understanding and pick gestures to represent the water cycle processes. e.g. Water travels in a cycle, yes it does. What's a cycle? *An action or event that repeats- happens over and over again.* How can we show that with our hands/bodies? *Draw a circle in the air with one hand, spin slowly on the spot.*

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.

Teacher Resources

- Assessment Tool: "Water Cycle" Answer Key
- "Kooshball Questions"

Student Resources

- Word Map : cycle (1/student)
- "Water Cycle Song" (1/student)

Lesson Resources

- Bicycle - actual, picture OR a picture of familiar lifecycle
- Soft ball
- computer and projector (SmartBoard or PowerPoint activities)

Note : Runoff will be explored more in Lesson 6 . "Water runs off', a play on words with runoff- water that flows over land (creeks, streams, rivers, roads, fields, lakes...)

3. Lead students through singing and gesturing to the song.
4. Have students draw and/or label the water cycle on the bottom of the lyrics sheet and place in their Water Porfolio.

Word Map

1. Have students create a word map and place it in their Water Portfolios.

   Cycle- a series of events repeated in the same order

Review - SnowFlake Kooshball

1. Divide class into two or have the class compete against the teacher.
2. Students take turns throwing the ball at the board. Where the ball hits, indicates a question to be asked. Students may negotiate amongst themselves for the answer, but the person throwing will answer for the group. Use Smartboard or PowerPoint games or recreate the game on any board, number the snowflakes and ask the provided "KooshBall Questions".

Extensions and Adaptations

Music

- Variations
  - change tempo, timbre, pitch while singing e.g. 'goes up' higher pitch, 'comes down' lower pitch.
  - add instruments or sounds to represent the water cycle processes and the forms of water e.g. precipitation- tap fingers on the table for rain.
  - divide gestures- e.g. some students clasp hands overhead (sun) while the rest motion evaporation, some pretend to freeze while others snow.
  - Assign roles- divide class into three. Group one gestures evaporation, group two condensation, group three precipitation then run off to stand where group one is standing- the other groups move down. Continue until everyone has made a complete cycle.
- Create a music video, video recording, animation or slideshow (SmartBoard or PowerPoint). Share it at **www.crd.bc.ca/teacher**
- Performance- have students perform the water cycle song to parents, other classes or the community, or record and share your performance with us and other schools. To submit your video go to **www.crd.bc.ca/teacher**

Curricular Competencies

Look for evidence that students are able to:

Arts Education

- Exploring and creating
  - Explore elements, processes, material, movements, technologies, tools, and techniques of the arts
  - Create artistic works collaboratively and as an individual using ideas inspired by imagination, inquiry, experimentation, and purposeful play

Curricular Integration

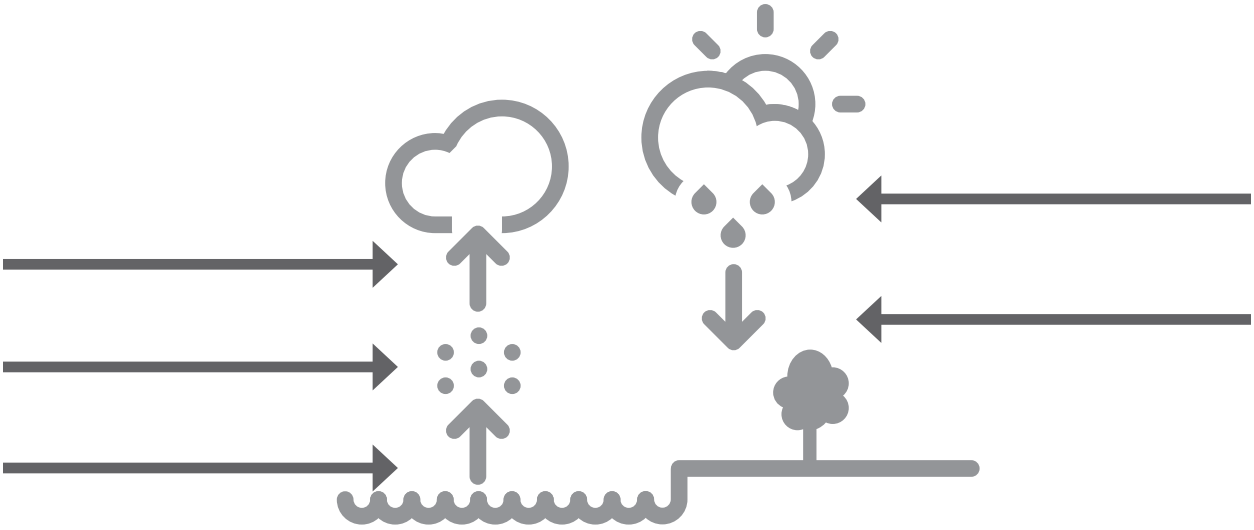
Science

- Water cycle in a jar. Either demonstrate or have students do it themselves- in small groups. In the following order, place in a jar or clam shell container: small rocks, sand, soil, a small bowl of water, and a plant, then cover with the lid. Place the container on a sunny windowsill. What happens? (evaporation) Put the jar in a cool place. What happens? (condensation) Can you see precipitation?
- Why is it colder on the top of a mountain than in the city? In this YouTube video, Bill Nye the Science Guy explains why it snows on the mountain but will rain in the city.
  www.youtube.com/watch?v=gGNxYtT_36I
- Other water songs
  - Listen at **http://havefunteaching.com/songs/science-songs/water-cycle-song/**
  - Listen at **http://havefunteaching.com/songs/science-songs/weather-song/**

Kooshball Questions

1. What is a cycle?
2. What is precipitation?
3. What is condensation?
4. What is evaporation?
5. What is an example of water vapour?
6. What is an example of liquid water?
7. What is an example of solid water?
8. When water freezes it becomes ...
9. When water boils it becomes...
10. When water vapour cools it ....
11. Is lake water fresh or salty?
12. Is ocean water fresh or salty?
13. What form of water is fog?
14. What form of water is hail?
15. What form of water is rain?
16. What form of water is snow?
17. Another word for snow, hail or rain falling from the sky is...
18. True or false- Water vapour can change shape.
19. True or False- Liquid water can change shape.
20. True or False- Solid water can change shape.

The Watercycle



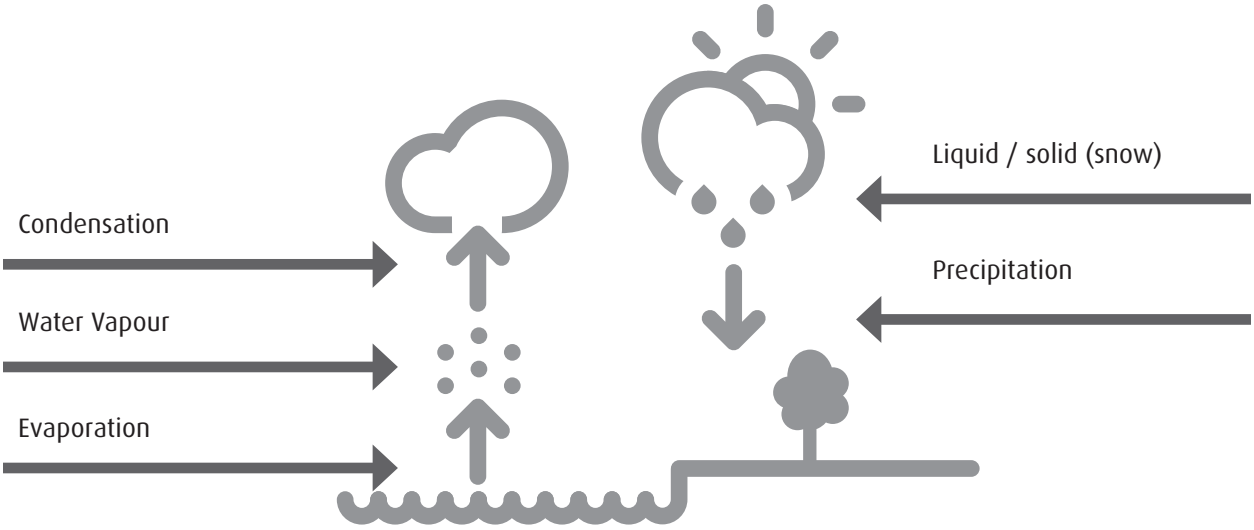
Forms (water)

- Liquid
- Solid
- Vapour

Changes (arrows)

- Evaporation
- Condensation
- Precipitation

The Watercycle - Answer Key



Forms (water)

- Liquid
- Solid
- Vapour

Changes (arrows)

- Evaporation
- Condensation
- Precipitation

Water Cycle Song (with gestures)

Sing-a-long to "She'll be Coming Round the Mountain"

Name: _____ Date: _____

Water travels in a cycle

spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

standing, facing front again

Water travels in a cycle

spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

standing, facing front again

It goes up as evaporation,

making vertical wave motions with hands, raise them up overhead

And forms clouds as condensation,

and bring hands together to form a cloud

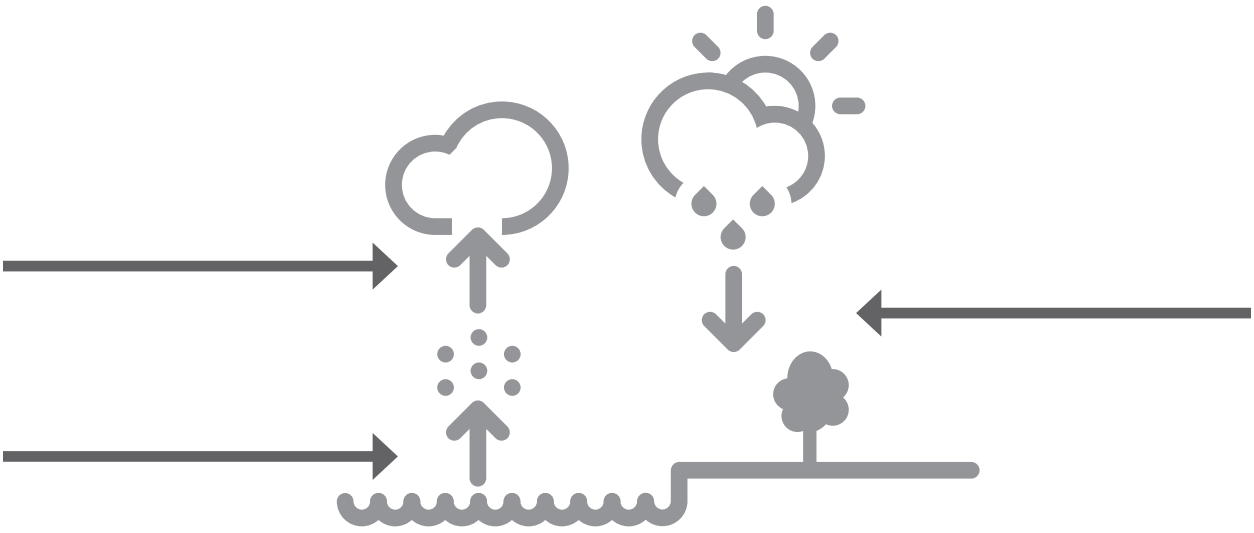
Then comes down as precipitation

separate hands and wiggle fingers as arms are lowered, crouching down to the ground

And runs off

Running on the spot

Label the water cycle: evaporation, condensation, precipitation



The Water Cycle

Water Cycle Song

Sing-a-long to "She'll be Coming Round the Mountain"

Name: _____ Date: _____

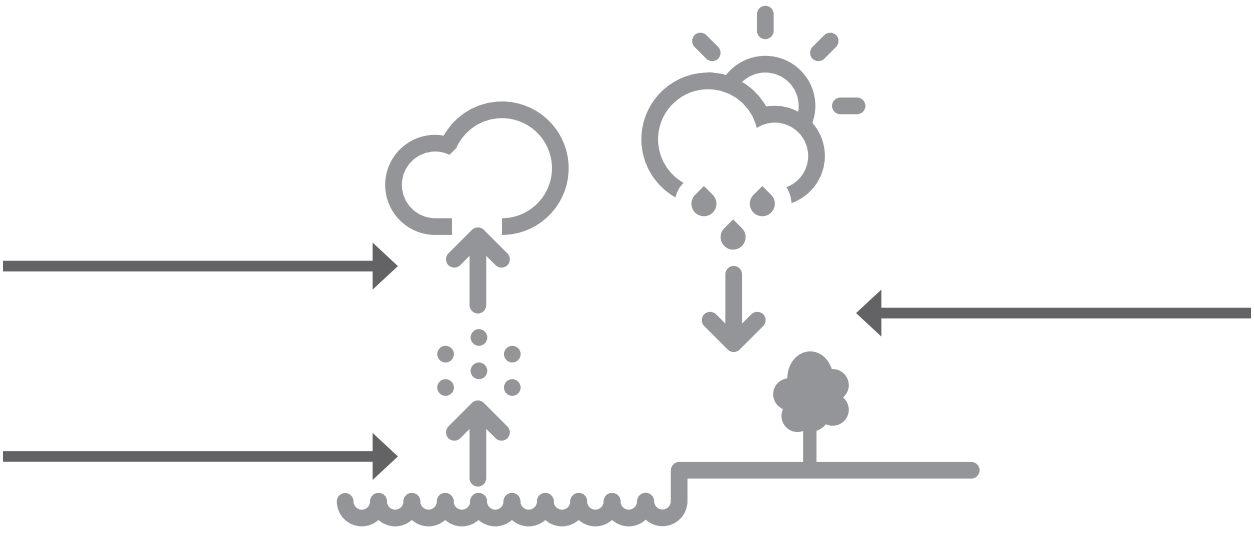
chorus
Water travels in a cycle
Yes it does
Uh huh
Water travels in a cycle
Yes it does
Uh huh

verse 1
It goes up as evaporation,
And forms clouds as condensation,
Then comes down as precipitation
And runs off

chorus
Water travels in a cycle
Yes it does
Uh huh
Water travels in a cycle
Yes it does
Uh huh

verse 2
It goes up as evaporation,
And forms clouds as condensation,
Then comes down as precipitation
And runs off

Label the water cycle: evaporation, condensation, precipitation



The Water Cycle

Water Cycle Song

Sing-a-long to "She'll be Coming Round the Mountain"

Name: _____ Date: _____

chorus
Water travels in a cycle
Yes it does
Uh huh
Water travels in a cycle
Yes it does
Uh huh

verse 1
It goes up as evaporation,
And forms clouds as condensation,
Then comes down as precipitation
And runs off

chorus
Water travels in a cycle
Yes it does
Uh huh
Water travels in a cycle
Yes it does
Uh huh

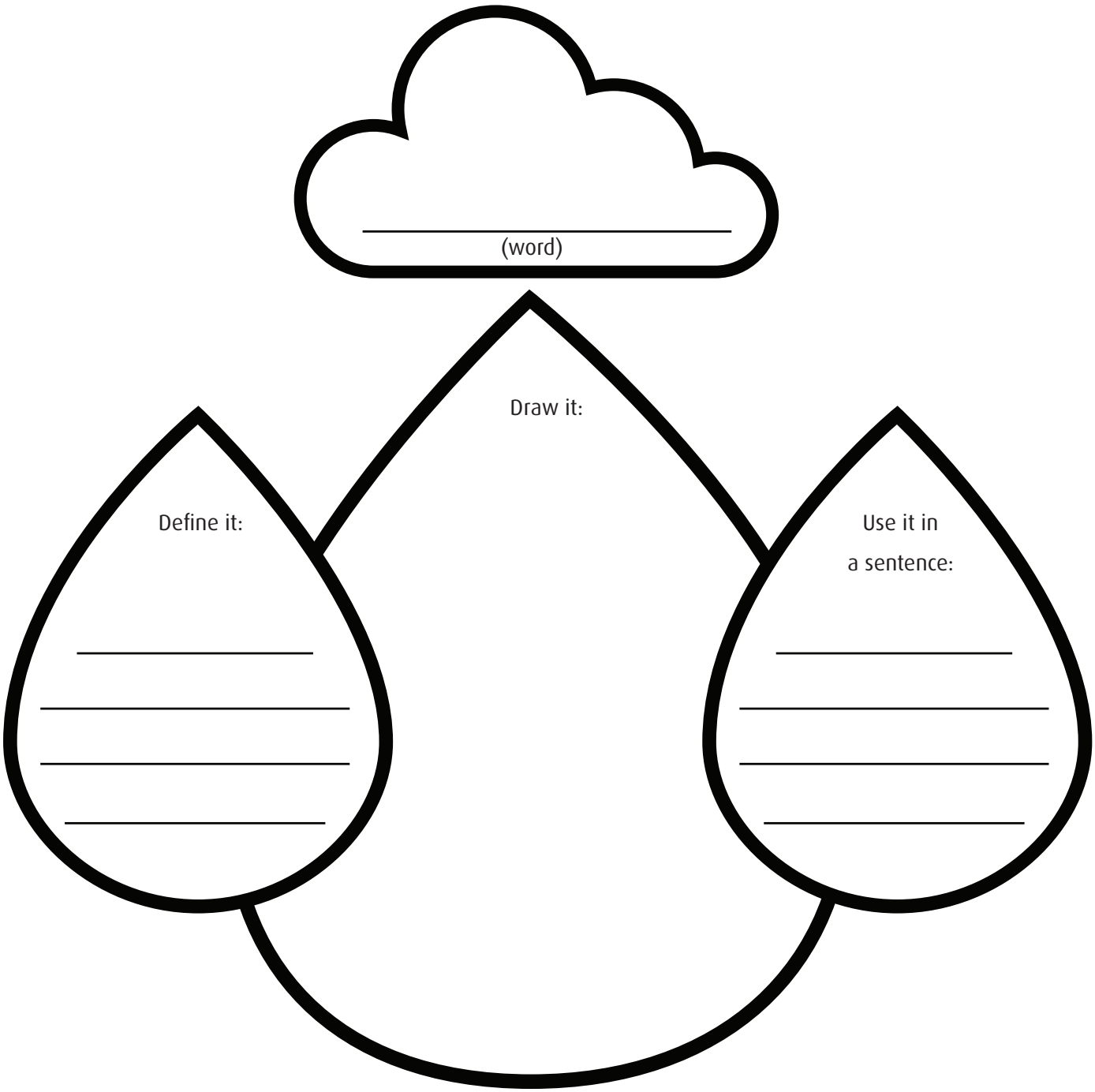
verse 2
It goes up as evaporation,
And forms clouds as condensation,
Then comes down as precipitation
And runs off

Draw and label the water cycle: evaporation, condensation, precipitation

The Water Cycle

Water Word Map

Name: _____ Date: _____



Lesson 6

Sooke Lake Watershed: Drinking Water Quality

Learning Standards & Assessment

Time

Resources

Activities

Handouts

Video

CRD

every drop counts

Lesson 6a :
Drinking Water Quality

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.
- Forces influence the motion of an object.

Content

- Water sources including local watersheds
- Water conservation
- The water cycle
- Types of forces

Social Studies

Big Ideas

- Local actions have global consequences, and global actions have local consequences.
- Individuals have rights and responsibilities as global citizens.

Content

- How people's needs and wants are met in communities
- Relationships between people and the environment in different communities
- Rights and responsibilities of individuals regionally and globally
- Roles and responsibilities of regional governments

Purpose

The Sooke Lake Watershed lessons provide an opportunity for student to learn about where our drinking water comes from, what makes it is safe to drink and how it is delivered to our taps. They will also learn how it compares to bottled water. Build on drinking water knowledge with extension activities which include well water.

In this lesson, students will explore how precipitation and runoff form a watershed and how erosion can affect water quality. The experiments may be conducted separately.

Build on drinking water knowledge with extension activities that tap into well water and bottled water.

Preparation

- Optional- lyrics to the "Water Cycle" song, diagram of the water cycle, *Down the Drain and Back Again* video
- Photocopy student handout 'Sooke Lake Watershed- How's it flowing?' (1/student or group)
- Prepare materials for experiments

Procedure

Warm up- Water cycle and our drinking water

1. (Optional) Have students sing the "Water Cycle" song.
2. Display or draw a picture of the water cycle and review that all water on Earth is part of the water cycle including our drinking water. (lesson 5d, The Water Cycle answer key)
3. Can students deduce where our drinking water fits into the water cycle based on what they have learned? Circle precipitation and runoff. Our drinking water is precipitation that falls to Earth and then, as runoff, flows over land in streams and creeks into the Sooke Lake Reservoir. (Optional -replay *Down the Drain and Back Again* video, Chapter 4)

Transition: Explain that students will be exploring this part of the water cycle more closely through a series of experiments.

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.

Teacher Resources

- Assessment Tool: "Sooke Lake Watershed: How is it flowing?"

Student Resources

- Handout: "Sooke Lake Watershed- How's it flowing?" (1/student or group)

Lesson Resources

- Capital Region Watersheds Map
- "Water Cycle Song Lyrics" (Opt.)
- "Water Cycle Diagram" (Less 5c)
- Video: *Down the Drain and Back Again*
- Water
- Towel or paper towel
- Pollutants (opt) - food colouring (chemicals- pesticides), molasses (oil, gas) crumbled cookie (animal droppings)
- Props (opt.)- toy car, toy boat, local animal toys

Exper. 1 - Erosion

- Paint tray OR a deep pan
- Soil
- Spray bottle or sport bottle of water (1-5)

Exper. 2 - Sink, Float

- Paint tray OR a deep pan (1/group)
- rocks, leaves, sticks, feathers (1/group)
- Water

Exper. 3 - Stopping Erosion

- Paint tray OR a deep pan (1/group)
- soil, rocks, sticks, moss, sponge (1/group)
- Spray or sport bottle of water

Exper. 4 - Pollution Solution

- water soluble markers (4 colours per group) per group)

Demonstration - Runoff and Watersheds

1. Ask students if they know the word "watershed"? Together breakdown the word into "water" and "shed" - the action of flowing in drops. (eg. shed tears) Explain that the circled area is like a "watershed"- an area of land where water under the land (groundwater) and "runoff" (rainfall and melted snow that flows over the land) flow into the same place such as a creek, stream, lake, river, or the ocean.
2. Pair students up or, if you have a document camera, have a student volunteer to help with a demonstration.
3. Have one partner cup their hands side by side. The other student will lightly spray water into their partner's hands - this is "precipitation". What happens? The water, called "runoff", flows through the creases in their hands (stream, creeks and rivers) and pools in their palms (lakes, reservoirs, oceans). Their hands, the area that drains the runoff into a body of water, are the "watershed".

Word Maps

1. Have students start Word Maps for "runoff" and "watershed".

Transition: One pair of hands is one watershed, but like our class that has many pairs of hands, the Earth has many watersheds.

Discussion - Watersheds in our Region

1. Display the "*CRD Watersheds Map*" outlining over 300 watersheds. Together identify watersheds of known locations, such as the school. Note: A watershed is usually named after the body of water where the runoff for the watershed collects.
2. Identify the Sooke Lake Watershed, and the Sooke Lake Reservoir within its boundaries-where our drinking water comes from. Invite students to take a closer look at runoff water in the Sooke Lake Watershed.

Experiment 1 -Erosion

1. Group students and distribute to each group: a tray with soil spread evenly, a spray bottle of water (or other container of water), the handout "Watershed: How's it flowing?"
2. Have students prop the tray up on one end and explain that the tray is a watershed and the bottom where the water collects is the lake (reservoir).
3. Have them complete the experiment and share their observations, e.g.:
   - that heavy rain can cause soil to flow into the "lake" - this is called "erosion"
   - that the soil causes the water to become "dirty" or "cloudy"
   - that if the water sits undisturbed, the soil will sink leaving clear water on top

NOTE: It can take 2 years for water to flow from the north end of Sooke Lake Reservoir to the intake tower at the south end. Eroded material settles to the bottom of the lake.

Experiment 2 - Sink, Float

1. Write the words "sink" and "float" on the board. Ask students if they know what these terms mean. Discuss as a class.
2. Have students conduct an experiment to explore which objects will sink and which will float: Distribute a leaf, stick, feather and a rock to each group, and one copy of the handout, "Sink or Float?", to each student.
3. Ask them to look at the objects, and make a prediction as to whether they will sink or float. Have them record their predictions on the handout, then try it out to see what happens. If needed, add more water to paint trays.

Note: The intake tower has gates at different heights. The reservoir water is tested and the gates in the clearest water level are opened (usually the lowest-it is the coolest water and less cloudy than the surface, which can be churned by weather)

Assessment Opportunity

Discuss students' conclusions as a class. Help students to see that the objects they tested that are heavier than water sank, while the objects that are lighter than water floated. Could erosion, sinking and floating effect our drinking water quality?

Experiment 3- Stopping Erosion

1. Provide students with rocks, clay, vegetation (moss or sponge to represent moss) or other materials to use to slow or divert water.
2. Have students share their observations e.g.:
   - that slowing down the flow of water helps reduce erosion
   - that placing rocks in the middle of the stream can cause erosion of soil elsewhere.
   - a layer of moss on top of the soil slows down erosion (absorbs the water, plant roots also hold soil in place)

Note: CRD staff maintain the drinking watershed and watch for and fight forest fires- the biggest concern for water quality since it removes vegetation, increases erosion and creates ash.

Experiment 4 – Other Watersheds – Pollution Solution

1. Have students draw a watershed on a piece of paper with the lake at the bottom of the paper or use a chalkboard, whiteboard or poster paper.
2. Post the paper on the wall. Optional - use a plastic table cloth or garbage bag to protect the wall and/or floor.
3. Use different colour water-soluble markers to draw possible pollutants in an unprotected watershed: a car, a boat, animal (e.g. feces), litter, fire (causes ash and erosion- tree and plant roots help hold soil in place).
4. Spray with water and watch as colours mix with runoff water flowing down the paper into the "lake" at the bottom of the page.

Note: Can conduct this experiment using paint trays and optional materials listed under lesson resources.

Discussion- Keeping it clean- What would you do?

1. Display the image of "Greater Victoria Drinking Water System" image OR in Google Maps, search "Sooke Lake" use Satellite or Earth view.
2. Encourage students to recognize that most water does not fall directly into the reservoir. Most of it flows in via streams or creeks, which feed run off and anything it picks up from the watershed (surrounding area) into the reservoir.
3. Tell students to imagine they have been asked to build a reservoir. Where would they build it? Why? How would they protect the drinking water in the watershed?
   - pick an isolated lake to be our reservoir (no houses, no factories or other industrial developments)

- limit access and activities in the watershed (guided public access only, no camping, no campfires, no hiking, no boating, no swimming)
- allow water time to settle

Assessment Opportunity

Have students add to their Word Maps and handouts to their Water Porfolios and revise the class Know, Wonder, Learned (KWL) chart.

Collect the students' handouts "Sooke Lake Watershed - How's it flowing? and "Sooke Lake Watershed: Pollution Solution".

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Demonstrate curiosity and a sense of wonder about the world
  - Observe objects and events in familiar context
  - Ask quesitons about familiar objects and events
  - Make simple predictions about familiar objects and events
- Planning and conducting
  - Make and record observations
  - Safely manipulate materials to test ideas and predictions
  - Make and record simple measurements using informal or non-standard methods
- Processing and Analyzing
  - Compare observations with predictions through discussion
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
  - Consider some environmental consequences of their actions
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play
  - Express and reflect on personal experiences of place

Social Studies

- Use Social Studies inquiry processes and skills to ask questions; gather, interpret, and analyze ideas; and communicate findings and decisions
- Explain why people, events, or places are significant to various individuals and groups (significance)
- Recognize causes and consequences of events, decisions, or developments (cause and consequence)

Extensions and Adaptations

- Alternative materials for the experiments:
  - Replace the tray with a transparency sheet or white plastic bag on an angled surface
  - Replace the materials and pollutants with water soluble markers
- Experiments may be performed as demonstrations by the teacher, or completed as jigsaw exercises in which students are separated into working groups (all like numbered students together) and reporting groups (students numbered e.g. 1, 2 and 3) Each working group has a different experiment and reports the findings to the reporting group.
- Have students draw a picture of a recreational lake and compare with a lake used as a reservoir.
- Challenge students to suggest additional objects to predict and test in the sink or float experiment.
- Collect water from a creek or stream in an unprotected watershed. Compare it to tap water from the protected Sooke Lake Reservoir. What differences do you see, feel and smell? NOTE: Do not taste or drink water from an unprotected source.

For more information about:

1. Our drinking water watershed protection
   https://www.crd.bc.ca/service/drinking-water/watershed-protection/greater-victoria-water-supply-area
2. General watershed information
   https://www.crd.bc.ca/education/our-environment/watersheds/watershed-basics
3. Meet Ollie the Otter, our local Watershed Warden who will take you on a learning adventure right in the middle of a watershed!
   https://www.youtube.com/playlist?list=PLQHNA9wdaAUHd1AP7mtCYXxXtO5VEWdy
   https://www.crd.bc.ca/education/school-programs/for-k12-teachers/educator-guides-resources/watersheds

Sooke Lake Watershed – How's It Flowing?

Name: _____ Date: _____

Experiment 1 - Erosion.

Draw and write what you see.

	My Observations
Pour Water Lightly 	When I poured the water slowly...
Pour Water Heavily 	When I poured the water quickly...

My conclusion: Does the amount of water make a difference? What happens to the "lake" water?

_____

_____

Experiment 2- Sink or Float.

Make a prediction. Will each object sink or float?

Object	I predict it will...		I saw it...	
	Sink	Float	Sink	Float

Experiment 3- Stopping Erosion

Pour water lightly.

What did you do to slow down erosion? Draw it.

We used...

My observations:

My conclusion:

Pour water heavily.

What did you do to slow down erosion? Draw it.

We used...

My observations:

My conclusion:

Name: _____ Date: _____

Experiment 4- Other Watersheds Pollution Solution.

What could pollute water in an unprotected watershed? What are some solutions?

What caused it?	Pollution	Solution
car		

My watershed.

What watershed is your school in?

_____

Where does the runoff water flow?

_____

What kinds of pollution do you think could be in the runoff water?

_____

What could you do to help prevent pollution of the runoff water?

_____

_____

_____

WATER WISE

To protect the quality of the Sooke Lake Reservoir water, the Capital Regional District staff:

- Plant trees to help bring back the forest
- Watch for and fight forest fires (roots from plants and trees hold onto the soil)
- Only allow limited human access and keep pets out.

Sooke Lake Watershed – How's It Flowing? - Answer Key

Name: _____ Date: _____

Experiment 1 - Erosion.

Does the amount of water make a difference? What happens to the "lake" water?

	My Observations
Pour Water Lightly 	▸ that heavy rain can cause soil to flow into the "lake". This is called "erosion" ▸ that the soil causes the water to become "dirty" ▸ that if the water sits undisturbed, the soil will sink leaving clear water on top
Pour Water Heavily 	

My conclusion:

_____

_____

Experiment 2- Sink or Float.

Make a prediction. Will each object sink or float?

Object	Sink	Float
Stick		✓
Rock	✓	
Leaf	✓	✓
Soil	✓	✓

Experiment 3- Stopping Erosion

Can you stop or slow down erosion?

	We used...	My Observations
Pour Water Lightly 	E.G. STICKS, ROCKS, SPONGE	▸ that slowing down the flow of water helps reduce erosion ▸ that placing rocks in the middle of the stream can cause erosion of soil elsewhere
Pour Water Heavily 		▸ that spongy materials like moss soak up water, slowing down the flow into the lake

My conclusion:

_____

_____

Experiment 4- Pollution and Solution.

What could pollute water in an unprotected watershed? What are some solutions?

What caused it?	Pollution	Solution
Car, van, truck	Oil, gas, and other chemicals, erosion	No public traffic on roads
Boats	Oil, gas, and other chemicals	No recreational boating on lake
Campers and hikers	Litter (plastic bottle cap); going to washroom, erosion	Area closed to public
Forest fires	Erosion	No camping or hiking, staff watching for signs of fire and ready to fight fires

My watershed.

What watershed is your school in? For map, go to **www.crd.bc.ca/teacher** or use map on next page.

Where does the runoff water flow? *This is usually the body of water with the same name as the watershed, then out to the ocean, harbour, lagoon or bay.*

What kinds of pollution do you think could be in the runoff water? *Gas, oil, chemicals from vehicles and equipment that runs on gas, pesticides, litter...*

What could you do to help prevent pollution of the runoff water? *Not litter, plan a community clean up day, education campaign.*

Lesson 6b:

Tap Map- Our Drinking Water's Journey

Purpose

The Sooke Lake Watershed lessons provide an opportunity for student to learn about where our drinking water comes from, what makes it is safe to drink and how it is delivered to our taps. They will also learn how it compares to well water and bottled water.

This lesson combines drinking water processing with mapping, tracking our drinking water's journey from the reservoir, through disinfection to our taps. Students use their knowledge of maps to determine the distance water travels from source to tap.

Preparation

- Copy student handout "Tap Map: Our Drinking Water's Journey" (1/student)
- Assessment Tool: "Where Does Our Water Come From?" photocopy (1/student)
- (optional) Cue *"Down the Drain and Back Again"* video to Chapter 3 where the water drop directs Dylan and Dana to the Intake Tower.

Procedure

Warm Up

1. Write the following riddle on the board "What do maps and fish have in common?" Have students discuss with a partner. Offer clues such as drawing a fish. Answer: Scales.
2. Briefly discuss how fish scales and map scales differ. Display the Greater Victoria Drinking Water System map or open Google maps.

Social Studies

Big Ideas

- Local actions have global consequences, and global actions of local consequences
- Individuals have rights and responsibilities as global citizens

Content

- How people's needs and wants are met in communities
- Relationships between people and the environment in different communities
- Rights and responsibilities of individuals regionally and globally
- Roles and responsibilities of regional governements

60-90 minutes

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Teacher Resources

- Tap map- Our Drinking Water's Journey

Student Resources

- Handout " Tap Map: Our Drinking Water's Journey"
- Assessment Tool: Where Does Our Drinking Water Come From?
- Drinking Water Cycle Song

Lesson Resources

- Image of Sooke Lake Reservoir Globe or world map
- Map: Greater Victoria Drinking Water System
- String (length of the projection screen);
- String or strips of paper 8 to 11 inches long (1/student)
- video: *Down the Drain and Back Again* (optional)
- DVD player and TV OR computer and projector
- Glass of tap water
- Glass of water from a local stream or lake
- Glass of crushed ice water, a drinking straw, spray bottle trigger (optional)

GOOGLE MAPS

Create your own map

- Go to http://maps.google.ca/
- Click on "Get Directions"
- Beside A: Enter your school name or location
- Beside B: Enter the name or location of another community landmark

Use "Public Pools and Water Parks" Map

- Go to http://g.co/maps/kqkth
- In the search box, enter the name or address of your school.
- Click back to see your school and other locations pinpointed on the map.

Map Views

- Available in the top right hand corner, click on: "Satellite", "Earth", or "Map".
- "Street view" is only possible when in "Map" view. Simply click and drag the orange person (top of the zoom scale) to a road on the map. To exit this view, click on the minus symbol (zoom scale) until exited.
- Click on the walking, bus and driving icons to see different routes between locations.
- Weather, Webcam, Photos etc. - place cursor over "traffic" and select the items in the checklist to add or remove from the map

Note: To use Google Earth you will be prompted to download a free plug-in.

Transition- Explain that students will be using their mapping skills to show the drinking water journey from the Sooke Lake Watershed to the tap.

Review- Parts of a Map

- Display a globe, world map or open Google Maps http://maps.google.ca/ invite students to identify known parts of a map and their function- e.g. scale, legend, compass.
- Display the "Greater Victoria Drinking Water System" or use Google Maps and review:

• Scale

  » Identify two known points on the "Greater Victoria Drinking Water System" map (e.g. a pool or waterpark). Invite two students to help demonstrate how to use the scale, measuring the distance between the two known points with a piece of string. Have them measure the string against the map scale, counting out each section of string equal to the scale length. Calculate the distance.

Transition: What helps us know if this place is north, south, east or west of the school?

- Compass
    - » Review compass directions. Ask volunteers to draw lines between points following and/or giving cardinal directions. For a more physical exercise, label the classroom with cardinal points and have students walk around the room following directions. Note this section can also be completed with Google Maps, however, a legend and a compass will have to be created on the board with the class.

Transition: What part of a map tells us what the colours, lines and images on a map mean?

- Legend
    - » Review the existing legend. Create symbols for the school and other known landmarks in the legend and place them on the map.

Discuss and Discover- Drinking Water Journey

1. Ask students if they remember the route that Dylan and Dana took through the Sooke Lake Watershed back to their bathroom tap? Can cue and view the *Down the Drain and Back Again* video (Chapter 4 and 5).
2. Using the "Greater Victoria Drinking Water System" map, and images of Sooke Lake Reservoir, work through the following steps in the drinking water journey with students, reviewing and introducing new components such as:
    - **known locations or landmarks**
    - **salt and fresh bodies of water** - more salt than fresh water
    - **watershed** - an area that drains runoff into a lake or creek, Sooke Lake (primary drinking water supply where Dylan and Dana fell as raindrops), Goldstream (backup water supply), Leech (future water supply). Remember, to protect the drinking water supply from pollution, these areas are off limits to all visitors: no one can go hiking, fishing, or walking in this area unless they are on official CRD business. If a lot of people were to get too near to the water supply, it could cause problems for water quality.
    - **reservoirs** - hold fresh water for use by humans- Sooke Lake Reservoir holds 160 million m^3 (160 billion litres) of water, which 92.7 million m^3 (92.7 billion litres) is accessible for drinking water - that's enough to fill 31 thousand Olympic sized pools. Goldstream, Butchart, and Lubbe reservoirs combined hold 10 million m^3 (10 billion litres).
    - **dams** - hold water in the reservoir.
    - **intake tower** - where water flows from the reservoir into the pipes that eventually lead to our taps, it has gates at different heights to select the clearest water at any given time.
    - **Kapoor tunnel** - 2.3 m (7.5 feet) in diameter, 8.8 km long, water flows through the tunnel from the reservoir to the disinfection plant.
    - **disinfection plant** - here UV light and chloramine inactivate (stop from reproducing) bacteria, parasites, or viruses in the water that could make us sick; after disinfection the reservoir water is safe, healthy and clean to drink.
    - **pipelines** - bring water from Sooke Lake Reservoir to our communities, decrease in diameter from 2.3 m (7.5 feet) at the Sooke Lake Reservoir to 15 cm (6 inches) in our communities. (the smallest size able to provide enough water to fight fires.)
    - **holding tank reservoirs** - hold water to be distributed into our communities- Mctavish, Tolmie, Haliburton.

Note: 1 m^3 = 1000 litres

For complete journey see the teacher's resource Tap Map - Our Drinking Water's Journey.

BACKGROUND INFORMATION: LAYING PIPELINES

Tunnels direct water in a straight line, like the Kapoor tunnel to the disinfection facility. Water mains follow roads and weave around obstacles- lakes, rivers, large buildings and parks. Pipes are not laid under cement walkways. Water pipes can go under/through bodies of water, such as the pipeline to Piers Island. Water pipes become progressively smaller the farther away they are from the reservoir.

Map it Activity

1. Distribute string or strips of paper and the Student Activity Sheet: "Tap Map: Our Drinking Water's Journey" to each students and have them complete the activity.

KWL Chart

Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from this lesson.

Demonstration Wells

1. Explain to students that while most people in the Greater Victoria area rely on the water system seen in the video for their water, some people get their water from wells. Wells tap into water underground in rock cracks and pockets in sandy/gravel layers. These pockets of water underground are called aquifers.
2. Present a slushy drink or fill a glass with crushed ice. The ice represents rock, sand or gravel. The liquid water or juice represents groundwater. The straw is the well. To bring the water up to the surface, a pump can be used or a bucket can be dropped into the well and pulled up to the surface. To demonstrate a pump, place the trigger for a spray bottle into the straw.

Discussion - Well Water in Our Region

- Not everybody in the Capital Region receives water from the Greater Victoria drinking water supply; some get their water from wells.
- Ask students:
  - » Have you ever seen a well?
  - » Does anyone in the class have a well?
  - » What does a well look like?
  - » Where does the water in a well come from?
- Notice that if all the liquid is used up too quickly it take time before more is available. Water conservation is necessary with well water too. (Note: Point out that the water in aquifers, unlike this demonstration, does not seep from the rocks/ice cubes themselves).

Assessment Opportunity

Review student activity sheeta as a class and/or have students place it in their Water Portfolio. Use questions such as those outlined on the assessment tool, *"Where Does Our Water Come From"*, in a conference approach. Add the completed assessments to students' Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

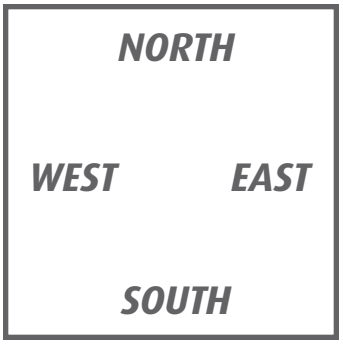
Social Studies

- Use Social Studies inquiry processes and skills to ask questions; gather, interpret, and analyze ideas; and communicate findings and decisions
- Explain why people, events, or places are significant to various individuals and groups (significance)
- Recognize causes and consequences of events, decisions, or developments (cause and consequence)

Extensions and Adaptations

"Drinking Water Cycle Song" extended version (includes drinking water) (Lesson 5d)

- **Monitor the flow of water**
  - Check the CRD website to see weekly pictures of the Sooke Lake Reservoir level and spillway. Look back over the year to see how water levels change throughout the seasons. **https://www.crd.bc.ca/about/data/sooke-lake-reservoir/sooke-lake-reservoir-photos**
- **Take it outside**
  Game- Students run to a location or make a motion that represents drinking water flow or actions. To practice vocabulary and cardinal directions.
- Intake Tower- south
- Rithlet creek- north



- Backup Reservoirs(Goldstream)- east
- Future Supply (Leech)- west
- Precipitation- jumping on the spot
- Run off- running on the spot
- Disinfection- standing still, pretending to wash
- Erosion (settles on the bottom of the lake)- falling to the ground

- **CRD Parks**
  Register for a CRD Parks school program in a local regional park. **https://www.crd.bc.ca/education/school-programs/for-k12-teachers/field-trips/park-interpretive-programs**

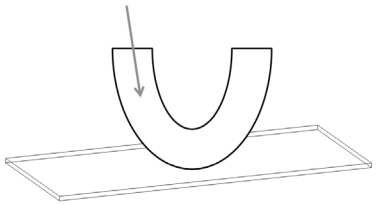
- **Dams**
  As a class, build a model of a dam, trying out different materials. Discuss: What are dams made out of today? *Clay core covered with earth and rock.* What did earlier residents of BC use to build dams? *Wood* Who else builds dams? *Beavers.* Read "The First Beaver" by Carol Simpson- a First Nation's story.

- **Water Pressure**
  In our drinking water system water builds up momentum going downhill to pressure water through most of the pipes. It's only in some very high places that we need to use pumps to push water uphill (for example, up to Triangle Mountain). To extend learning about how water flows uphill- demonstrate using a plastic or rubber tube in a tub. Pour water quickly into the tube forcing the water to move up the other vertical side of the tube.

- **The US Environmental Protection Agency**
  Developed a number of lesson plans related to water use and the environment. These activities are available online at **http://water.epa.gov/learn/kids/drinkingwater/index.cfm.**

  In particular, the following activities can be used to extend the learning in this lesson (in both cases, the models suggested would likely work best as whole class demonstrations):

  - K-3 — Aquifer in a Cup
  - 4-7 — Teach kids about the Water Filtration Process
  - Teacher Resource – watch a demonstration of how to build and aquifer and watershed in a fish tank. Suggest skipping to activity. **www.epa.gov/safewater/kids/flash/flash_aquifer.html**



  - Other groundwater resources:
    - » Ministry of Environment: Water Protection and Sustainability Branch **www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/index.html**
    - » The Groundwater Foundation: Information and Activities about groundwater for educators and students. **www.groundwater.org/kids**
    - » BC Groundwater Association **http://bcgwa.org/**

Curricular Integration

Science

Extend the concept of dams by including a study of beaver dams. Focus on how beavers, like humans, use dams to adapt their environment for their purposes.

Tap Map – Our Drinking Water's Journey

The following is a step by step explanation of our drinking water's journey from the sky to the tap. This can be paired with the Sooke Lake Reservoir image, the Greater Victoria Drinking Water Map and/or a Google map of the Capital Region.

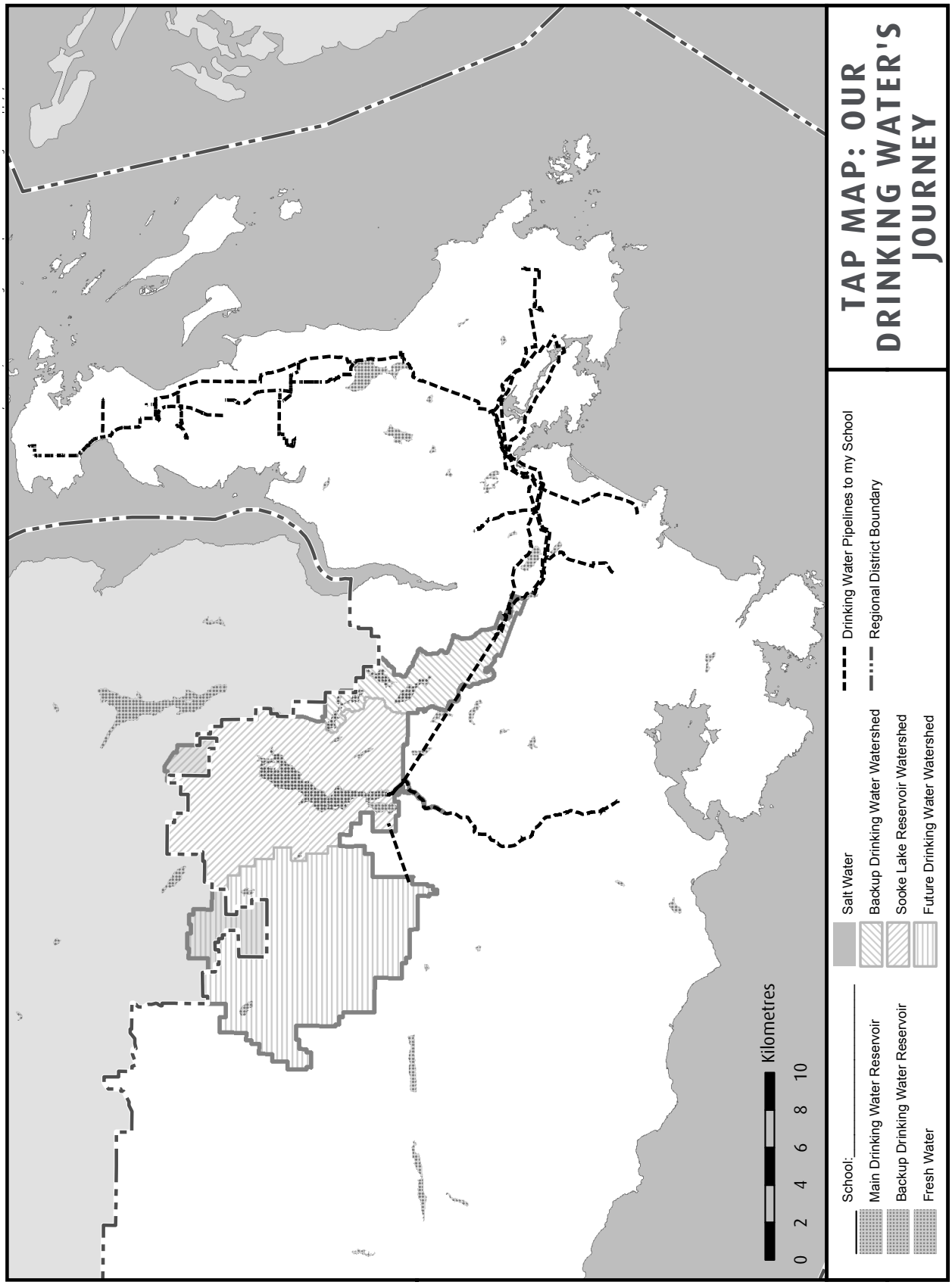
1. Precipitation (usually rain) becomes runoff- flowing over land in to the Sooke Lake watershed.
2. Most water enters the reservoir from creeks and streams at the north end of the lake.
3. Water flows from north to south end of the lake- a 2 year journey.
4. Material in the lake water settles to the lake floor.
5. At the Intake Tower, water quality is tested and gates at level of the best quality water are opened.
6. Water flows through the intake tower, through Kapoor Tunnel or Sooke Tunnel to a treatment plant.
7. At the treatment plant- The water passes through UV light, then chlorine is added and 10 minutes later ammonia (this makes chloramine, a longer lasting disinfectant). This combination kills pathogens- disease causing parasites, bacteria and viruses.
8. From the treatment plant water flows through pipes decreasing size, from the 2.3 m wide Kapoor tunnel down to 15 cm wide pipes (any smaller than this and fighting fires could be difficult).
9. Our driking water flows using gravity. Sooke Lake Reservoir is 187.5 m above sea level in the Sooke Hills, the Goldstream Backup Supply is even higher. Water flow builds up pressure, pushing water through the whole system, except for a few locations where electricity is needed to power a pumping station to push the water high uphill (e.g. Triangle Mountain).
10. Small covered holding reservoirs (essentially tanks) in the drinking water supply system hold water to be distributed through municipal pipes to our communities.
11. Once a year, when inspecting the Kapoor Tunnel and other infrastructure associated with the Sooke Lake Reservoir, the Goldstream System is used.

Tap Map – Our Drinking Water's Journey

Name: _____ Date: _____

1. Draw a compass on the map.
2. Create a symbol in the legend for each item and add them to the map.
   - Your school
   - Main drinking water reservoir
   - Back-up drinking water reservoir (hint: there are three)
3. Add colour in the legend for each item then colour the map:
   - Fresh Water
   - Salt Water
   - Sooke Lake Reservoir Watershed
   - Back-Up Drinking Water
   - Future Drinking Water Watershed
   - Drinking water journey. Draw a coloured line beside "Drinking Water Pipelines to My School". Use this colour to fill in the drinking water pipelines from the Sooke Lake Reservoir to your school.
4. Label your map:
   - Sooke Lake Reservoir
   - Pacific Ocean

Tap Map – Our Drinking Water's Journey



QUESTIONS:

5. How far would Dylan and Dana have to travel as water drops from the Sooke Lake Reservoir to your school?

_____

Place one end of the string at the Sooke Lake Reservoir Dam. Place the rest of the string on the coloured pipeline to your school. Draw a line on the string where it lands on the school. Measure the string along the scale. Calculate the distance.

6. Dylan and Dana want to go on an adventure from the Sooke Lake Reservoir through the drinking water pipelines to your school. Write down the directions to help them find their way. (Use cardinal directions, e.g. north, south, east, west)

Hi Dylan and Dana,

To travel from the Sooke Lake Reservoir to my school

_____ ***, you must flow...***

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Drinking Water Cycle Song

Sing-a-long to "She'll be Coming Round the Mountain"

Name: _____ Date: _____

Water travels in a cycle

Spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

Stand facing front again

Water travels in a cycle

Spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

Stand facing front again

It goes up as evaporation,

Make vertical wave motions with hands, raise them up overhead

And forms clouds as condensation,

Bring hands together to form a cloud

Then comes down as precipitation

Separate hands and wiggle fingers as arms are lowered, crouching down to the ground

And runs off.

Run on the spot

Water travels in a cycle

Spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

Stand facing front again

Water travels in a cycle

Spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

Stand facing front again

It flows down to the reservoir

Make horizontal waves with hands

Then through pipes to our taps afar

Motion as if turning on a tap to fill a glass of water and drinking, brushing teeth, washing hands

And goes down the drain, "au revoir"

Wave down the drain

Into the sea.

One hand on forehead looking into the distance

BUT

(spoken)

Water travels in a cycle

Spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

Stand facing front again

Water travels in a cycle

Spin on the spot, with one hand making a circle overhead, like a lasso

Yes it does.

Stand facing front again

It goes up as evaporation,

Make vertical wave motions with hands, raise them up overhead

And forms clouds as condensation,

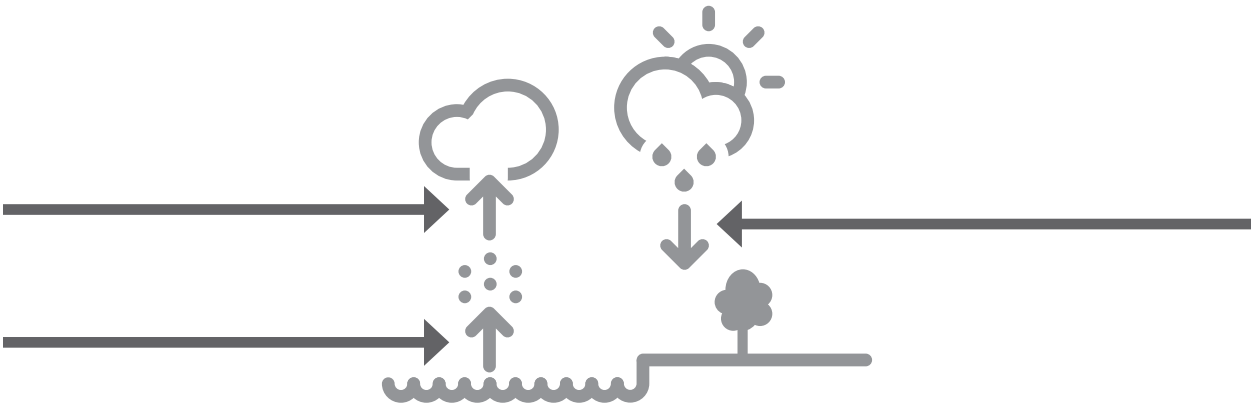
Bring hands together to form a cloud

Then comes down as precipitation

Separate hands and wiggle fingers as arms are lowered, crouching down to the ground

Back to me.

Label the water cycle: evaporation, condensation, precipitation



Drinking Water Cycle Song

Sing-a-long to "She'll be Coming Round the Mountain"

Name: _____ Date: _____

Chorus *Water travels in a cycle*
Yes it does.
Water travels in a cycle
Yes it does.

Verse 1 *It goes up as evaporation,*
And forms clouds as condensation,
Then comes down as precipitation
And runs off

Chorus *Water travels in a cycle*
Yes it does.
Water travels in a cycle
Yes it does.

Verse 2 *It flows down to the reservoir*
Then through pipes to our taps afar
And goes down the drain, "au revoir"
Into the sea.

BUT (spoken)

Chorus *Water travels in a cycle*
Yes it does.
Water travels in a cycle
Yes it does.

Verse 3 *It goes up as evaporation,*
And forms clouds as condensation,
Then comes down as precipitation
Back to me.

Where Does Our Drinking Water Come From?

Date: _____ Student: _____

What is the name for the place where most of the water for the Greater Victoria area is stored? How does it get from there to your home?

Is water in the reservoir safe to drink?

Is water you find in a pond, stream, or lake safe to drink?

Is water out of the tap safe to drink?

Why do we have to pay for water?

How would your life be different if you didn't have access to clean drinking water all of the time?

Why is it important to conserve and protect our drinking water?

Additional Comments:

Where Does Our Drinking Water Come From? - Answer Key

What is the name for the place where most of the water for the Greater Victoria area is stored? How does it get from there to your home?

Sooke Lake Reservoir; through pipes underground.

Is water in the reservoir safe to drink?

Not until it is cleaned at the disinfection plant.

Is water you find in a pond, stream, or lake safe to drink?

No. It should be cleaned/disinfected.

Is water out of the tap safe to drink?

Yes, it has been cleaned/disinfected.

Why do we have to pay for water?

The money is used to pay for :

- *drinking water pipes to be put underground and to fix them*
- *cleaning the water.*
- *buying land that will be used for drinking water in the future*
- *taking care of the drinking watersheds- like planting trees*

How would your life be different if you didn't have access to clean drinking water all of the time?

Answers may include walking long distances for water, no water fights or swimming pools.

Why is it important to conserve and protect our drinking water?

- *So there is enough clean, fresh water for everyone*
- *So we can have enough drinking water even when it doesn't rain for a long time*
- *Because we also need it to fight fires*
- *Because all living things need water to survive*

Lesson 6c:
Bottled Water Journey

Social Studies

Big Ideas

- Local actions have global consequences, and global actions of local consequences
- Individuals have rights and responsibilities as global citizens

Content

- Relationships between people and the environment in different communities
- Rights and responsibilities of individuals regionally and globally

60-90 minutes

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.

Purpose

The Sooke Lake Watershed lessons provide an opportunity for student to learn about where our drinking water comes from, what makes it is safe to drink and how it is delivered to our taps. They will also learn how it compares to bottled water.

In this lesson, students will use their mapping skills to determine how far bottled water travels compared to our municipal tap water. They will look at the energy and resource required to deliver the water as well as the cost.

Preparation

1. Prepare the computer and projector.
2. Load Chris Jordan's *Caps Seurat* in full screen mode, then minimize the window and maximize when ready. **www.chrisjordan.com/gallery/rtn/#caps-seurat**
3. Make note of distance from Sooke Lake Reservoir to the School (calculated in lesson 6a).
4. Photocopy student handout "Bottled Water Journey".
5. Optional- 1 litre bottle, 300 pennies, 1 paper penny cut-out, 1 litre reusable bottle or cup.

Procedure

Warm Up- Chris Jordan's Caps

1. Display Chris Jordan's *Caps Seurat* and ask students if they recognize the artwork.[1] **www.chrisjordan.com/gallery/rtn/#caps-seurat**
2. Explain to students that this image is a copy of a painting by a Georges-Pierre Seurat- a French artist from the 1800's. The artist of this new image, Chris Jordan, did not use paint. "Can you guess what he used?"
3. Click on the image and watch the focus zoom-in to show plastic bottle caps.

1 From the art collection Running the Numbers: An American Self- Portrait.

Student Resources

- Student Handout "My Drinking Water Journey"

Lesson Resources

- Chris Jordan *Caps Seurat* webpage.
- World map (or Google Map)
- Book- "E is for Environment: Bottled Up" by Ian James Corlett.
- KWL Chart
- Internet access, computer and projector

Optional

- 1 litre bottle
- 1 litre reusable bottle or cup
- 300 pennies (paper, plastic or real)
- 1 penny (paper)
- Scissors

4. It is estimated that we buy as many bottles of water in BC (400,000) per day as there are bottle caps in this picture.
5. "Whip around"- one by one point to each student who will say one word to describe their reaction to this statistic. This is a fast paced exercise.

Review- Local Drinking Water

Have students share what they know about their drinking water: where does it come from? Is it safe, healthy and clean to drink? Is most of the water pumped using electricity or is it mostly pulled along by gravity? What kind of packaging does it require? *Reusable water bottle or cup, none if from a drinking fountain.*

On the board write the distance that our drinking water travels from the reservoir to your school (Lesson 6c).

Transition: Where does bottled water come from? Allow for discussion.

Bottled Water

1. Display a world map. Explain that bottles of water sold in stores and vending machines are filled all over the world. They can be filled with spring water (streams or groundwater aquifers- wells) or municipal water (filtered tap water).
2. Distribute the student handout "Bottled Water Journey". Have students measure the distance travelled by bottled water within BC and internationally. Review as a class. Note that bottled water isn't delivered directly to your home like tap water. Which was closer? *Sooke Lake Reservoir*
3. How were the bottles transported? *Trucks, trains, boats, possibly planes.* What kind of energy does this use? *Lots of gas and oil, which are harmful to the environment; the burning of fossil fuels is the leading cause of climate change.*
4. What packaging is required to deliver the bottled water? *Bottle, cap, label, creates, plastic wrap, boxes.* Where do these materials come from? *The Earth*
   Optional- Identify Vancouver and St. John's Newfoundland on the map. The same amount of oil is required to make the water bottles sold in BC in one year as it would take to power 12,000 Ford Explorer SUVs from Vancouver to St. John's Newfoundland. It also takes energy to:
   - mine the fossil fuels from the Earth to make the plastic packaging, trees to create boxes.
   - make the bottles, caps and labels
   - transport the bottles to stores
   - refrigerate the water in stores

Transition- The planet pays for our drinking water by giving up resources such as oil for plastic and trees for cardboard. How much money does drinking water cost us?

Cost of drinking water

1. Ask students: Is our water free?
   No. Houses, apartments, buildings schools and offices have meters that measure how much water is used. Saving water means saving money.
2. Ask students if they know why we pay for drinking water.
   Remind students of what they have already learned about water disinfection, building dams, the pipes that carry water to people's homes, etc. We pay for drinking water because if costs money to clean it and send it to people's houses through pipes. We also pay for the electricity that heats our hot tap water- so wasting hot water wastes money for the water and the electricity.
3. Explain that our tap water costs approximately $0.16 for 100 litres. Bottled water costs $300/100 litres ($3.00/litre). For added effect, fill a 1 litre plastic bottle with 300 pennies. Show the class a paper penny and cut a sliver off the side, put this into a 1 litre reusable bottle or cup. Which would students prefer to pay for?
4. Have students complete their "My Drinking Water Journey" handouts. Questions 3-6 can also be completed orally.

Story - E is for Environment: Bottled Up

Read and use discussion questions provided in "E is for Environment: Bottled Up" by Ian James Corlett (usually at the end of each chapter).

KWL Chart

Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from this lesson.

Assessment Opportunity

Questions 3-6 can also be completed in a conference approach or set up criteria and have student peers evaluate. Add the completed assessments to students' Water Portfolios. Review the student activity sheet as a class and/or have students place it in their Water Portfolio.

Curricular Competencies

Look for evidence that students are able to:

Social Studies

- Use Social Studies inquiry processes and skills to ask questions; gather, interpret, and analyze ideas; and communicate findings and decisions
- Recognize causes and consequences of events, decisions, or developments (cause and consequence)

"My Drinking Water Journey"

Name: _____ Date: _____

Use a piece of string to measure the distance bottled water travels between a bottling plant and a city. Measure the string along the scale, marking the string as you measure. Calculate the distance.

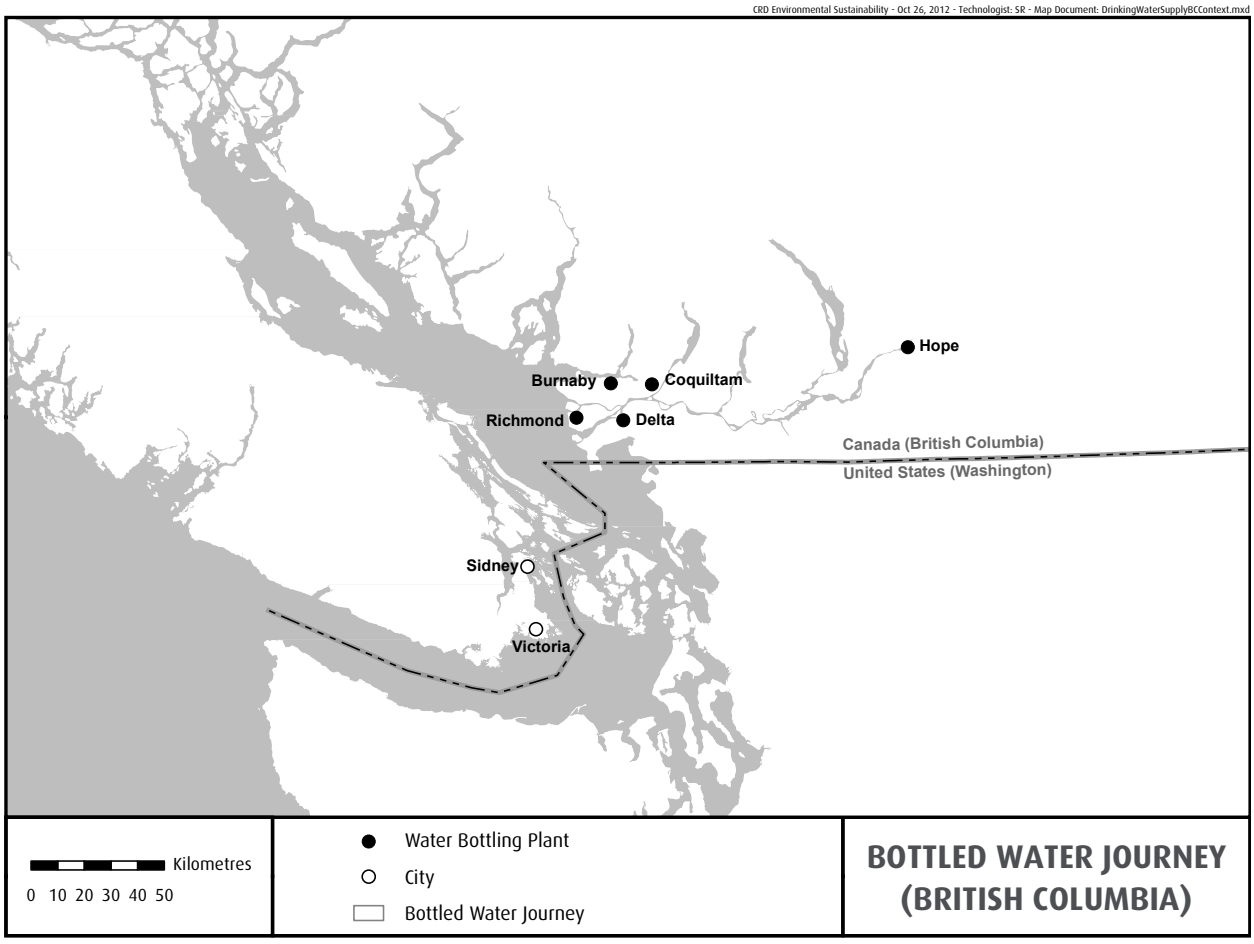
Eg. From Victoria to Burnaby

50 + 50 = 100 km

50 **50**

Kilometres

0 10 20 30 40 50



1. Approximately how far does bottled water travel from:

a. Hope to Victoria _____

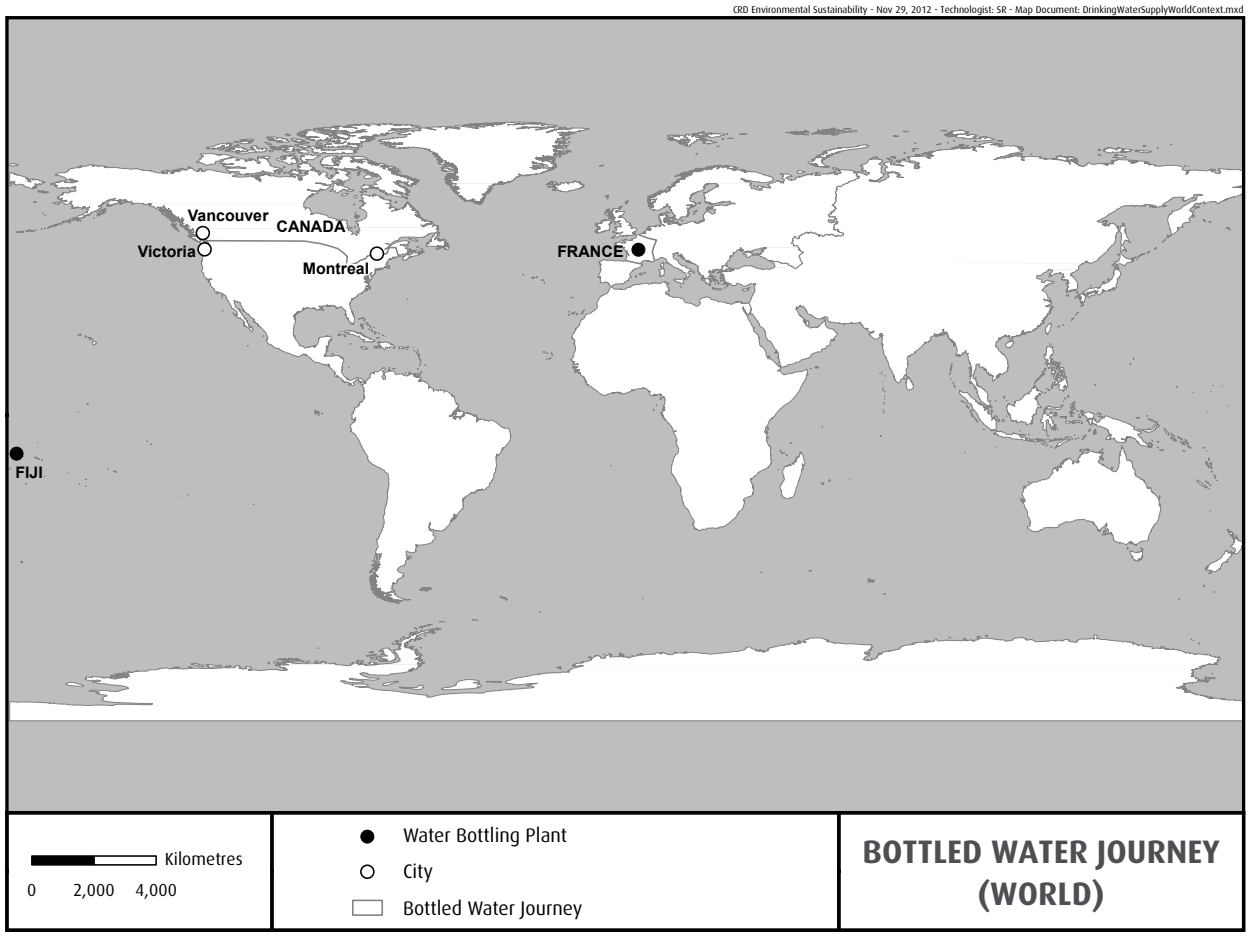
b. Richmond to Victoria _____

"My Drinking Water Journey"

2. How far does bottled water travel if it comes from:

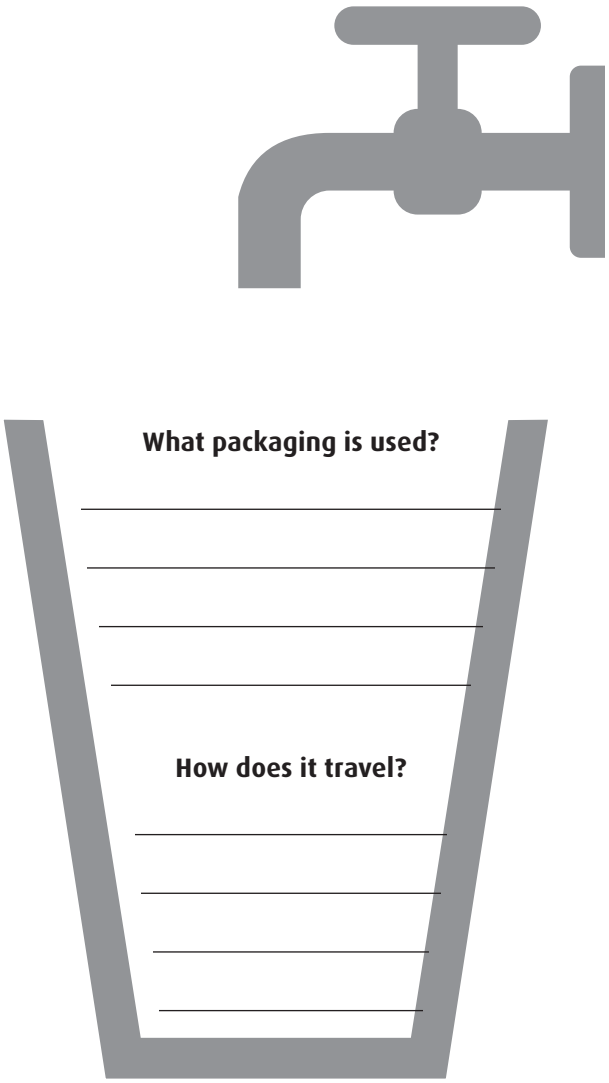
a. France _____

b. Fiji _____



"My Drinking Water Journey"

3. Compare packaging and energy needed to deliver drinking water.



4. Which uses more energy and packaging, bottled water or tap water? Why?

5. Which costs more money, bottled water or tap water?

6. The choice is yours. What kind of water will you drink- bottled or tap? Why?

"My Drinking Water Journey"

Name: _____ Date: _____

Use a piece of string to measure the distance bottled water travels between a bottling plant and a city. Measure the string along the scale, marking the string as you measure. Calculate the distance.

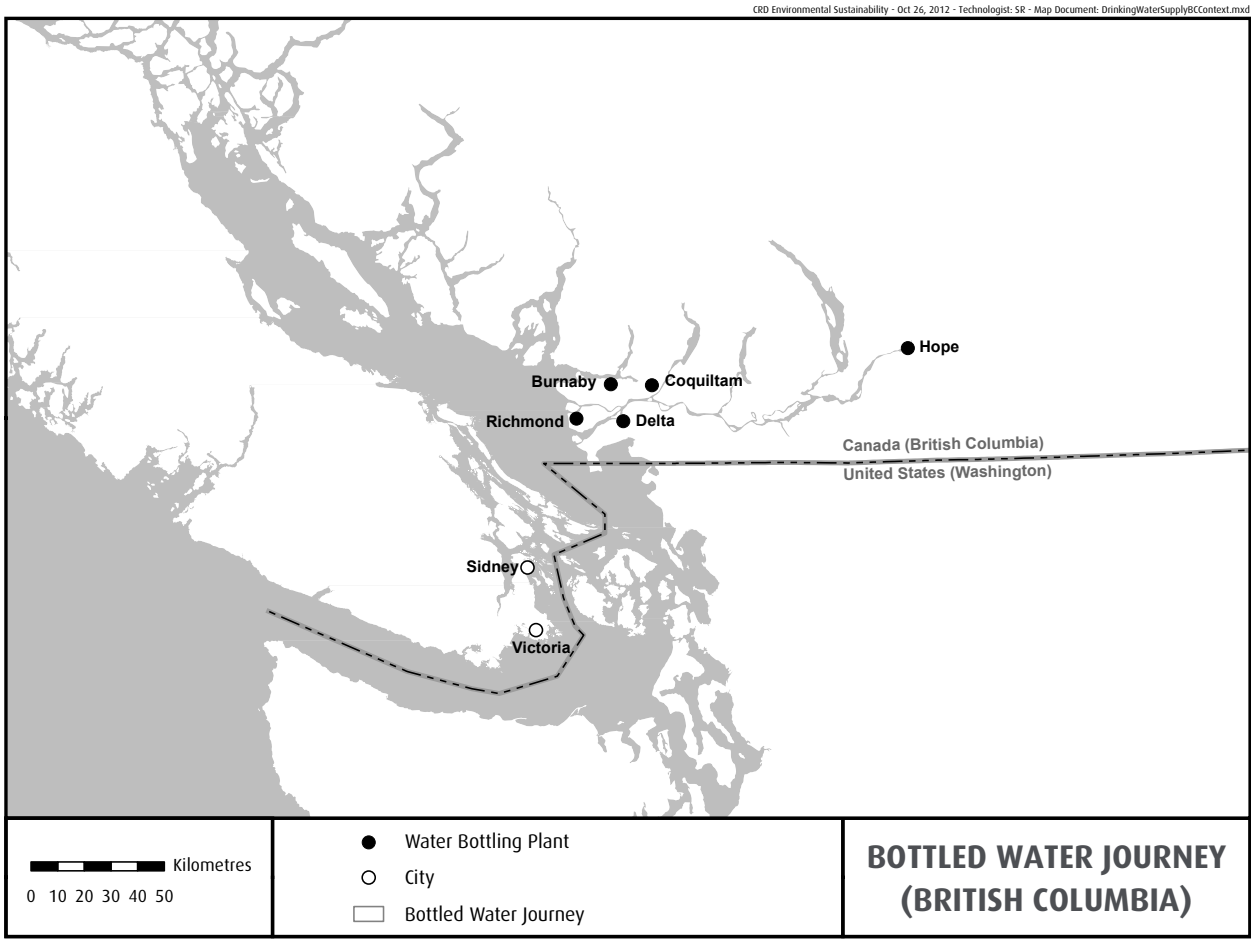
Eg. From Victoria to Burnaby

50 + 50 = 100 km

50 **50**

Kilometres

0 10 20 30 40 50



1. Approximately how far does bottled water travel from:

a. Hope to Victoria _____*170 km*_____

50 + 50 + 50 + 20 = 170 km

b. Richmond to Victoria _____*90 km*_____

50 + 40 = 90 km

"My Drinking Water Journey- Answer Key"

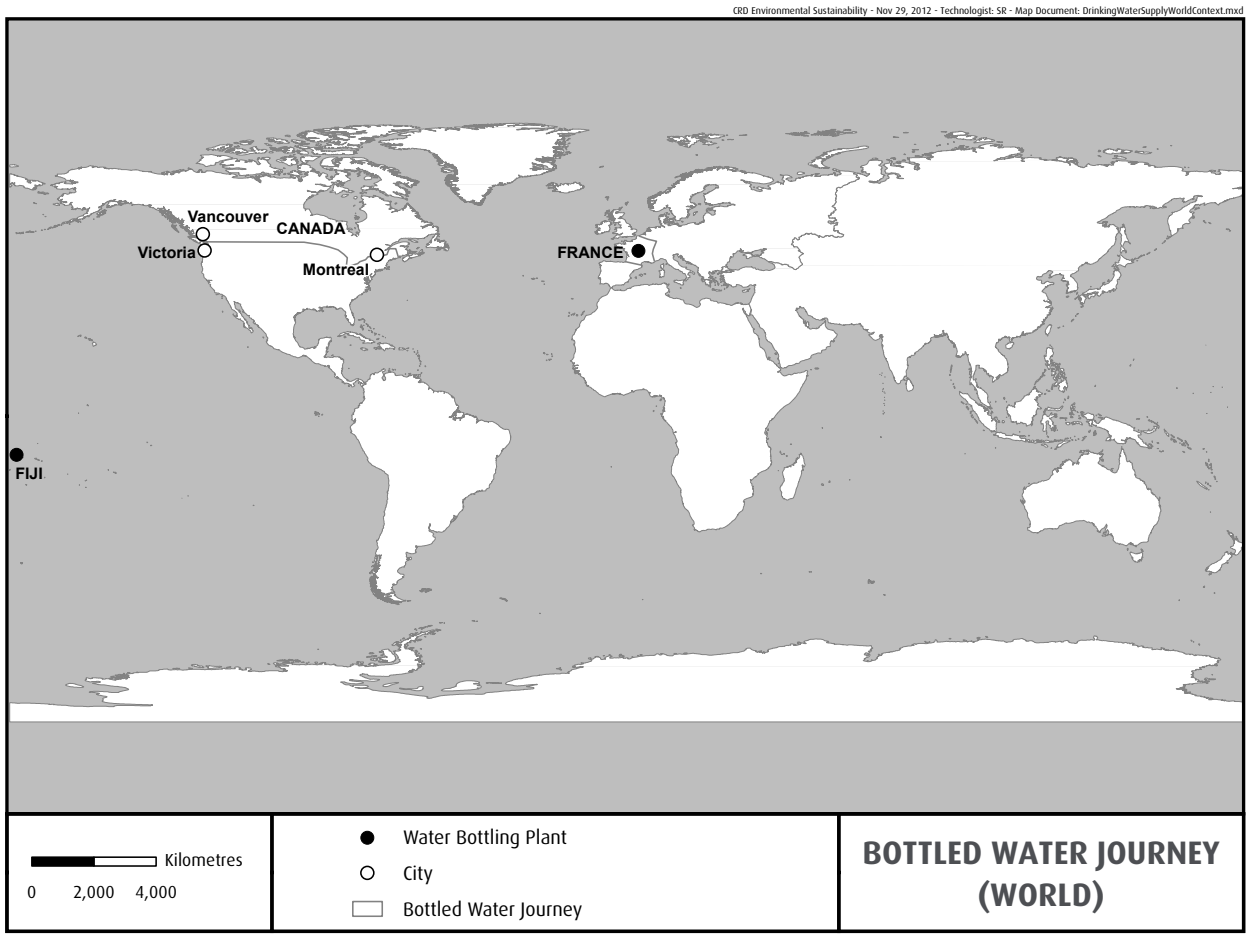
2. How far does bottled water travel if it comes from:

a. France *13,000 km*

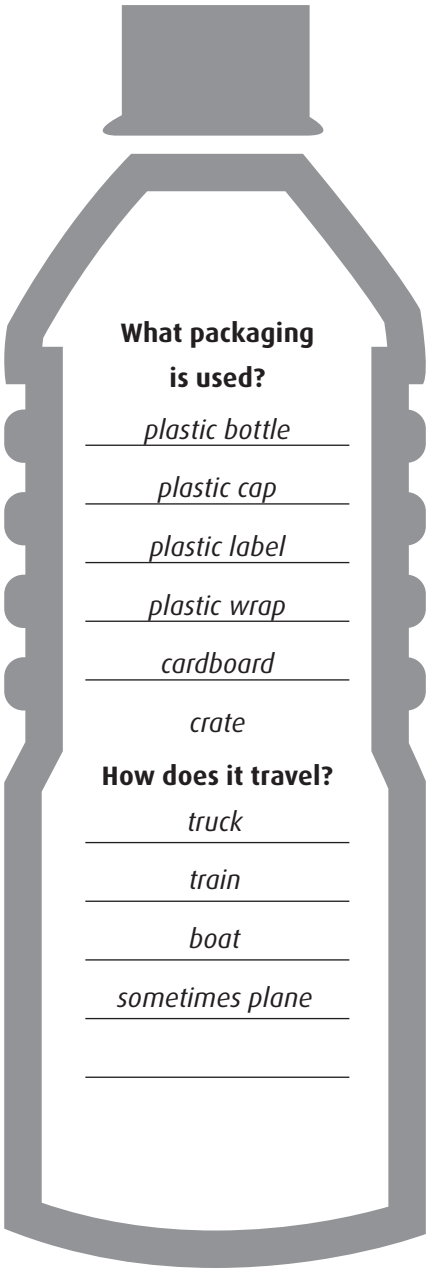
4,000 + 4,000 + 4,000 +1,000 = 13,000 km

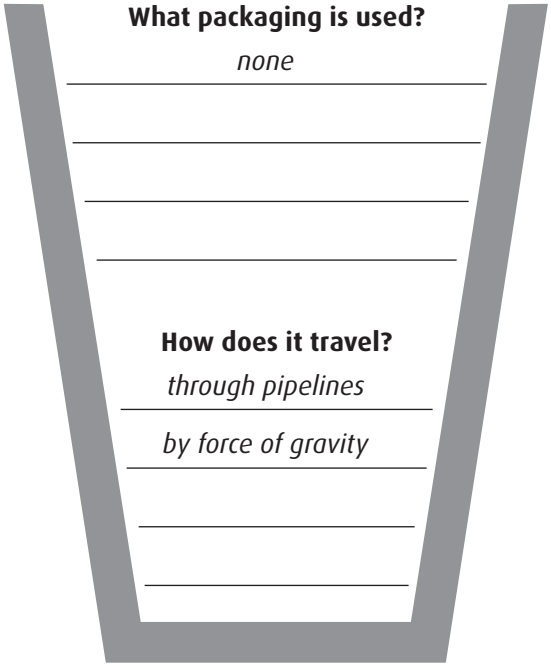
b. Fiji *9,000 km*

4,000 + 4,000 + 1,000 = 9,000 km



3. Compare packaging and energy needed to deliver drinking water.





4. Which uses more energy and packaging, bottled water or tap water? Why?

In greater Victoria, bottled water uses more energy and packaging. Fuel for transportation. Plastic for packaging

5. Which costs more money, bottled water or tap water?

Bottle water

6. The choice is yours. What kind of water will you drink- bottled or tap? Why?

Lesson 6d:

Drinking Water Cycle in Motion

Purpose

In this kinetic 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.

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

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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

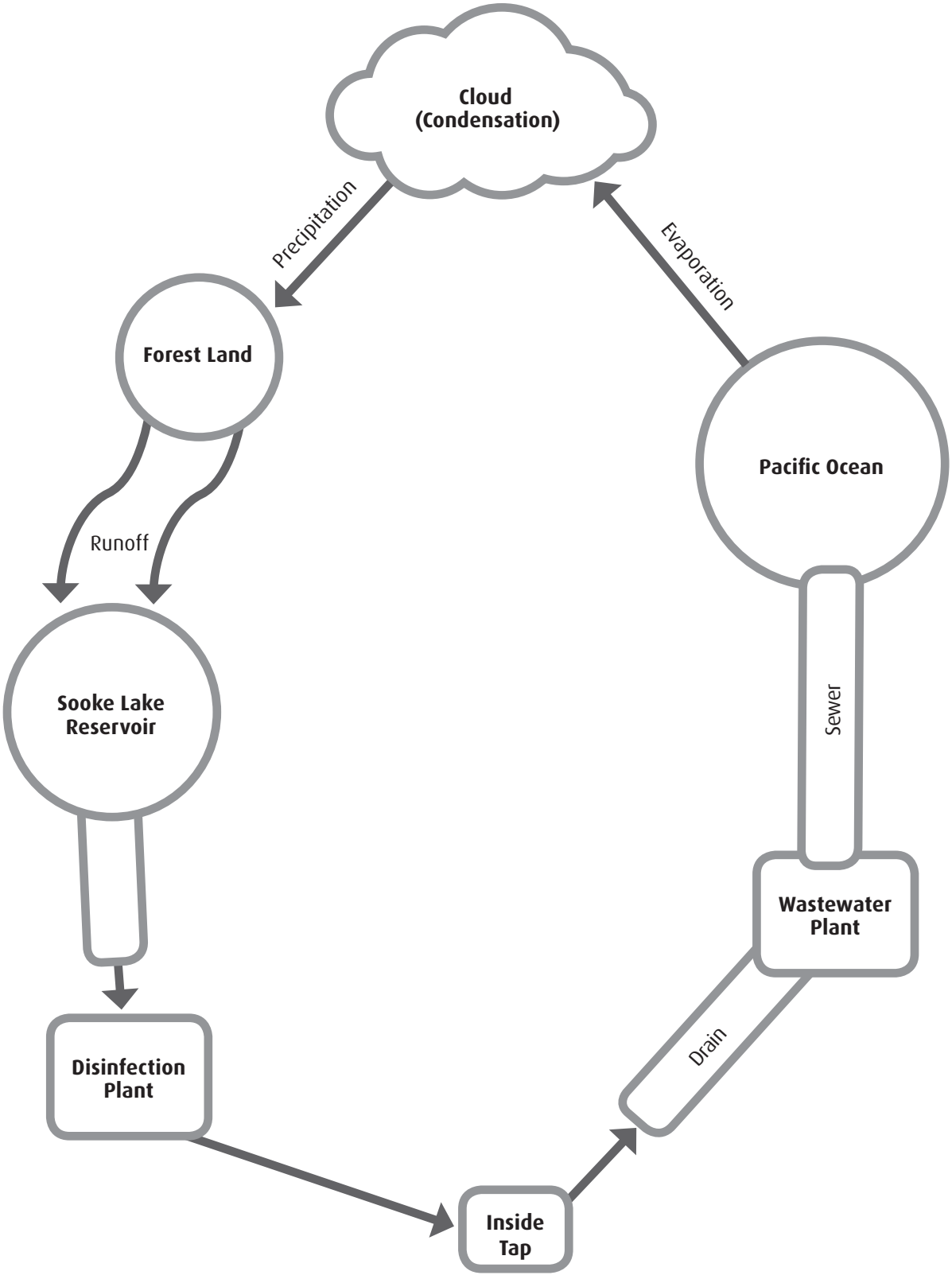
- Physical literacy
  - Develop and demonstrate a variety of fundamental movement skills in a variety of physical activities and environments (ex. can throw and catch the "salt")
  - Develop and demonstrate safety, fair play, and leadership in physical activities
- Healthy and active living
  - Participate 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

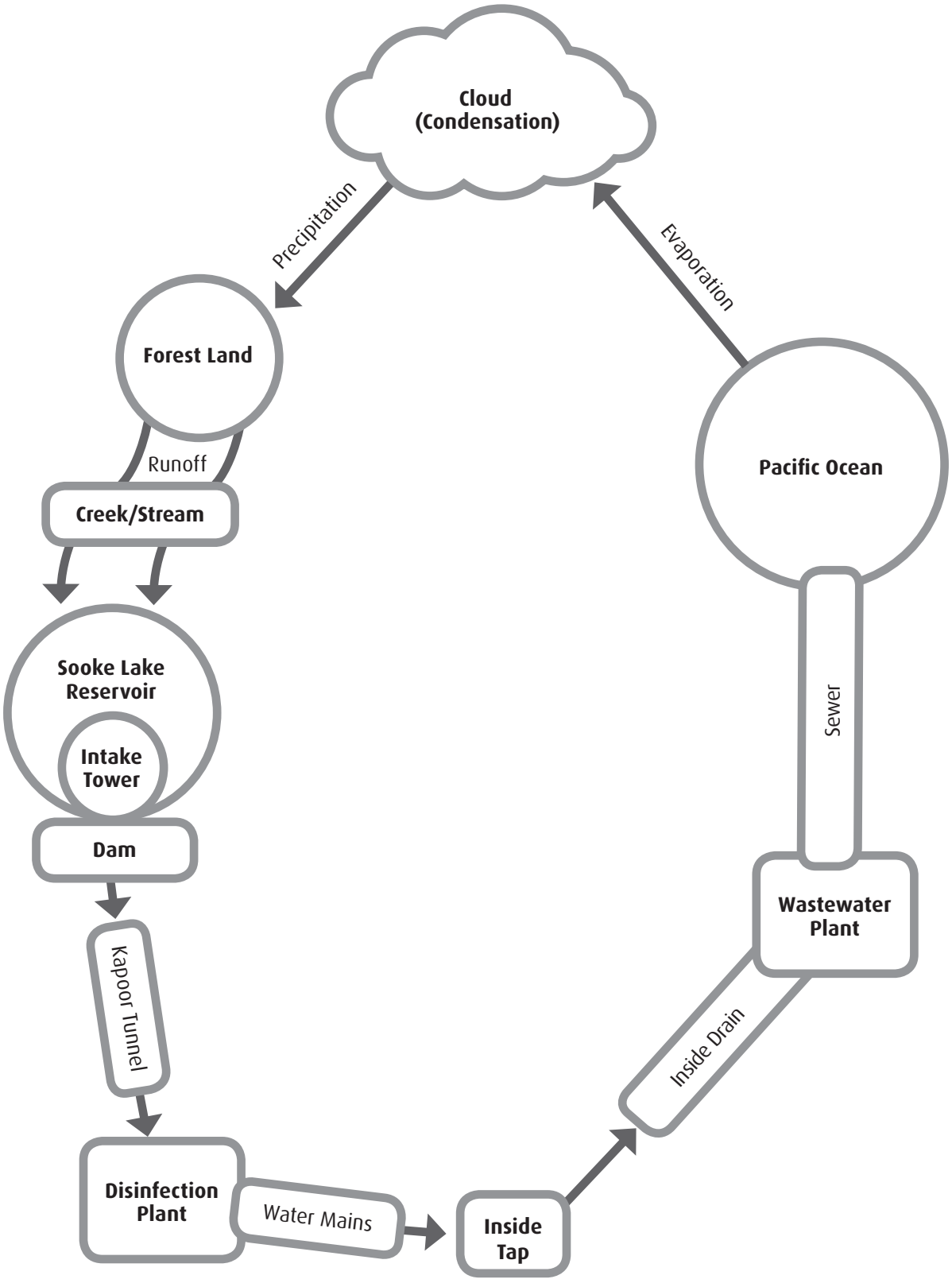
- Replace dice with cards indicating next move or create paper dice with images of destinations.
- To simplify the game, remove the disinfection and wastewater plants.
- To add more detail to the activity:
  - While flowing down the creek, take a break and roll another dice- plant (return to cloud via evaporation), sweating animal (return to cloud via evaporation), or contimnue 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.

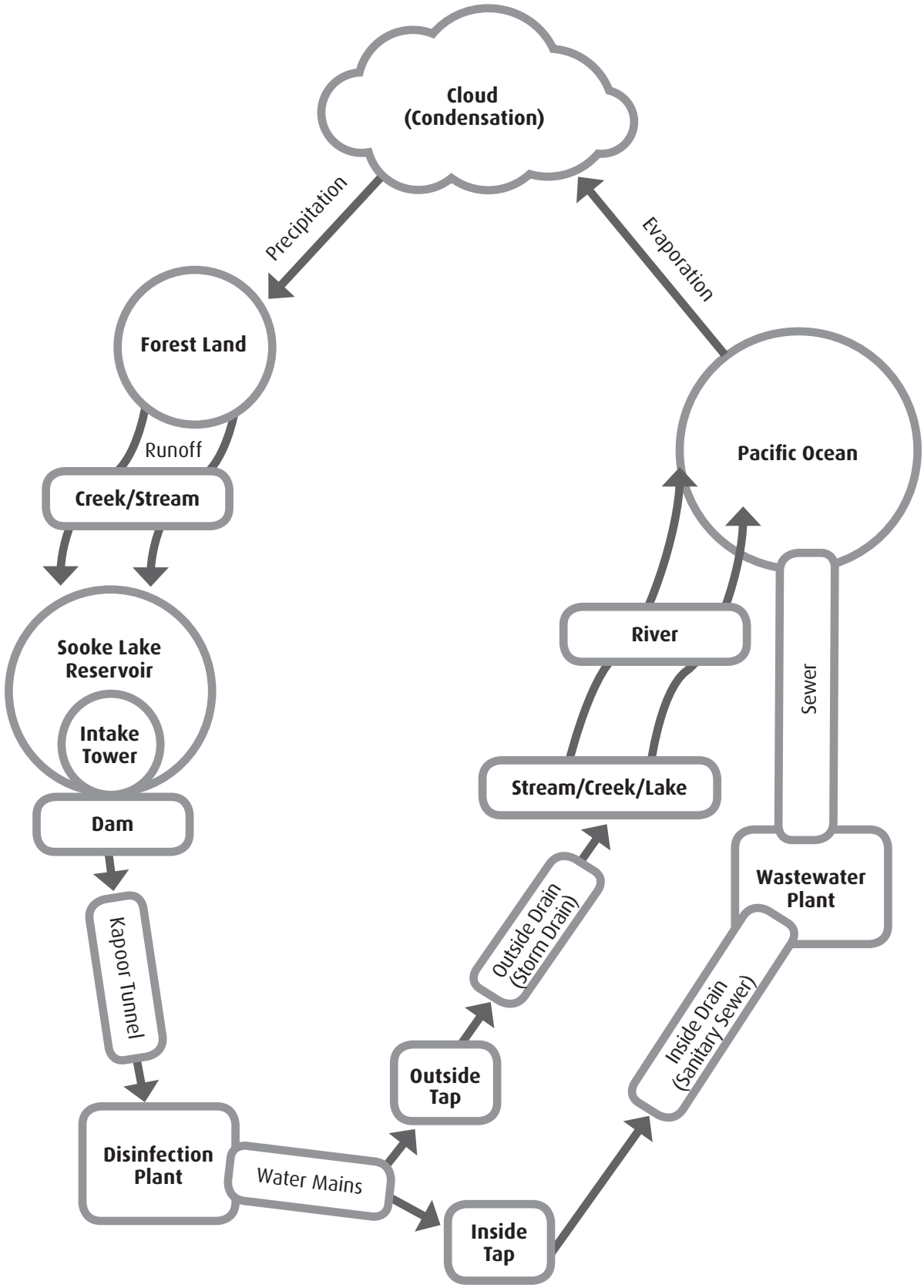
Drinking Water Cycle Relay Maps - Basics



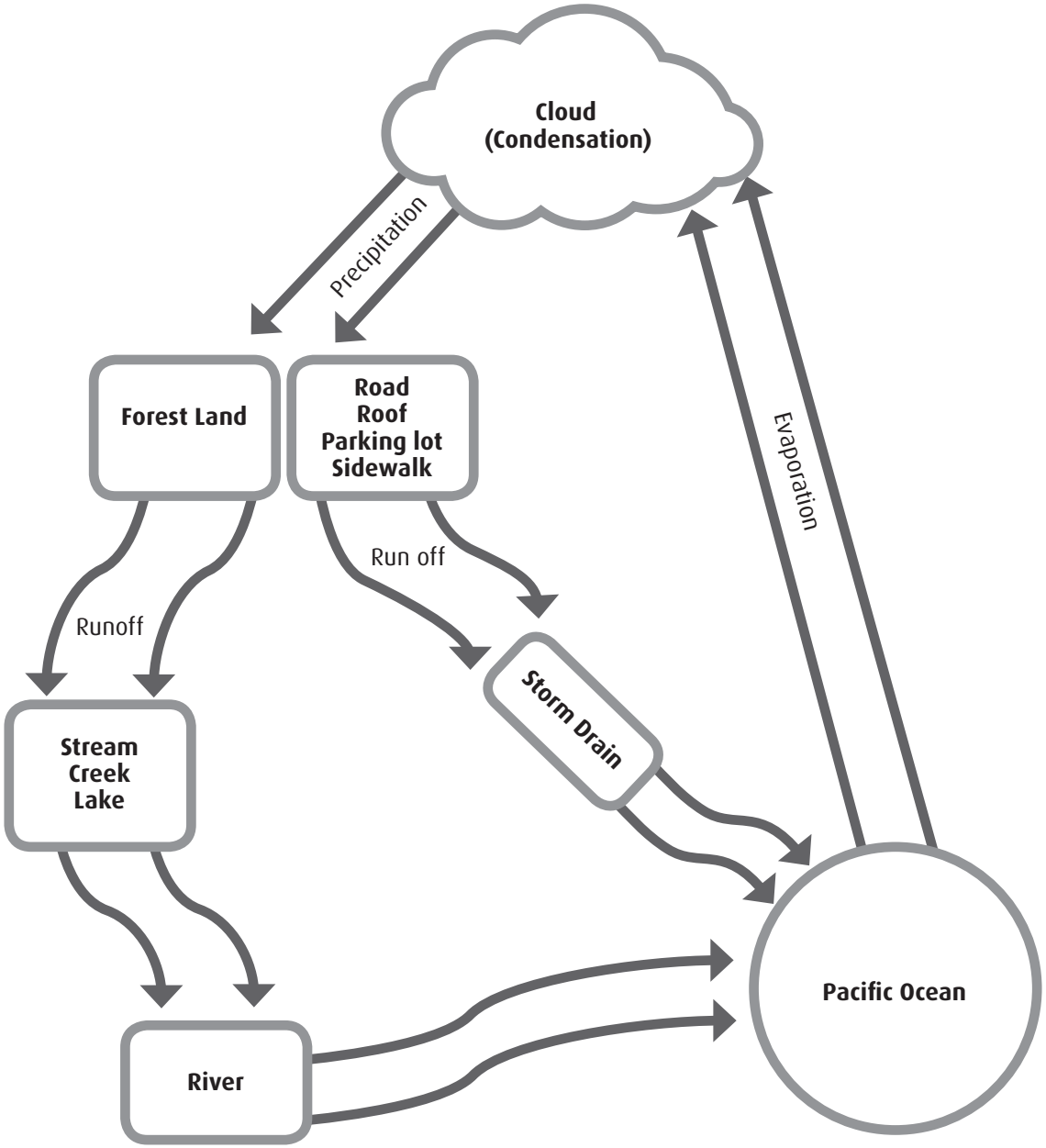
Drinking Water Cycle Relay Maps - Pro



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

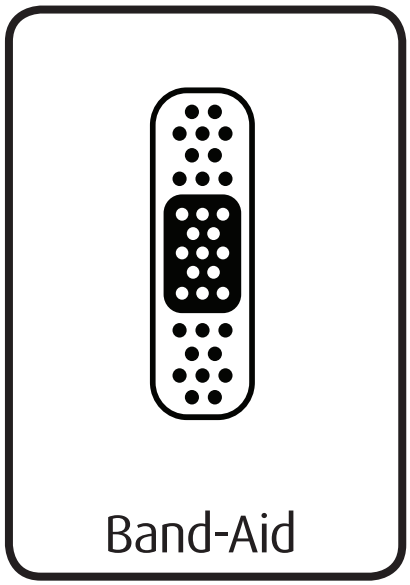
(Colour) _____ Dice

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

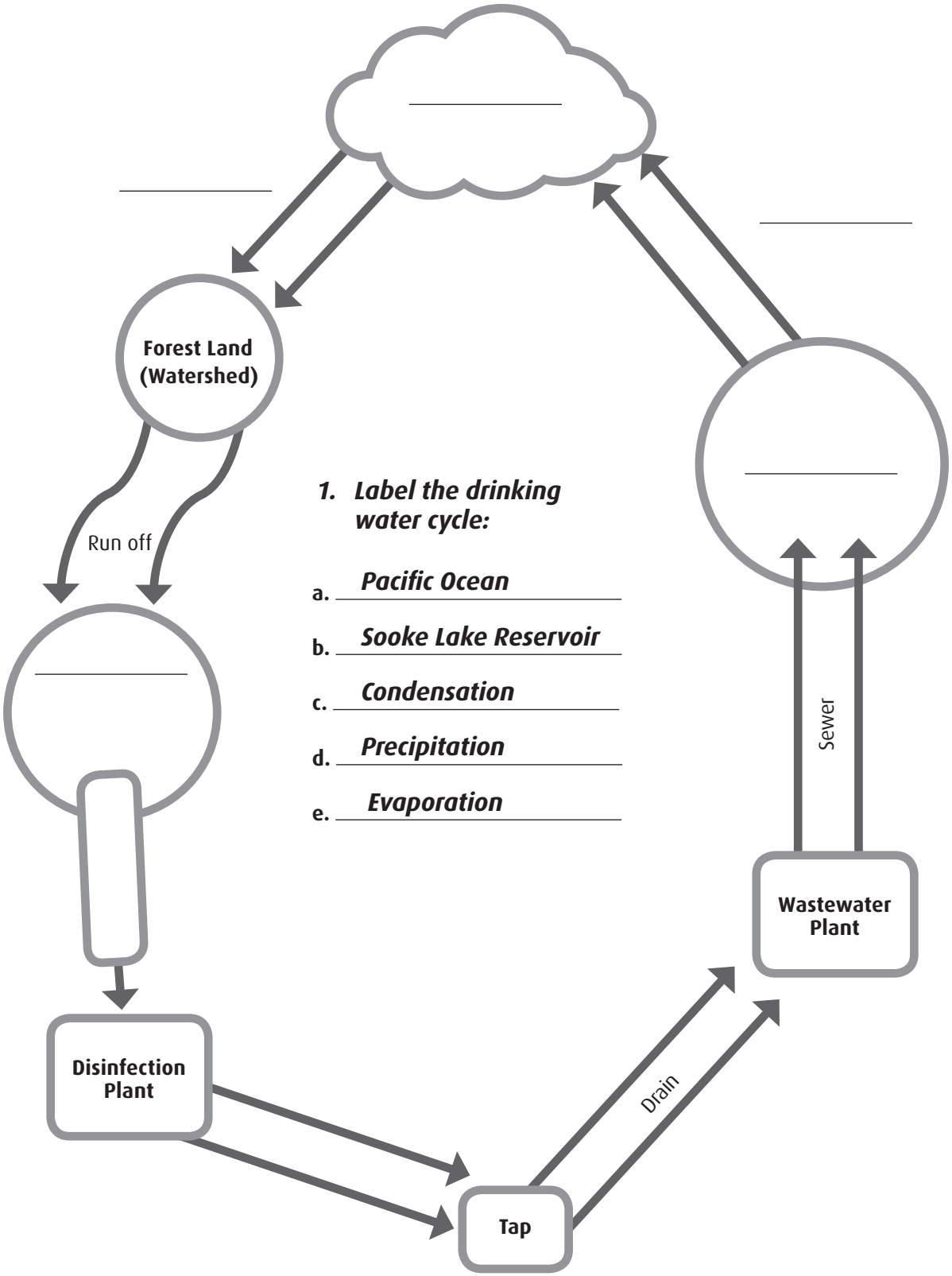
Down the Drain? Cards

INDOOR DRAIN OPTIONS	OUTDOOR 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	**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.



1. Label the drinking water cycle:

a. ***Pacific Ocean***

b. ***Sooke Lake Reservoir***

c. ***Condensation***

d. ***Precipitation***

e. ***Evaporation***

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

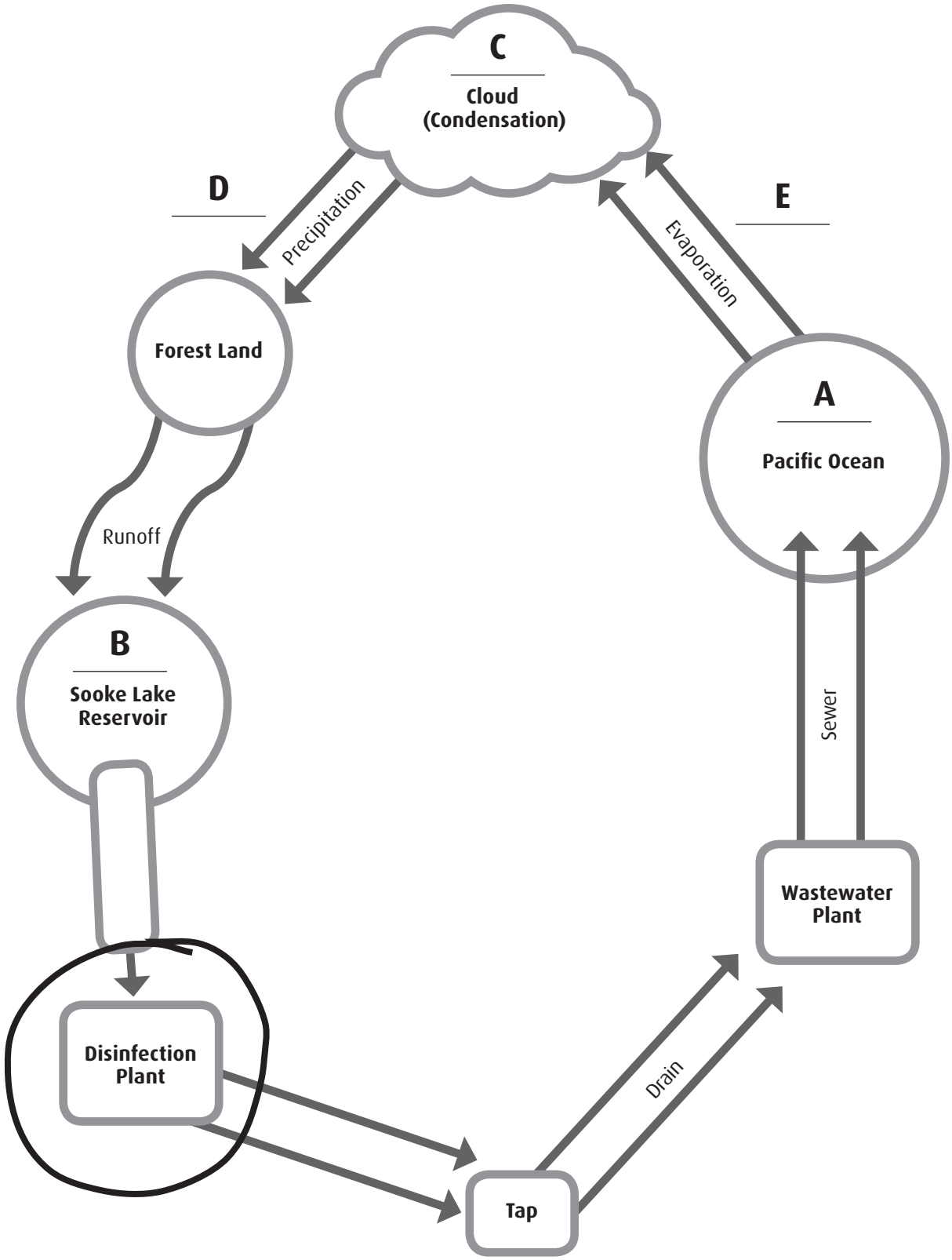
7. *Circle what you did well:*

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, f ollow 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

Lesson 7

Using Water

Learning Standards & Assessment

Time

Resources

Curricular Integration

Handouts

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.
- Living things have life cycles adapted to their environment.

Content

- Water sources including local watersheds
- Water conservation
- Metamorphic and non-metamorphic life cycles of different organisms
- Similarities and differences between offspring and parent

English Language Arts

Big Ideas

- Stories and other texts connect us to ourselves, our families, and our communities
- Through listening and speaking, we connect with others and share our world

Content

- Strategies and processes
  - oral language strategies
- Language features, structures, and conventions
  - Word patterns, word families
  - Letter formation

45-60 minutes

Lesson 7a:
Using Water - Who and How

Purpose

This is the first of the Using Water lessons. This brief lesson introduces students to the topic. The subsequent lessons are:

- 7b: How Animals Use Fresh Water
- 7c: How Plants Use Fresh Water
- 7d: How We Use Fresh Water
- 7e: Using Water - Who and How - Conclusion

Using a gallery walk approach, this lesson focusses on how animals (terrestrial and aquatic), plants and humans use water.

Preparation

1. Photocopy (one/student) "How Animals, Plants and People Use Water"
2. Set up a gallery walk of images depicting various ways in which water is used by animals.
3. Print images of animals using water (possible source www.crd.bc.ca/teacher)
4. Place each image on a large piece of paper, or on the board, so that there is room for notes on each side.

Optional- Set up criteria based on BC Ministry of Education Writing Standards- "Writing to Communicate Information" page 53 **www.bced.gov.bc.ca/perf_stands/writing_g2.pdf.**

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.

Teacher Resources

- Assessment Tool: "Plant and People" performance grid template

Student Resources

- Activity Sheet: "How Animals Plants and People Use Water"
- Assessment Tool:Self/Peer Performance grid template
- Water Portfolio

Lesson Resources

- Images of animals using water www.crd.bc.ca/teacher
- Tape or sticky tack
- Poster markers
- Poster paper (or space on board to post images)
- Optional- computer and projector

Procedure

Warm-Up Activity

Allow students three minutes to write or draw as many water users as they can think of on the back of their handout. Have students share words with the class. For added scanning and reading- have students cross off any words that they have in common with classmates. Which were the least common answers? Can the answers be categorized plants, animals, people, living things?

Gallery Walk

1. Set up the gallery walk.
2. As a class examine an image to demonstrate activity requirements, then have students work in groups to examine the images in the gallery walk that depict animals, plants and humans using water.
3. At each station, have students record what they see on the sheet of paper provided. For added focus, define types of information or words to be written above, below and to each side of the images- e.g. words that "describe", words that are "things", and "action" words. These notes can be used to write sentences to summarize how animals use water, or to compare how plants and people use water.
4. Encourage subsequent groups to build on the previous groups' comments.
5. Once rotation is complete, review the comments aloud. Have students underline the words or sentences related to "how water is used". Can they be organized it into categories?

Discussion – Survival

1. Review the gallery walk categories as a class.
2. Lead a discussion to identify and reason which water uses are necessary for survival, e.g.:

- **Drinking** - Plants, humans and most animals need fresh water (some salt water animals and plants do not need fresh water such as ocean fish and seaweed)
- **Eating** - Animals can sometimes get all the water they need for several days just from the foods they eat. Herbivores eat grass and other juicy plants for water. Carnivores can get water from the blood of the prey they eat.
- **Breathing** - aquatic animals such as fish use water in a special way: they use it to breathe. They have special lungs called gills that let them breathe oxygen right from the water they swim in.

"How Animals, Plants and People Use Water"

1. Present prepared criteria or set up criteria as a class (electronic, projected or copied onto the board)
   - What information should be included? (e.g. Animal's name, how it uses water, something that surprised you, one thing we can do to help keep the water clean)
   - Which standards of language should be checked? BC Ministry of Education Writing Standards- "Writing to Communicate Information" page 53
     www.bced.gov.bc.ca/perf_stands/writing_g2.pdf
   - Other - image to support information
2. Demonstrate how to complete the student handout, "How Animals, Plants and People Use Water". Possible methods include referencing gallery walk notes, examining a new image, using pre-knowledge.
3. Distribute the student activity sheet, "How Animals, Plants and People Use Water" and remind students to refer to the established performance criteria.

Assessment Opportunity

Have students complete the performance grid as a self, or peer assessment. Students may add the completed activity sheet to their Water Portfolio. Use the assessment tool, "How Is Water Used?" to record student achievement.

Curricular Competencies

Observe students as they complete the tasks, looking for evidence that they are able to:

English Language Arts

- Comprehend and connect (reading, listening, viewing)
  - Use sources of information and prior knowledge to make meaning
  - Use developmentally appropriate reading, listening and viewing strategies to make meaning
  - Engage actively as listeners, viewers, and readers, as appropriate, to develop understanding of self, identity, and community
  - use personal experience and knowledge to connect to stories and other texts to make meaning
- Create and communicate (writing, speaking, representing)
  - Exchange ideas and perspectives to build shared understanding

Science

- Questioning and predicting
  - Observe objects and events in familiar context
- Planning and conducting
  - make and record observations
- Processing and Analyzing
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
  - Consider some environmental consequences of their actions
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

Curricular Integration

Science: discuss juvenile vs. adult adaptations and life cycles using animals that lay eggs in water but adults are more terrestrial (frogs, slamanders, mosquitoes, dragonflies etc.)

Drama: Could have students express the ideas and feelings of an animal while in character.

Extensions and Adaptations

- As an alternative to the gallery walk approach, have students find pictures (from books, magazines, the Internet, etc.) of animals using water, then share them in small groups or as a class.
- **Water and life cycles** - include photographs of animals using water at different points in their life cycles (frogs, salamaders, mosquitos, dragonflies - lay eggs in water, juviniles live in water, adults are more terrestrial; turtles - adults live in water but lay eggs on land; marine mammals - give birth and live entirely in water)
- **Living with little water** - Extend the lesson by providing opportunities for students to learn more about some of the animals and plants that have adapted to living in habitats with very little water (e.g., camel, elephant, cactus, succulents).
- **Scavenger Hunt** - Go for a walk around the community or to a local park/stream. Have students look for signs of how wildlife, people and plants use water (drinking, playing, cleaning, shelter). Refer to "Who Uses Water and How" for scavenger hunt ideas. Use the "Scavenger Hunt" handout.

Field Trips and programs

- **CRD Parks Nature Program** - register your class for a program **https://www.crd.bc.ca/education/school-programs/for-k12-teachers/field-trips/park-interpretive-programs**
- **CRD Parks Event** - Participate or encourage your students' families to participate (free of charge) **https://www.crd.bc.ca/parks-recreation-culture/parks-trails/crd-regional-parks/events**
- **The Eco Learning Hive** - local organizations offering environmental education and programs and field trips **www.ecolearninghive.org/eco-programs**

Watershed Protection

- Meet Ollie the Otter, our local Watershed Warden who will take you on a learning adventure right in the middle of a watershed! Take students to the computer lab to explore the online watershed adventure (or in class, explore as a group). **https://www.crd.bc.ca/education/school-programs/for-k12-teachers/educator-guides-resources/watersheds**
- Print and distribute the related watershed coloring poster and activity sheet. **https://www.crd.bc.ca/education/school-programs/for-k12-teachers/educator-guides-resources/watersheds**
- For other watershed protection ideas, visit: **https://www.crd.bc.ca/education/our-environment/watersheds/integrated-watershed-management**

Who Uses Water and How

a. Animals use water:

i. for drinking

ii. for food (e.g. a bear catches fish from river, ducks eat plants from a pond)

iii. to keep clean (e.g. mammals take mud baths. Shaking the mud off removes insects and dead skin.)

iv. for a home (e.g., fish)

v. to cool off from the heat

vi. for transportation (e.g. to swim)

vii. for reproduction (e.g. frogs, salamanders, insects lay eggs in water)

Viii. for safety (e.g. beavers build their lodges on water for protection)

b. Plants use water:

i. for food. Water is essential in creating sugar to feed the plant (photosynthesis)

ii. for transporting, within the plant - sugars and minerals absorbed from the soil

iii. for support. Water plumps up the plant, giving it structure.

iv. for growth and reproduction (fruit, seeds, flowers, roots)

v. to store energy. Water transports sugars to be stored (in bulbs or tubers).

vi. to keep cool. (transpiration) Water vapour evaporates through holes in plant leaves. Also creates tension which allows water to flow up into the plant against gravity.

c. Humans use water:

i. for drinking

ii. for food (growing plants and keeping livestock)

iii. for cooking and preparing food

iv. for shelter

v. for cleaning

vi. to keep cool

vii. for transportation

viii. for energy

ix. for relaxation and fun (e.g. swimming, boating)

x. for ceremonies (e.g. baptism, therapy)

xi. to make things

How Animals, Plants and People Use Water

Name: _____ Date: _____

Select one animal you have learned about.
Draw how this animal uses water.

All living things need water to survive. This is a picture of _____ using water.

(name of animal, plant, person)

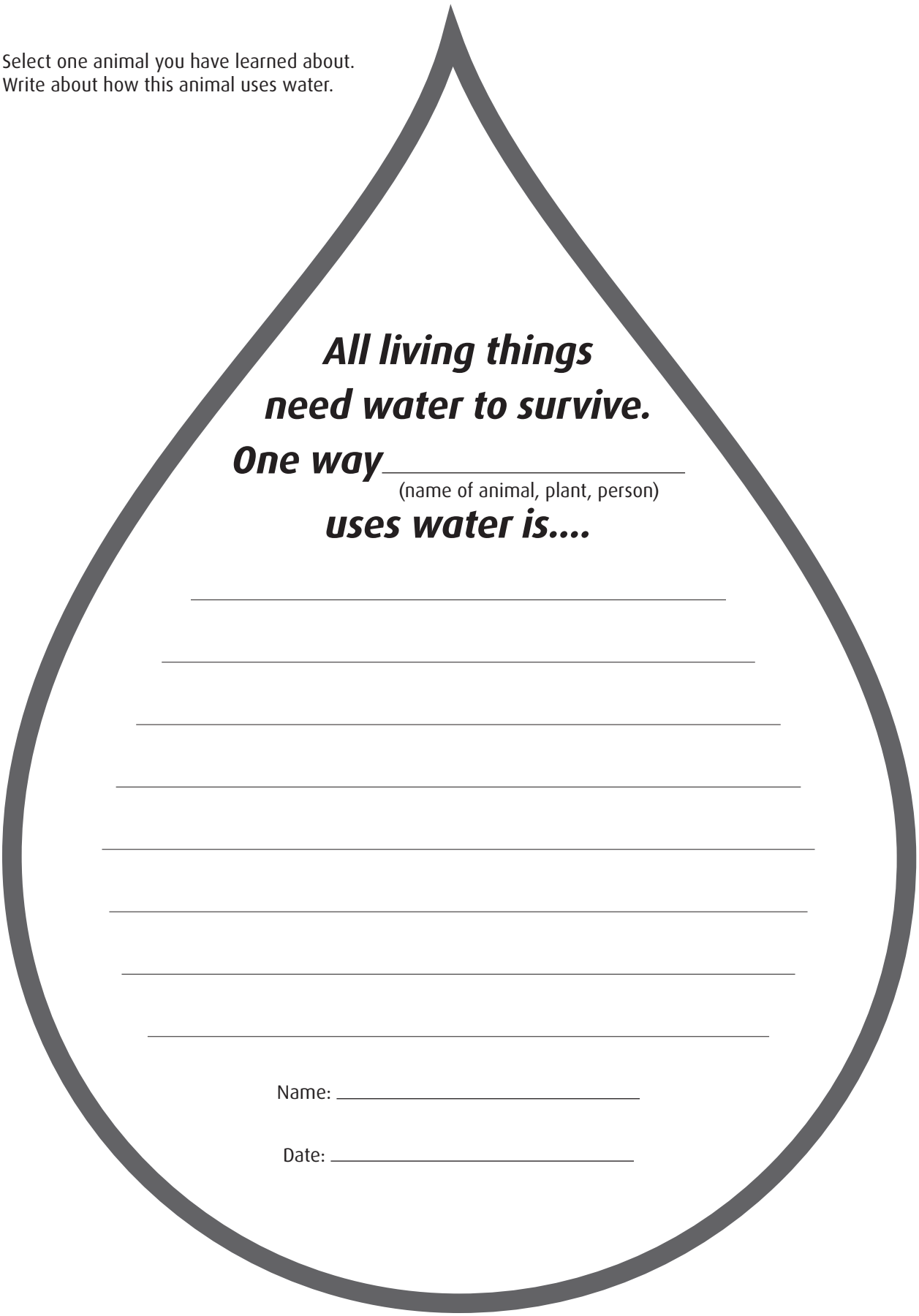
Name: _____

Date: _____

How Animals, Plants and People Use Water

Name: _____ Date: _____

Select one animal you have learned about.
Write about how this animal uses water.



All living things need water to survive.

One way _____
(name of animal, plant, person)
uses water is....

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____

Date: _____

Performance Grid: _____

Name: _____ Date: _____

CRITERIA	I am working on this	I show this in my work	I am good at this

CRITERIA	I am working on this	I show this in my work	I am good at this

Performance Grid: _____

Name: _____ Date: _____

CRITERIA	I show this in my work when...

CRITERIA	I show this in my work when...

Water Use Scavenger Hunt

Name: _____ Date: _____

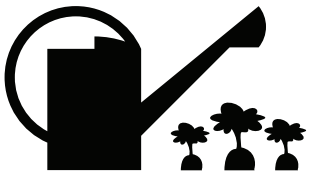
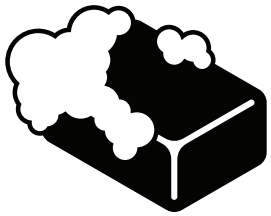
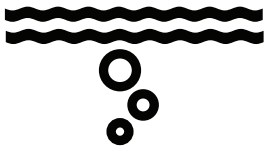
1. Who uses water in our community?

	
My neighbour _____ (who) uses water to drink _____ (to/for)	_____ (who) uses water _____ (to/for)
_____ (who) uses water _____ (to/for)	_____ (who) uses water _____ (to/for)
_____ (who) uses water _____ (to/for)	_____ (who) uses water _____ (to/for)

Water Use Scavenger Hunt

Name: _____ Date: _____

1. Who uses water in our community?

	
_____ (who) uses water to drink.	_____ (who) uses water for food.
	
_____ (who) uses water to play.	_____ (who) uses water to clean.
	
_____ (who) uses water to breathe.	_____ (who) uses water for shelter.

Lesson 7b:
Using Water – Animals

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.
- Living things have life cycles adapted to their environment.

Content

- Water sources including local watersheds
- Water conservation
- Metamorphic and non-metamorphic life cycles of different organisms
- similarities and differences between offspring and parent

45-60 minutes

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Purpose

This is the second lesson of the Using Water lessons. Students will discover facts about local animals, their lifecycles, explore different ways these animals use and rely on fresh, clean water.

Note- second activity will require extra time for research in a computer lab or library. Alternately, it may be completed with pre-knowledge.

Preparation

1. Print "Guess Who- Game Cards, Game Board" and Answer Key (1/group)
2. Print "Guess Who- My Research" (1-4/student)
3. Print "Guess Who- My Cards", "Guess Who- My Answer Key" (0.25-1/student)
4. Book time in the library or computer lab for research about local animals and water use.

Procedure

Warm up - Animals using water

1. Show one or more video clips of animals using water, such as the following.

   Beavers 00:00-03:08

   Learn how beavers use water for transportation, refrigeration and more...

   Animal Planet TV
   www.youtube.com/watch?v=Na2HYq11yuM

   Note: Beavers can be an issue for water quality in a drinking-water watershed. However, this video demonstrates the many possible uses of fresh water by animals.

Teacher Resources

- Assessment Tool: "What Can I Do?: Keeping Water Clean and Safe"

Student Resources

- Handout and Self- Assessment Tool: "Guess Who- My Research and Criteria"
- Handout: "Guess Who- My Cards"
- Water Portfolio

Lesson Resources

- "Guess Who" (one/group) cut into game cards
- Optional computer, projector and internet

River Otters 00:00- 02:02

Learn how North American river otters play, hunt and hold their breath in water.

The Wild Centre
www.youtube.com/watch?v=0jyyfIT_bl4

Bears 00:00- 01:26

See bears use a river to catch salmon.

BBC
www.youtube.com/watch?v=0NcJ_63z-mA

Raccoons 01:40- 02:12

Watch a raccoon wet its paws before eating. Studies suggest racoons wet their paws and food to create a stronger tactile sense of what they are about to eat.

Lewis C. Wilson
www.youtube.com/watch?v=R0hnqsucH-c

Note- remind class that they should not feed wildlife, as depicted in this video.

Penguins, Pigs and more 00:00 – 01:18

See how animals at the London Zoo cool down on a hot day.

London Zoo
www.youtube.com/watch?v=CqXh2FVAIgk

Red-legged frog eggs 01:50 – 2:40

How do red-legged frogs use water? See what a dedicated group of people are doing to help.

Golden Gate National Park Conservancy
www.youtube.com/watch?v=9ohavgOHNlU

2. Ask students all the ways they saw animals using water.

Mix and Match- How animals use fresh water

1. Have students form groups of 4 players
2. Explain that students will receive cards with details about different local animals, their home, their food, their status and how they use water. Using their powers of deduction they will match the cards to the animal they describe.
3. Give each group a set of game cards.
4. Have students divide cards evenly.
5. Each student reads their card(s) and works with the group to match it to the animal.
6. Post or distribute the answer key.

Discussion

Ask students if any answers surprised them? What clues helped? What threatens these animals? What can we do to keep fresh water clean? (see teacher resource "What Can I Do") (Note: Often humans impact shelter and fresh water quality through development and pollution.)

My Mix and Match

1. Distribute the "Guess Who - My Research" handout.
2. Take students to the library or computer las for research or have them complete the handout with previously studied information.
3. Set up "My Research Performance Grid Criteria" and have students complete the worksheet with research or known information.

Assessment Opportunity

Collect the "My Research" sheets and review for accuracy and demonstrated learning outcomes.

Have students correct any mistakes and use to complete "Guess Who - My Cards" and handout. First photocopy each sheet to be an answer key. Then have students cut out the cards.

Note: These cards can be used to play the game again with classmates or at home.

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Observe objects and events in familiar context
  - Ask questions about familiar objects and events
  - Make simple predictions about familiar objects and events
- Planning and conducting
  - Make and record observations
- Processing and Analyzing
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
  - Consider some environmental consequences of their actions
- Communicating
  - communicate observations and ideas using oral or written language, drawing, or role-play

Extensions and Adaptations

- Modify difficulty and demonstrated skills and strategies through manipulation of the game cards and board (e.g. number of animals to research, type information to research, and method of representation) and through performance criteria.
- Field Trips and programs
  - **CRD Parks Nature Program**- register your class for a program **https://www.crd.bc.ca/education/school-programs/for-k12-teachers/field-trips**
  - **Eco Learning Hive**- local organizations offering environmental programs **ecolearninghive.org/**

Guess Who

www.crd.bc.ca/education/our-environment/wildlife-plants

Red-Legged Frog	*Painted Turtle*	*River Otter*	*Pacific Salmon*
My Home I live near ponds or streams in cool wet forests. My family can be found hopping anywhere from the Fraser Valley and Vancouver Island in BC to California in the USA.	**My Home** I am native to BC, but humans brought me to Vancouver Island. I live in ponds, streams and ditches with muddy bottoms.	**My Home** I live in dens next to rivers, streams, ponds, lakes or beaches.	**My Home** Most of my life is spent in the salty sea, but some of my life is in fresh water.
My Lifecycle I lay my eggs in a shallow pond or stream. We are tadpoles first then I grow into 7-10 cm long frogs.	**My Lifecycle** You can see me in Esquimalt. I lay my eggs in a shallow hole in the ground near ponds, streams and ditches. I can live 20 to 30 years.	**My Lifecycle** I am born underground in a den. When I am young I am called a kit. I will live up to 12 years old.	**My Lifecycle** I am born in fresh water, but spend my adult life in the salty sea. When it is time to breed, I return to fresh water.
My Food As a tadpole, I eat algae. When I am grown up, I eat insects.	**My Food** I eat small animals, like crayfish, and water plants.	**My Food** I eat fish, shellfish, birds and small mammals. I catch food by feeling it with my whiskers.	**My Food** I eat plankton (tiny shellfish and fish worms) as I swim through the salty sea.
My Status Oh oh, there are less of us frogs. Humans changed the areas where we live by cutting down trees and built farms and cities where we live. Now, I am protected in BC.	**My Status** I am protected in BC because there are not many of us left. My shell doesn't protect me from carsrunning over me or from humans taking me home to be a pet.	**My Status** Great. There are lots of us running and swimming around rivers, streams, ponds, lakes and beaches in Canada.	**My Status** OK, but in some parts of the Pacific Ocean there are less of us. Plants help keep the fresh water clean and cool, but humans replaced the plants with buildings and roads.
My Water Use I use water to stay cool, keep my red legs and skin wet, and to keep my eggs safe.	**My Water Use** I use water to help me swallow my food, to keep me safe and to hibernate in my shell.	**My Water Use** I use water to hunt food and for transportation like when I swim up and down rivers.	**My Water Use** I use water to breathe through my gills, to hunt, for transportation and as my home.

Guess Who - My Cards

Name: _____ Date: _____

Guess Who... ***Make your own "Guess Who" game cards with your research information.***	**My Home**
My Lifecycle	**My Food**
My Status	**My Water Use**

Guess Who - My Research

Name: _____ Date: _____

Write 1-2 sentences for each point below about an animal you know, researched or learned about in class.

My Lifecycle

My Home

My Food

My Water Use

My Status

How can you help keep water clean and safe for these animals?

CRITERIA	I show this in my work

What Can I Do? Keeping Water Clean and Safe

All living things need water to survive. Help protect local animals in the following ways:

- Protect plants near waterways. They help keep the water clean (prevent erosion) and the temperature cool. They provide nutrients to animals and other plants too.
- When in parks and natural areas
  - keep dogs on leashes
  - walk on paths
  - watch wildlife from a distance
  - be careful where you step
  - leave animals in their natural habitats
- Don't let garbage go down the drain. Anything that goes down an indoor drain can end up in the ocean (sanitary sewer) or our groundwater (septic system). Anything that goes down an outdoor drain (storm drain) can end up in our streams, creeks and ocean.
- Recycle, compost and use garbage bins.
- Make homemade cleaners.
  https://www.crd.bc.ca/docs/default-source/source-control-pdf/2017recipe-card_forweb.pdf?sfvrsn=669d0aca_2
- Coordinate a community clean up.
  https://www.crd.bc.ca/service/community-clean-up-assistance-program
- Adopt a stream
- Be curious. Learn from others.
- Learn more about these and other local animals.
- Ask friends and family about their water wise habits.
- Spread the word. Let your friends and family know what you are doing to help. They can learn from your good habits.

Lesson 7c:
Using Water – Plants

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.
- Forces influence the motion of an object.

Content

- Water conservation
- Types of forces

English Language Arts

Big Ideas

- Through listening and speaking, we connect with others and share our world.

Content

- Strategies and processes
  - oral language strategies

45-60 minutes, over at least 2 days

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.

Purpose

This is the third of the Using Water lessons. This lesson provides hands-on opportunities for students to explore how plants use fresh water.

Preparation

1. Photocopy (one/student) "How Plants Use Fresh Water". This lesson extends over two days.
2. Prepare the following materials for the experiments:
   - select a houseplant (or one plant/group, if available), and leave it un-watered for as long as it takes to look droopy and dry
   - "wilt" several stalks of celery (two per group) by leaving them in a warm dry place for one or two days.

Procedure

Ask students to predict: "What would happen if a plant did not get enough water?" (Answer: It would wilt, would not be able to transport nutrients throughout the plant and could eventually die.)

DAY ONE

Houseplant Experiment

1. Show students the wilted houseplant, or assign each group a houseplant.
2. What can they observe about this plant? Have them record their observations on the student activity sheet, "How Plants Use Fresh Water."
3. Water the plant(s). Explain that you will observe the plant again the next day.

Celery Experiment

1. Distribute one stalk of wilted celery to each group.

Teacher Resources

- Assessment Tool: "How Plants Use Fresh Water" performance grid template

Student Resources

- Handout: "How Plants Use Fresh Water"
- Assessment Tool: "How Plants Use Fresh Water" performance grid template
- Water Portfolio

Lesson Resources

- Images of plants using water **www.crd.bc.ca/teacher**
- House plant, slightly wilted (1/class or 1/group)
- Celery sticks (2 /group)
- Food colouring (for best effect use a bright colour).
- Clear cups (1/group)
- tap water

2. What can they observe? What do they think will happen if they put the celery in a glass of water? Have them discuss their predictions in their groups, and record their predictions on the student activity sheet.
3. Distribute a cup of water to each group.
4. Have students place the celery stick into the cup and record what happens.
5. Distribute the second piece of celery to each group.
6. Have students predict what will happen when they place the celery in a glass of coloured water.
7. Add food colouring to each cup of water.
8. Have students record the results on their handouts.

Discussion

Debrief as a class, using questions such as the following:

- What happened to the first stalk of celery? Why do you think that happened? *Water gives a plant structure.*
- What happened to the second stalk of celery? *Coloured water moves up into the stalk.*
- Were your predictions correct?
- Based on these observations, what do you think will happen to the houseplant tomorrow?

DAY TWO

Houseplant Experiment

1. In their groups, have students observe and record what happened to the plant.

Discussion

Debrief as a class, using questions such as the following:

- What happened to the houseplant? Why?

  When a wilted plant is given water, it will stand up straight again. Water gives a plant structure.

- What did you learn from these experiments?

  Plants use water for :

  - » *support - water plumps up the plant, giving it structure.*
  - » *to transport food, minerals and sugars somtimes against gravity (tension)*
  - » *growth and reproduction- fruit, seeds, flowers, roots*
  - » *food. Water is essential in creating sugar to feed the plant (photosynthesis)*
  - » *storing energy - water transports sugars to be stored*
  - » *keeping cool - water vapour evaporates through holes in plant leaves. (transpiration)*

- Do you think we could give the plant too much water? What do you think would happen?

  Yes, too much water is not good for plants. It can:

  » *"drown" the plant, plants need air in the soil to "breathe"*
  » *cause roots to grow shallow in the ground instead of deep into the soil. This means they are dependent on a continuous source of water instead of becoming "independent" and seeking their own source underground.*

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Demonstrate curiosity and a sense of wonder about the world
  - Observe objects and events in familiar context
  - Ask questions about familiar objects and events
  - Make simple predictions about familiar objects and events
- Planning and conducting
  - Make and record observations
  - Safely manipulate materials to test ideas and predictions
  - Make and record simple measurements using informal or non-standard methods
- Processing and Analyzing
  - Sort and classifydata and information using drawings, pictographs and provided tables
  - Compare observations with predictions through discussion
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
  - Consider some environmental consequences of their actions
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

Extensions and Adaptations

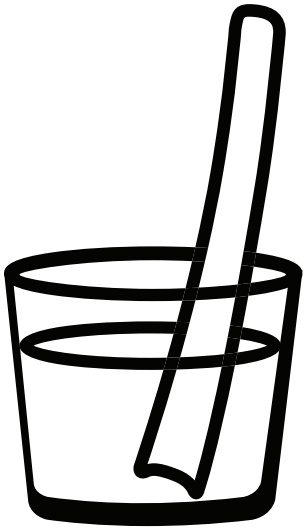
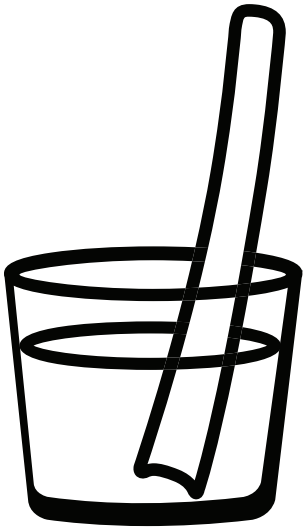
- As an alternative to the gallery walk approach, have students find pictures (from books, magazines, the Internet, etc.) of plants using water, then share them in small groups or as a class.
- Extend the lesson by providing opportunities for students to learn more about some of the plants they have seen, as well as plants that have adapted to living in habitats with very little water (e.g., cactus).
- **Compare and contrast.** Compare a fresh cut flower to a houseplant over time. Which lives longer and why? *Answer: Houseplant. Plants also need nutrients from soil to survive.*
- **Compost Workshop**- Book a class program with the Greater Victoria Compost Education Centre. Students learn the importance of composting for reducing waste and improving our soil, water and air. **https://www.compost.bc.ca/education/school-programs/**
- **CRD Parks Workshop**. Register your class for a CRD Parks Nature Program **https://www.crd.bc.ca/education/school-programs/for-k12-teachers/field-trips**
- **The Eco Learning Hive.** A list of local southern Vancouver Island organizations offering environmental fieldtrips and programs **ecolearninghive.org/**
- Recreate the game from lesson 7b, but this time focus on drought tolerant, native plants **https://www.crd.bc.ca/education/natural-gardening**

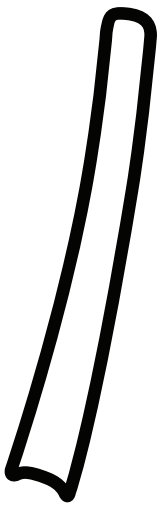
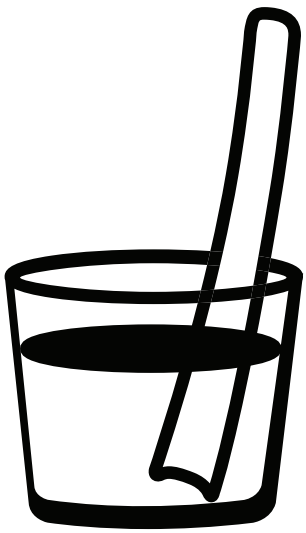
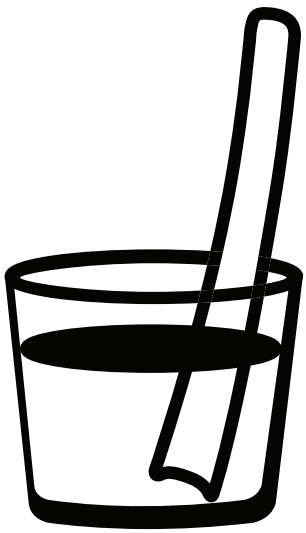
How Plants Use Fresh Water

Name: _____ Date: _____

Draw what happened!

PLANT		
		
BEFORE: What does the plant look like?	I PREDICT: What do you think will happen if the plant is watered?	AFTER: Draw what happened.

STALK OF CELERY IN WATER		
		
BEFORE: What does the first stalk of celery look like?	I PREDICT: What do you think will happen if you put the celery in a glass of water?	AFTER: Draw what happened.

STALK OF CELERY IN COLOURED WATER		
		
BEFORE: What does the second stalk of celery look like ?	I PREDICT: What do you think will happen if you put the celery in a glass of coloured water?	AFTER: Draw what happened.

Based on what you saw:

1. How do plants use water?

2. Do plants need water to survive? What clues did you see?

3. Which do you think will live longer, the houseplant or the celery? Why?

Lesson 7d:
Using Water - Humans

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.

Content

- Water sources including local watersheds
- Water conservation

45-60 minutes, over at least 2 days, plus out of class time

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.

Purpose

This is the fourth of the Using Water lessons. This lesson focusses on how humans use water.

Note: This lesson extends over two days.

Preparation

1. Photocopy "My Fresh Water Log" (one/student)

Procedure

Water Audit - How I Use Water

DAY ONE- LOG

1. Distribute the student handout, ""My Fresh Water Log". Explain that for one full day, students will use the handout to log all the ways they use water.
2. Have them make predictions about their water use habits- What do they think they will use water for the most? The least? Where do they think they will use water the most? The least?

DAY TWO- TALLY

1. Have students calculate their top three most frequent water uses. Distribute 3 water drops to each student and have them place one water drop beside each of their top three uses.
2. Review the gallery walk categories and which water uses are necessary for survival, e.g.: Drinking- we need fresh water and Eating - People can absorb water from the plants and animals they eat. How often did they use water for "survival"?

Teacher Resources

- Assessment Tool: "My Fresh Water Log"

Student Resources

- Activity Sheet: : "My Fresh Water Log"
- Water Portfolio

Lesson Resources

- Tally: Top Three (ways our class uses water)
- Tally Markers

Parent Resources

- *How is Fresh Water Used?*
- *My Family's Fresh Water Log*

Discussion

1. Discuss the findings such as:
   - Where and when did the class use the most water, the least and what for?
   - How many people used water to wash their dogs?
   - What are some of the unique ways your classmates have used water?
   - Were any predictions right? Were there any surprises?

Distribute the parent handout, *How Is Fresh Water Used?* for students to take home. Advise students that they should also take home their water usage logs.

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Observe objects and events in familiar context
  - Ask questions about familiar objects and events
  - Make simple predictions about familiar objects and events
- Planning and conducting
  - Make and record observations
  - Make and record simple measurements using informal or non-standard methods
- Processing and Analyzing
  - Sort and classifydata and information using drawings, pictographs and provided tables
  - Compare observations with predictions through discussion
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
  - Consider some environmental consequences of their actions
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play

Extensions and Adaptations

- Save the data collected from the logging exercise, and use in conjunction with Lesson 11: Water Consumption (mathematics).
- **Have students create a Community Water Map.**
  Community maps allow users to add their own information and knowledge including icons, photos, artwork and stories. Electronic versions can include links to videos, audio tracks, webpages and other multimedia. A water map could include identification of salt water and fresh water sources, who uses water and how. The map could include toilets, sinks, shower/bath, swimming pool, water fountains, water park, hoses, laundromat, dog grooming, lakes, streams, rivers, beaches, ocean, car washes etc.

  Sample maps: **www.greenmap.org**
  Maps are listed by theme or location.

  Sample icons: **www.greenmap.org/icons**
  Use these or create your own.

Social Studies: use Social Studies inquiry processes and skills to ask questions; gather, interpret, and analyze ideas; and communicate findings and decisions

- Online games and resources:
  - **www.wateruseitwisely.com/kids/index.php**

My Fresh Water Log

Name: _____ Date: _____

Make a prediction.

I will use water most often at (school, home, other) _____ .

I will use water the least often _____ .

Record all the ways you use water for one full day.

Morning		
AT HOME	**AT SCHOOL**	**AT OTHER PLACES**

Answer at least one of the following:

Something I noticed was...

_____

An idea I had about using less water was...

_____

One way I conserve water is...

_____

Other:

_____

Name: _____ Date: _____

Lunchtime		
AT HOME	**AT SCHOOL**	**AT OTHER PLACES**

Answer at least one of the following:

Something I noticed was...

_____

An idea I had about using less water was...

_____

One way I conserve water is...

_____

Other:

_____

Name: _____ Date: _____

Afternoon		
AT HOME	**AT SCHOOL**	**AT OTHER PLACES**

Answer at least one of the following:

Something I noticed was...

_____

An idea I had about using less water was...

_____

One way I conserve water is...

_____

Other:

_____

Name: _____ Date: _____

Evening		
AT HOME	**AT SCHOOL**	**AT OTHER PLACES**

Answer at least one of the following:

Something I noticed was...

_____

An idea I had about using less water was...

_____

One way I conserve water is...

_____

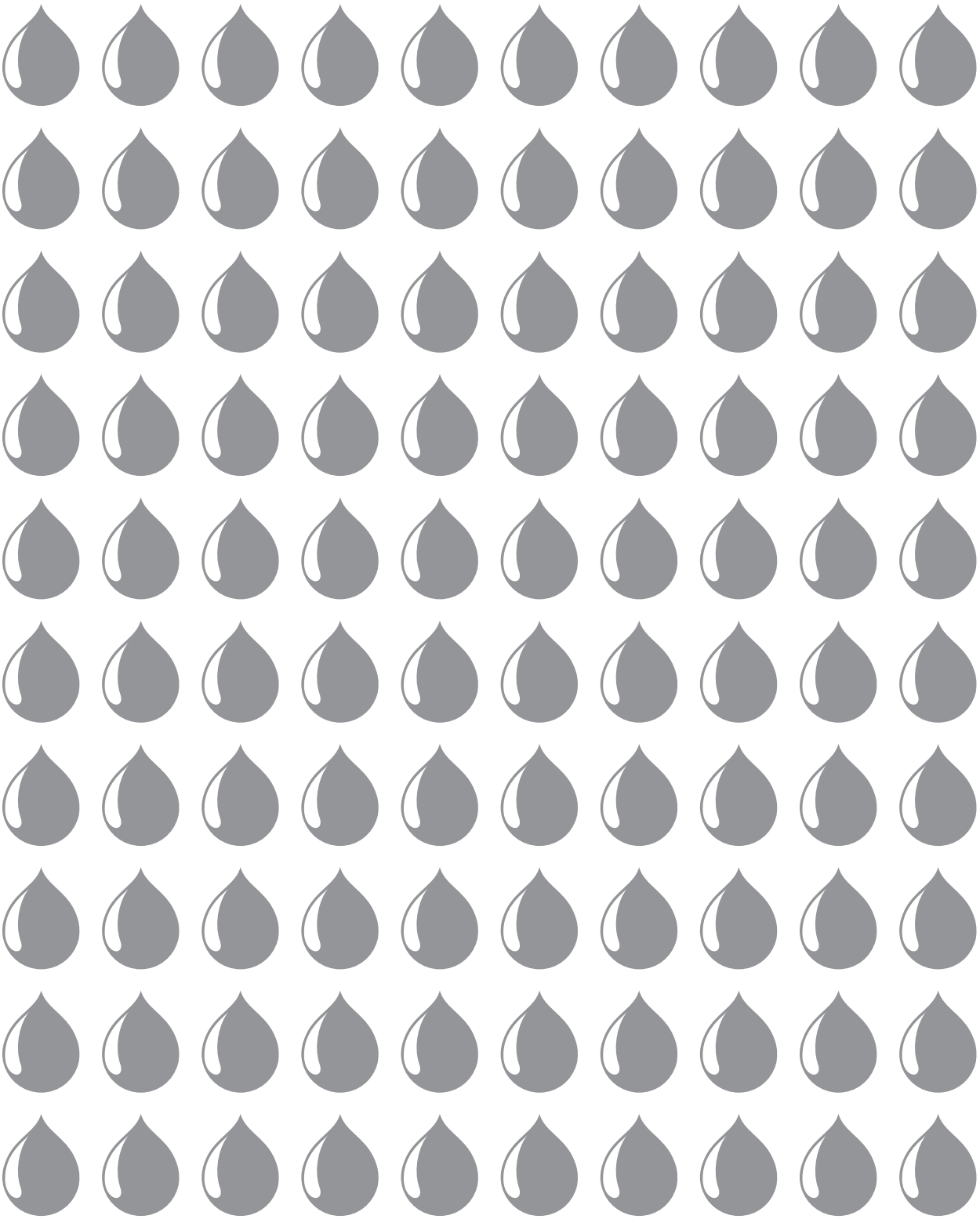
Other:

_____

Tally - Top Three Ways Our Class Uses Water.

Food – cook, grow, transport	
Energy	
Drinking	
Transportation	
Fun & Relaxation	
Cleaning	
Hygiene (cleaning myself)	
Cultural	
Gardening	

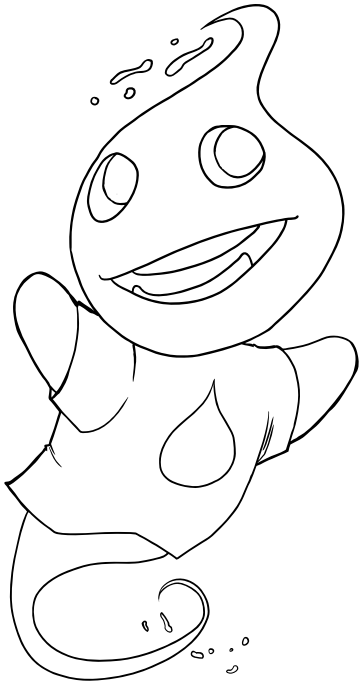
Tally Markers



How is Water Used?

Over the past few days in class, your child has been learning about the number of different ways that all living things – plants, animals, and people – use water. As part of this unit, your child has been asked to create a log to record all the ways in which she or he uses water over the course of the day.

You can help your child learn more by completing a water usage chart for the whole family. Include water used inside or outside your home, at work, at school, and in the community. Use this as an opportunity to think about how much water you use and ways that you might conserve and protect water for all living things..



Did You Know...

Showers and baths are the greatest water use in the home - 35% of indoor water use.

My Family's Fresh Water Log

FAMILY MEMBER	I USED WATER TO...	WHEN	WHERE

Lesson 7e:
Using Water – Conclusion

Purpose

This is the final lesson of the Using Water lessons. This brief conclusion provides an opportunity for students to summarize and synthesize their learning.

You Learn About Fresh Water?

Lesson Resources

- KWL chart (begun in Lesson 1)

Preparation

Photocopy of Assessment Tool: *What Did You Learn About Fresh Water?* (one/student)

Procedure

1. Begin with a class debrief on what students learned during the various activities in this series of lessons. What was the most interesting? What would they like to try again?
2. Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from the experiments in this lesson. Add any new terminology to the class vocabulary list.

Assessment Opportunity

In addition, questions such as the ones found in the Assessment Tool, "What Did I Learn About Fresh Water?" can be used in a conference approach to help students summarize and synthesize their learning. Add students' answers to their Water Portfolios.

Extensions and Adaptations

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.
- Forces influence the motion of an object.
- Living things have life cycles adapted to their environment.

Content

- Water conservation
- Types of forces
- Water sources including local watersheds
- Metamorphic and non-metamorphic life cycles of different organisms

30-45 minutes

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.

Teacher Resources

- Assessment Tool: How is Fresh Water Used? (provided with Lesson 7b)

Student Resources

- Assessment Tool: What Did

- A number of learning resources are available that offer additional suggestions for teaching water science.

SEE APPENDIX D FOR SUGGESTIONS

What Did You Learn About Fresh Water?

Student Name	1. True or false: All living things need water to survive.	2. What will happen to a plant if it doesn't get enough water?	3. Can you name 3 ways animals use water?	4. Can you name 3 ways people use water?	5. What do you think is the most important thing you learned about water?	Notes

How is Fresh Water Used?

Name: _____ Date: _____

1. True or false: All living things need water to survive.

2. What will happen to a plant if it doesn't get enough water?

3. Can you name 3 ways animals use water?

4. Can you name 3 ways people use water?

5. What do you think is the most important thing you learned about water?

Lesson 8

The Water Song

Learning Standards & Assessment Tools

Time

Resources

Curricular Integration

Handouts

Music

Lesson 8:
The Water Song

Arts Education (Music)

- Creative expression develops our unique identity and voice
- Dance, drama, music, and visual arts are each unique languages for creating and communicating

Content

- Elements in the arts
  - Music: beat/pulse, duration, rhythm, tempo, pitch, timbre, dynamics, form, texture
- Processes, materials, technologies, tools, and techniques to support arts activities
- Personal and collective responsibility associated with creating, experiencing, or sharing in a safe learning environment

60 minutes

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.

Purpose

In this lesson, students listen to a water conservation song, "Drip, Drip, Drop". Option to learn and perform.

Preparation

1. Set up the audio equipment and the song, and arrange the room so that students have space to move.
2. Photocopy "Drip Drip Drop" lyrics and Assessment Tool "Drip Drip Drop" (1/student)

Note that this lesson has been designed so that it can be taught by classroom teachers without any music expertise; however, you may wish to enlist the help of a music specialist teacher, if available.

Procedure

Rhythm Exploration

1. Play the instrumental version of the song (Track 2 on the CD), and invite students to move around the room in response to the music. Repeat two or three times.
2. Play the recording again, this time asking them to chant along with the music (select a single word or phrase for all students to chant, such as "drip drip" or "water water"). Alternatively, students can use rhythm instruments, clapping or body percussion to respond rhythmically to the music (e.g., creating rhythmic ostinati).
3. Next, play the vocal version of the song recording (Track 1 on the CD). Distribute the student handout "Song Lyrics" and play the recording again while students follow along. As they listen, ask them to think of actions they could use along with the music. For example:
   - make dripping motions with their hands
   - make motions of turning off taps
   - make wave motions with arms
   - form raindrop shapes with index fingers and thumbs of both hands.

Teacher Resources

- "*Drip Drip Drop*: Music Notation"
- Assessment Tool : "*Drip Drip Drop*" (1/student)

Student Resources

- Handout "*Drip Drip Drop*" lyrics (1/student)

Lesson resources

- Song "*Drip Drip Drop*" (CD or electronic file)
- CD player OR computer and speakers
- Optional: rhythm instruments

Music Actions

After allowing time for exploration, invite student volunteers to share their actions with the rest of the class. Decide as a class which actions to use, then play the recording again while students perform the gestures

Thoughts and Feelings

Have students use the student handout "*Drip, Drip, Drop"* to reflect on the thoughts and feelings that came to mind as they listened to the song. To direct their reflections, you may wish to have them begin by creating their own title for the song.

Assessment Opportunity

Observe students as they share and decide on the movements and gestures they will use. Look for evidence that they are respectful of each other's contributions.

Collect students' completed handouts, and look for evidence that they are able to make personal connections with the music. Add students' completed sheets to their Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

Arts Education (Music)

- Exploring and creating
  - Explore elements, processed, material, movements, technologies, tools, and techniques of the arts
- Reasoning and reflecting
  - Observe and share how artists (dancers, actors, musicians, and visual artists) use processes, materials, movements, technologies, tools, and techniques
  - Develop processes and technical skills in a variety of art forms to refine artistic abilities
- Communicating and documenting
  - Interpret symbolism and how it can be used to express meaning through the arts
  - Express feeling, ideas, stories, observations, and experiences through creative works

Curricular Integration

- Dance: Use the recording of the song as the basis for movement exploration activities.
- The song lyrics, along with the recording, can be used as the basis for English language arts lessons. Activities could include:
  - using the recording and the printed lyrics together as a tool to help students read the lyrics
  - using the video sing-along of *Drip, Drip, Drop* as a tool to help students read the lyrics
  - comparing rhyme and metre in music to rhyme and metre in poetry
  - having students write new lyrics for the song.

Extensions and Adaptations

- Play Track 3 of the CD, which contains a vocal version of the song without sound effects. Challenge students to create their own sound effects to perform along with the recording.
- "*Drip, Drip, Drop*" music notation is written in the key corresponding to the audio recording and also in a higher key that may be more appropriate for student voices at this age.
- Form a longer music unit using the song, incorporating singing, instruments, movement, etc. and focus on other aspects of the grade 2 music curriculum, including:
  - melodic contour and rhythmic patterns
  - verse-and-chorus form in songs
  - purposes for music (i.e., in this case, to deliver a water conservation message).
- Rehearse and present to parents, other classes, the school or community.
- Showcase your creativity- submit a video of your class performance or other project inspired by this song to education@crd.bc.ca.
- Listen to other songs about saving water such as *The Saving Water Song* - 2009 Audience Choice Winner- by filmmaker Keith Cantrell of McPherson.
  https://vimeo.com/6505893

Drip, Drip, Drop - Song Lyrics

chorus
Drip, drip, drop, save the water
Drip, drip, drop, save the water
Every drop counts, don't waste one
Drip, Drip, Drop

verse 1
When you brush your teeth, be quick
Don't let the water rush through the sink
When you want to give your body a real good scrub
Just take a shower don't fill the tub

chorus
Drip, drip, drop, save the water
Drip, drip, drop, save the water
Every drop counts, don't waste one
Drip, Drip, Drop

verse 2
The water you drink from the reservoir
Was here before the dinosaur
It falls from the sky as drops of rain
We drink it, and flush it, and use it again

chorus
Drip, drip, drop, save the water
Drip, drip, drop, save the water
Every drop counts, don't waste one
Drip, Drip, Drop

verse 3
Washing your hands is easy to do
Put water in the sink and use a plug too
Use lots of soap. Give them a rub
(ALTERNATIVE WORDING - REPLACE "LOTS OF SOAP" WITH "SOME")
Don't let the water run while you scrub

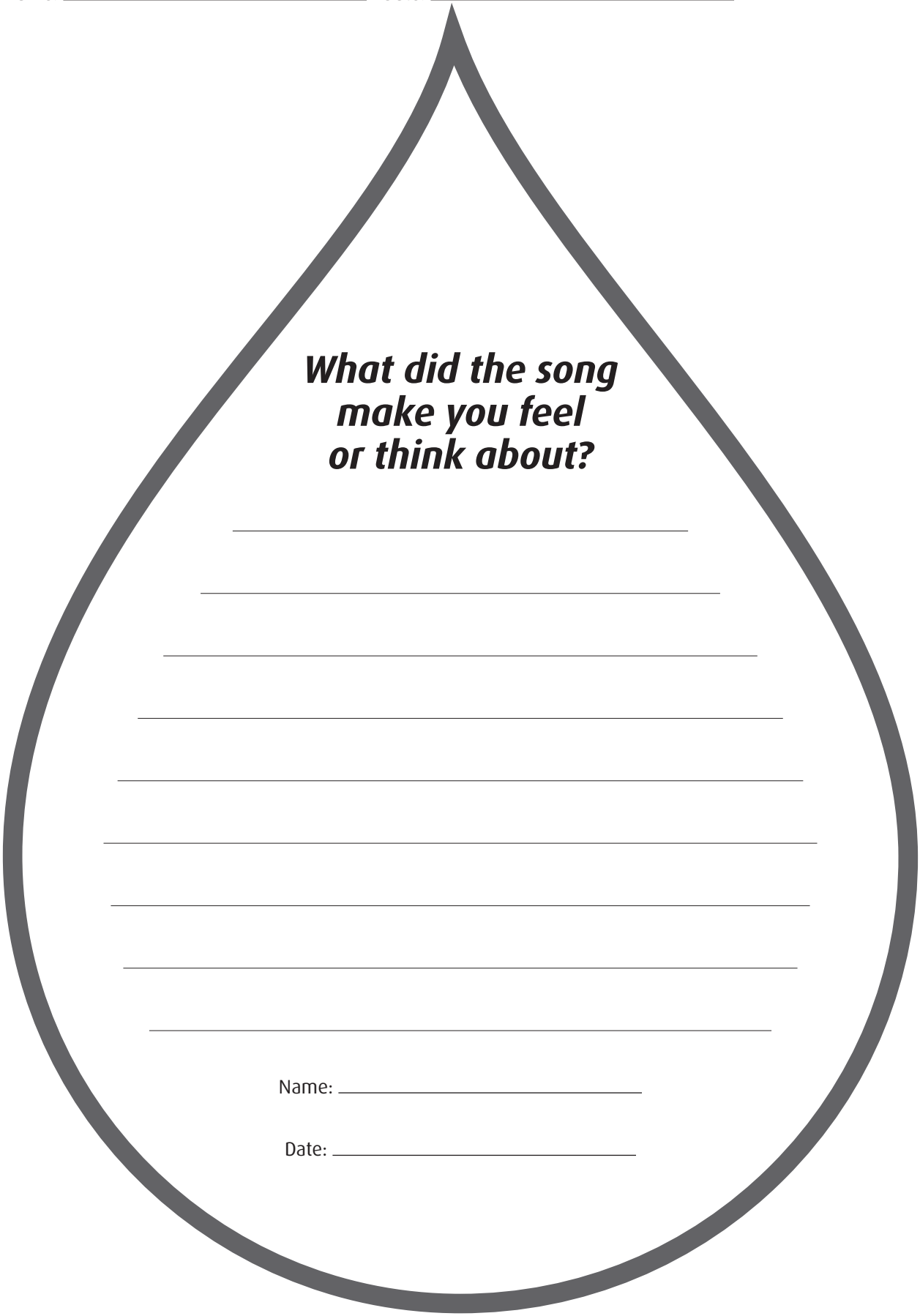
chorus
Drip, drip, drop, save the water
Drip, drip, drop, save the water
Every drop counts, don't waste one
Drip, Drip, Drop

verse 4
We share the water with animals and fish
If they could talk, they'd have one wish
Please use the water carefully
So there will be some left for me

chorus
Drip, drip, drop, save the water
Drip, drip, drop, save the water
Every drop counts, don't waste one
Drip, Drip, Drop

Drip, Drip, Drop

Name: _____ Date: _____



What did the song make you feel or think about?

_____

_____

_____

_____

_____

_____

_____

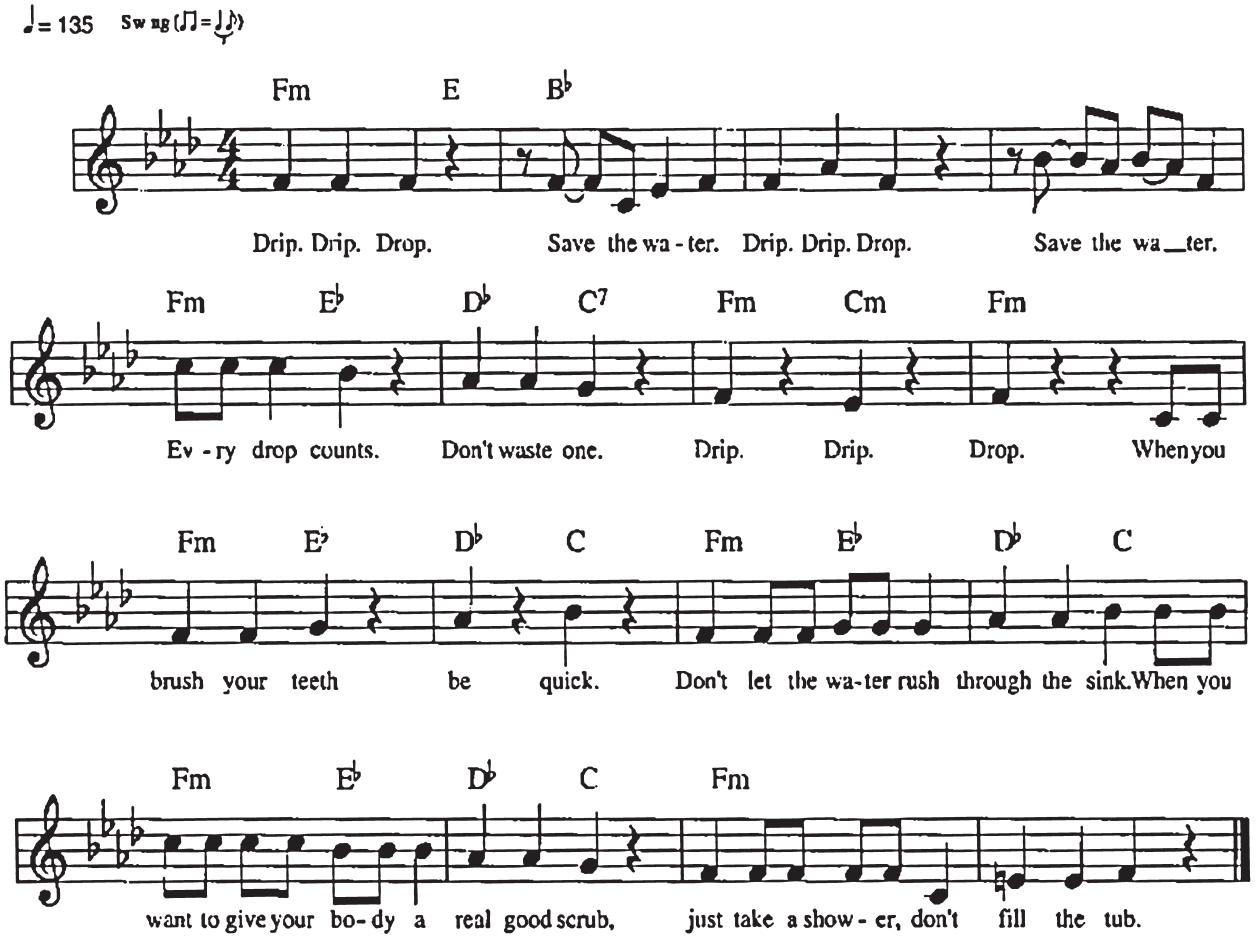
_____

_____

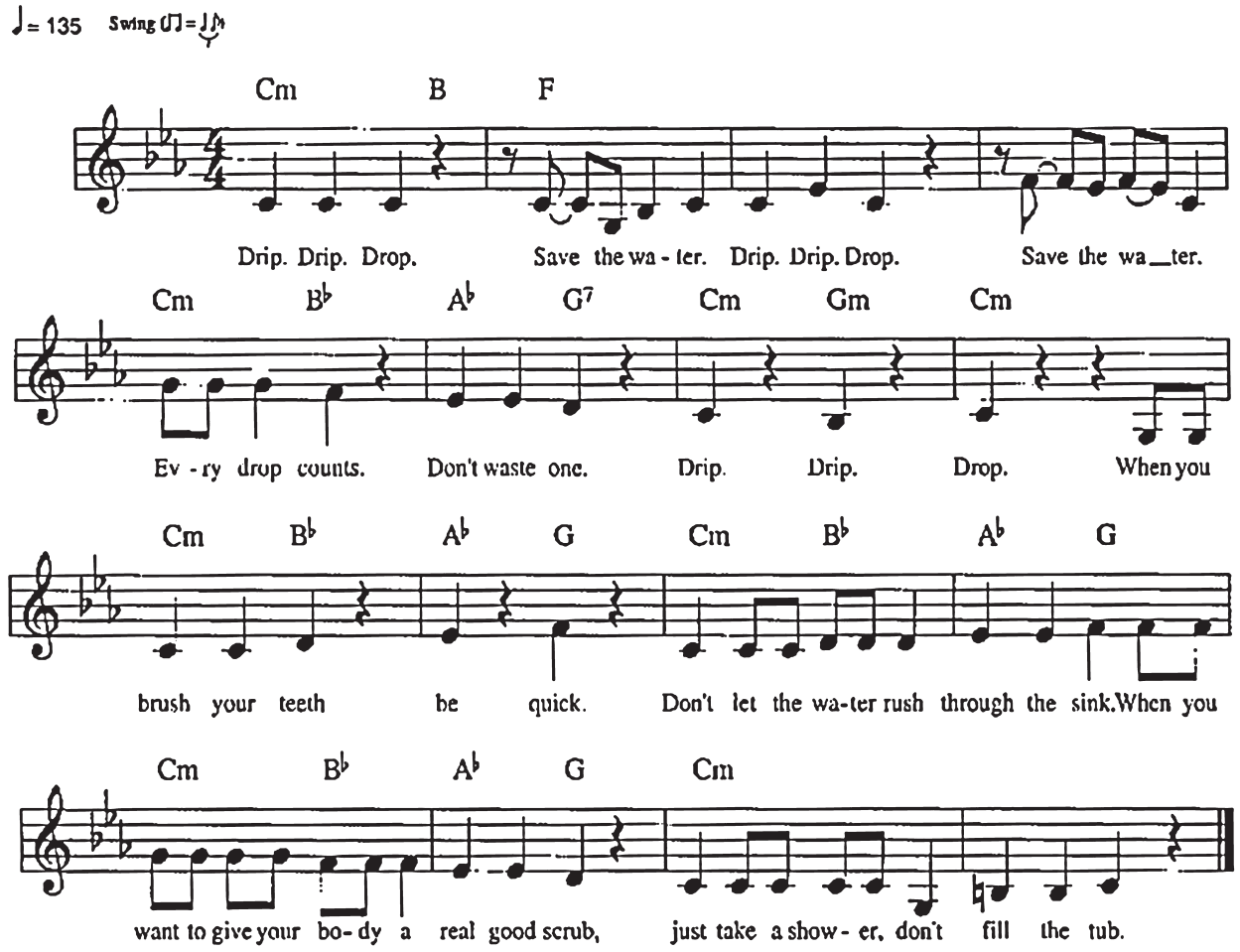
Name: _____

Date: _____

Drip, Drip, Drop - Music Notation, F minor



Drip, Drip, Drop - Music Notation, C Minor



Lesson 9

Water Words

Learning Standards & Assessment

Time

Resources

Curricular Integration

Handouts

CRD

every drop counts

Lesson 9:
Water Words

English Language Arts

Big Ideas

- Playing with language helps us discover how language works.

Content

- Strategies and processes
  - reading strategies
  - oral langugae strategies
- Language features, structures, and coventions
  - word patterns, word families

45-60 minutes

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.

Purpose

In this lesson, students engage in a number of activities to help them review vocabulary terms related to water and water conservation.

Preparation

Review the teacher resource "*Water Words"* and add any additional words from your class vocabulary list as necessary. Make one photocopy of the resource/student. Cut out the words and place them in the envelopes (one complete set/student).

1. Photocopy:
   - student handout - *Water Words* (one/student)
   - student handout - *Word Maps* (three/student)
   - assessment tool - *Water Words*
2. Photocopy "*Water Words"* Game (one/group), cut out and place into an envelope (one/group)

Procedure

Warm-up: Strategies for learning words

Review with students their strategies for learning new words. For example:

- sounding the word out
- looking for parts of the word that are familiar
- reading or hearing the word in context
- looking at pictures

Word Maps

1. Distribute the student handout "*Water Words"*. Have students put different marks beside words they know (✓), are unsure of(?), and don't know(*). Distribute three blank Word Maps to each student.
2. Go over each word individually, and define them as a class. Use the definitions found in Appendix B: Glossary as necessary.

Teacher Resources

- Assessment Tool:
  "Water Words"
  "Water Words Story"
  "Water Words Map"

Student Resources

- Handout "*Water Words*" (one/student)
- Handout - "*Water Word Map*" (three/student)

Lesson resources

- Class vocabulary list
- "*Water Words*" Game for cut-outs
- Envelopes (one/group)

3. Have students complete a word map for three words they did not know or were unsure of. Encourage them to personalize the word maps (add videos, texts, songs, activities, personal or shared stories and diagrams that help remember the definitions.)

Water Word Categories

1. Referencing the "Water Words" list, demonstrate ways to show connections among related words and draw on pre-knowledge to learn unfamiliar words. For example:
   - Evaporate, evaporation, vapour are all related. They all have vapour in them.
   - We make reservations at a restaurant to save a table. "We reserve water in the Sooke Reservoir."
   - Lake, river, and ocean are all bodies of water.
   - Waste is the opposite of conserve. Melt is the opposite of freeze.
   - Divide the class into groups, and distribute one envelope of words to each group. Challenge students to come up with at least three different ways to organize the words. If students are having problems getting started, offer suggestions such as:
     - alphabetically
     - from shortest word to longest word
     - creating a web
     - creating a list with categories (e.g., "bodies of water," "opposites")
     - "action words," "things," and "other."
3. Debrief as a class, and invite groups to share the different ways they organized the words. Did this exercise help them with their understanding of the various terms?
4. Distribute an Assessment Tool, "*Water Words, Water Words Story* or three *Water Word Maps"*, to define Reservoir, Precipitation and conserve. Go over it as a class, ensuring students understand the instructions.

Assessment Opportunity

Collect students' completed sheets and check for accuracy. Discuss students' responses using prompts such as:

- My favourite new word is _____. I can use it in a sentence this way: _____.
- My favourite strategy for learning new words is _____.

Add students' completed sheets to their Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

English Language Arts

- Comprehend and connect
  - Read fluently at grade level
  - Use sources of information and prior knowledge to make meaning
  - Use developmentally appropriate reading, listening, and viewing strategies to make meaning
- Create and communicate
  - Exchange ideas and perspectives to build shared understanding

Extensions and Adaptations

- To facilitate rearranging and ordering the words in different ways, you may wish to provide students with the vocabulary terms written on removable sticky notes.
- For ESL students, provide additional concrete objects, charts, pictures, facial expressions, etc. to assist in learning new terminology and making connections.
- Have students create a book of water words with their unit word maps.
- Use the vocabulary list for other activities such as:
  - memory games
  - matching games
  - create individual or class illustrated glossaries.
  - mix and match word to definition or image
  - complete word map
  - make a sentence with...
  - mad libs - each person writes a sentence to make a group story knowing only the last word of the previous sentence.
  - write a story
  - write a poem
  - charades
  - bingo
  - slap-it - read the definition, students race to slap the word or write it on the board. To avoid accidents, have two identical boards of vocabulary rather than one shared.

Curricular Integration

Science: This lesson builds students' understanding of science vocabulary and concepts related to the water cycle, water sources and water conservation.

Water Words

Name: _____ Date: _____

1. Create a symbol in the box for:

☐ ***Words I know*** ☐ ***Words I maybe know*** ☐ ***New words***

2. Put a symbol next to each water word.

☐ ***boil***
☐ ***cloud***
☐ ***condensation***
☐ ***conserve***
☐ ***conservation***
☐ ***contaminated***
☐ ***creek***
☐ ***cycle***
☐ ***dam***
☐ ***drain***
☐ ***disinfect***
☐ ***efficient***
☐ ***evaporate***
☐ ***evaporation***
☐ ***fog***
☐ ***freeze***
☐ ***fresh water***
☐ ***groundwater***
☐ ***ice***
☐ ***lake***
☐ ***liquid***
☐ ***melt***
☐ ***ocean***
☐ ***precipitation***
☐ ***pressure***
☐ ***pump***
☐ ***reservoir***
☐ ***river***
☐ ***runoff***
☐ ***waste***
☐ ***watershed***
☐ ***well***
☐ ***vapour***

Water Words Game

boil	efficient	ocean
cloud	evaporate	precipitation
condensation	evaporation	pressure
conserve	fresh water	pump
conservation	freeze	river
contaminated	fog	reservoir
creek	groundwater	runoff
cycle	ice	waste
dam	lake	watershed
disinfect	liquid	well
drain	melt	vapour

Water Words

Name: _____ Date: _____

Fill in the blanks. Pick from these eight words.

vapour, waste, well, conserve, evaporate, ocean, condensation, reservoir

1. It is very important for everyone to _____ water.

2. Water _____ is the gas form of water.

3. Some people get their water from a _____ in the ground.

4. The biggest source of drinking water in the Victoria area is the Sooke Lake

_____ .

5. All the fish who live in the _____ need water to survive.

6. Turn off the tap so you don't _____ water.

Water Words Story

Name: _____ Date: _____

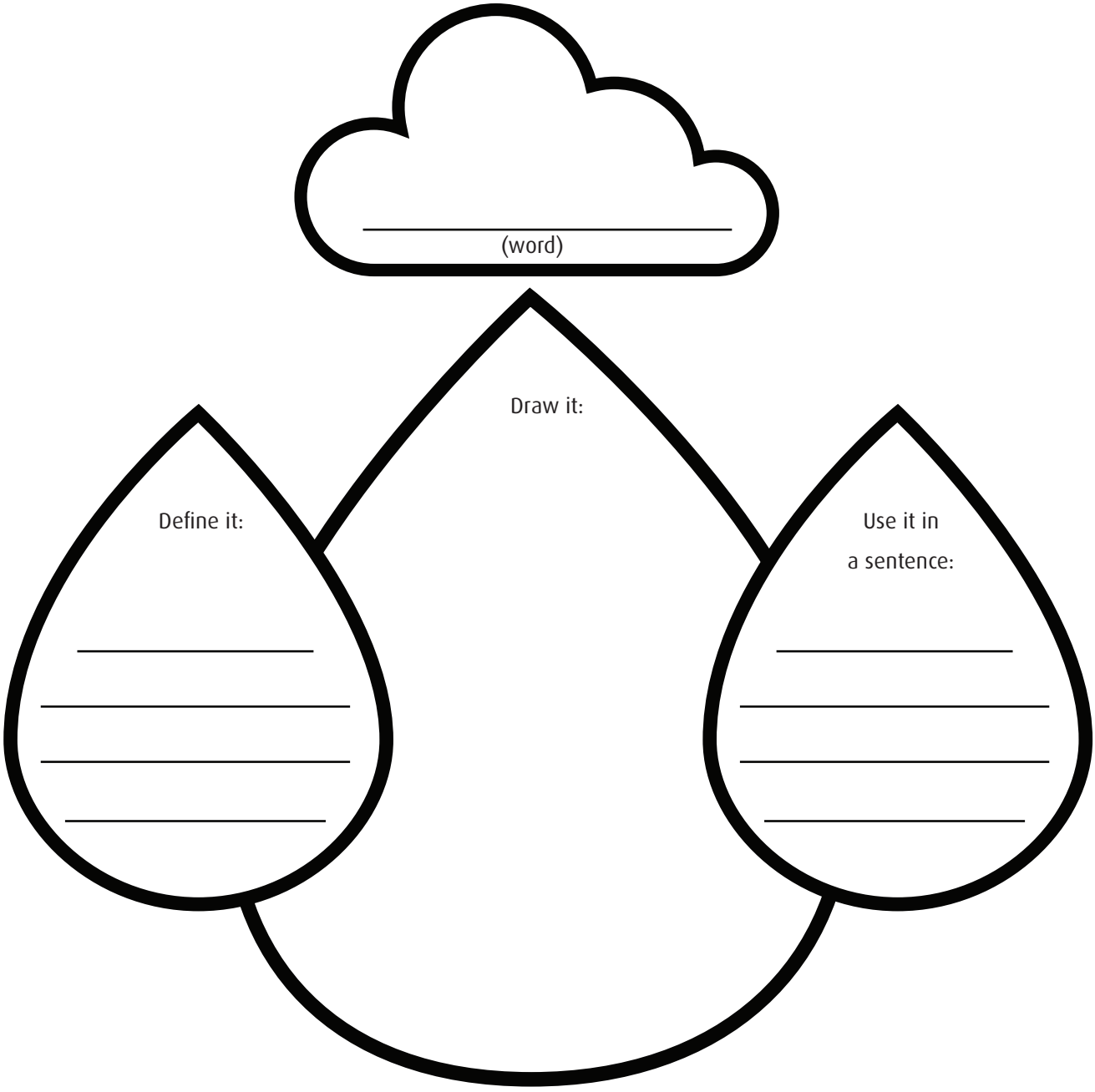
Write or tell a story using <u>at least 5</u> of these words:

vapour, waste, well, conserve, evaporate, ocean, condensation, reservoir, fresh water

What is your favourite way to learn new words?

Water Word Maps

Name: _____ Date: _____



What is your favourite strategy to learn new words?

_____

_____

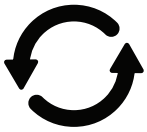
Water Words - Mix and Match

Name: _____ Date: _____

cycle

watershed

solid



liquid

condensation

salt water (ocean)

precipitation

reservoir

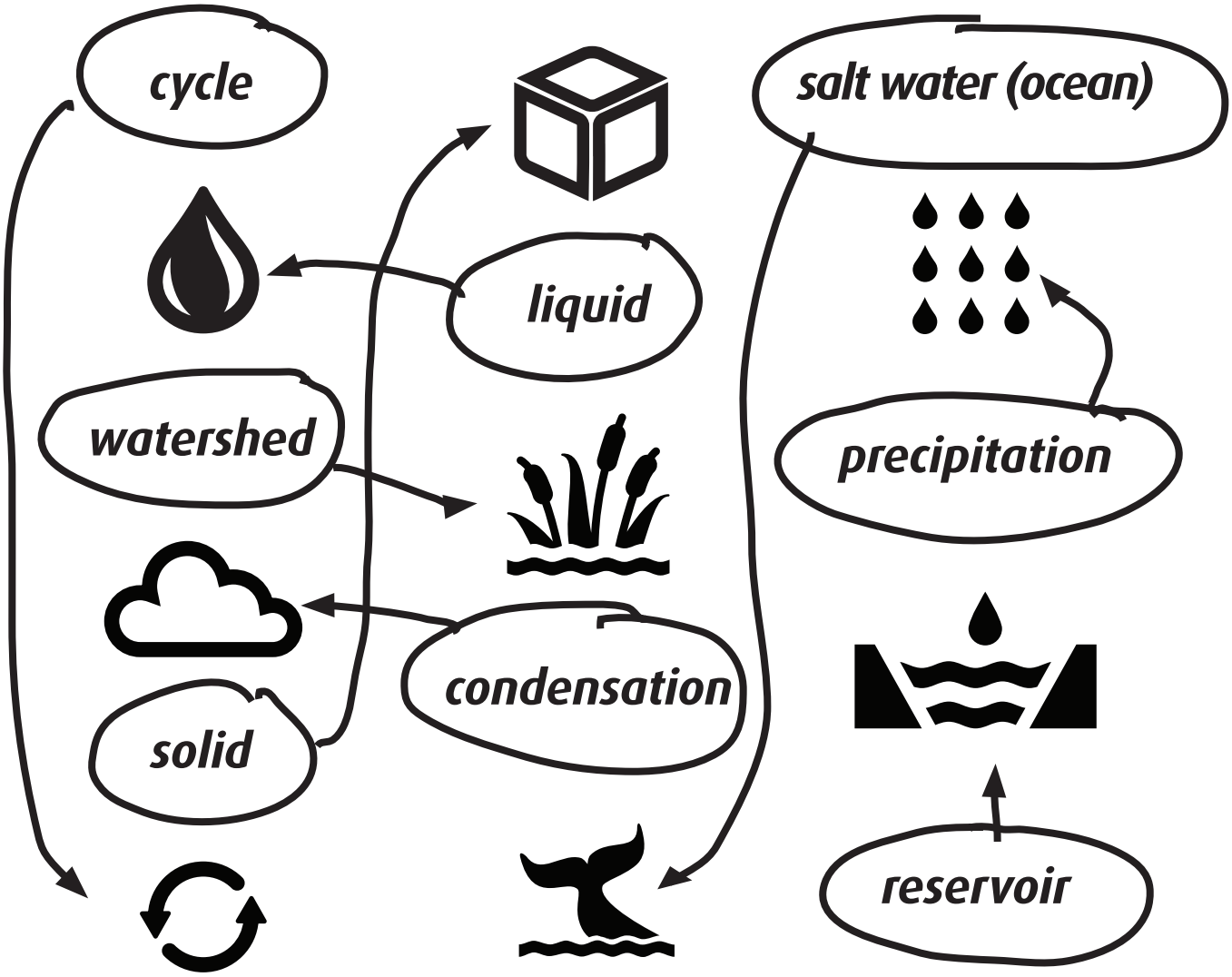
What is your favourite way to learn new words?

_____

_____

Water Words - Mix and Match Answer Key

Name: _____ Date: _____



What is your favourite way to learn new words?

_____

_____

Lesson 10

Indoor Water Consumption

Learning Standards & Assessment

Time

Resources

Curricular Integration

Handouts

Letters to Parents

CRD

every drop counts

Lesson 10:
Indoor Water Consumption

Purpose

This lesson uses manipulatives, pictograms, and other representations to depict water consumption, helping students see how "water waste" compares with "water conservation."

Preparation

1. Contact the CRD for student take home packages.
2. For the pictogram exercise, prepare a chart on a large sheet of paper or the chalkboard with the following headings:
   - showers and baths
   - toilets
   - washing clothes
   - kitchen and drinking
   - cleaning
2. Photocopy the Teacher Resource "Water Pictograph" (enlarge if desired). Cut out the individual water drops (you may want to keep some drops in groups of 10 or 5).
3. Photocopy the following handouts (one/student):
   - Student Handout: "How Much Water?"
   - Assessment Tool: "Water Consumption"
   - Parent Handout: "Water Consumption" (or send via email)

Note: the parent handout gives instructions for families to test their toilets for leaks and links to online water conservation information. Also included in the kit are copies of the "Leak Detection" and "Shower Smart" brochures that may be requested by families.

Procedure

Warm-up

1. Allow students an opportunity to look at a globe or map of the world (www.googlemaps.com) and to note how much of the Earth's surface is covered with water. Ask: "If we have so much water on Earth, why do we need to be careful about using it wisely?" Allow time for discussion.

Mathematics

Big Ideas

- Numbers to 100 represent quantities that can be decomposed into 10s and 1s.
- Development of computational fluency in addition and subtraction with numbers to 100 requires and understanding of place value.
- Concrete items can be represented, compared, and interpreted pictorially in graphs.

Content

- Number concepts to 100
- Benchmarks of 25, 50, and 100 and personal referents
- Addition and subtraction to 100
- Change in quantity, using pictorial and symbolic representation

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.

Teacher Resources

- Assessment Tool: "Water Consumption"
- Parent Handout: "Water Consumption"
- "Home Water Consumption"
- Water Pictographs

Student Resources

- Handout "How Much Water? " (1/student)
- Word Maps

Lesson resources

- A Drop in the Bucket Kit, can be recreated with:
  - 4 L milk jug
  - measuring spoons
  - small glass or plastic dishes (2)
- Globe or map of the world (optional- Google maps)
- food colouring
- base-ten blocks (1,000 in hundreds, tens, and ones/ student or group of students)
- paste or glue
- CRD materials, one of each/ student: *"Leak Detection" and "Shower Smart" brochures; "Is Your Showerhead Water-Efficient?" plastic bag; toilet tank dye tablet*
- Optional Computer, projector, screen, DVD player
- KWL chart (begun in Lesson 1)
- video, *Down the Drain and Back Again* (optional)

2. Remind students about something Sprinkle said in the video, Down the Drain and Back Again: "YOU CAN'T DRINK OCEAN WATER, IT'S SALTY!YOUR TAP WATER IS FRESH, CLEAN AND SAFE TO DRINK AND THERE'S A LOT LESS FRESH WATER THAN OCEAN WATER." (You may wish to use one of the Sprinkle puppets if these were created in lesson 4 to dramatize this concept, or replay Chapter 1 of the video.

A drop in the bucket

Use this demonstration to help illustrate how little of the world's water is available fresh water:

1. Fill a 4 L jug with water and add a few drops of blue food colouring. Tell students that this represents all the water on Earth.
2. Pour out 100 mL into one of the small dishes. Explain that this represents all the fresh water on Earth. The water left in the jug is all salt water.
3. Next, from the water in the dish, pour out 70 mL into a new dish. Explain that this represents the amount of fresh water that is trapped in glaciers or buried too deep in the ground to be accessed easily by humans.
4. The remaining 30 mL—less than 1 percent of the Earth's total water supply—is left to support human needs for agriculture, drinking, and washing as well as for lakes, rivers, and fresh water ecosystems.

Counters

1. Have students try modeling this comparison themselves using base-ten blocks. Individually or in groups, have them begin with 1000 base-ten blocks representing all the water in the world. Have them count out 25 blocks to represent all the fresh water on Earth. From that 25, have them remove 15 blocks to represent inaccessible fresh water. The remaining 10 blocks represent the accessible fresh water on Earth.

(Note that students are not required to understand the concept of 'percent'; the purpose of this exercise is to focus on subtracting from the whole. Note also that base-ten blocks are the preferred manipulative for this exercise as they make it easier to count in large numbers. However other counters can be substituted if enough base-ten blocks are not available.)

Indoor Water Use at Home

1. Next, write or project the "*Indoor Water Use at Home Tally*". Ask students to vote for what they think uses the most water in the average home.
2. Inform students of the correct breakdown—for every 100 litres of water used in the home:
   - showers and baths use 35 litres
   - toilets use 30 litres
   - washing clothes uses 20 litres

- kitchen and drinking 10 litres
- cleaning 5 litres.
  https://www.mcgill.ca/waterislife/waterathome/how-much-are-we-using

3. Point out that these figures represent indoor use only, and do not include outdoor uses such as lawn watering and swimming pools.
4. Create a class pictogram to help students understand the proportions of water consumption in the home. Distribute the individual water drops or felt markers to several students. Read the numbers for the first category of water usage and have students paste or draw the appropriate number of water drops in that column to represent the percentage (i.e., 27 water drops to represent 27 litres). Continue until all the columns are filled. (Again, the concept of percent is not important—the numbers merely represent comparative volumes of water.)
5. Provide an opportunity for all students to examine the completed graph. Discuss as a class. Can they tell from this graph which category uses the most water? Are they surprised by this? Which category did they expect to use the most water? Which one did they expect to use the least? Note- the Teacher Resource "Water Usage" contains an example of a completed pictograph, as well as a bar graph representing the same data.
6. Distribute the student handout "How Much Water?"
   - Review as a class, explaining that the numbers on the left show how much water is used in a home that is not "water-efficient," and the right-hand side shows how much water is used in a home that is "water-efficient." Explain any new words as required (e.g., efficient), and the use of L as a symbol for litres. Provide students with manipulatives and any other support as required to complete the questions on the worksheet.
7. Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from this lesson.

Word Maps

1. Review and create word maps including:
   - Efficient – Describes completing a task with little to no waste.
   - Aerator - A device that attaches to the end of a household. Some aerators blow air bubbles through the water, others take all the bubbles out and others make the water spray in small streams.
   - Consumption - The action of using a resource or transforming it into something else.

Connecting with Home

Distribute the parent handout "Water Consumption" for students to take home. In addition, provide students with the following CRD materials:

- "Leak Detection: Common Household Water Leaks" brochure
- "Is your showerhead water-efficient?" plastic bag
- Toilet tank dye tablet

You may also wish to demonstrate how to use the dye tablet and the showerhead measuring bag so that students can help their parents use these tools. These experiments must be done with adult supervision. Please use caution when removing the toilet tank lid and filling the showerhead bag- we don't want any broken toes or toilets, or scalded skin.

Assessment Opportunity

Observe students as they complete the exercise. Look for evidence that they perform accurate subtractions; are able to see the relationship between the base-ten blocks and the amount of water on Earth etc.

Collect students' completed handouts. Use the Assessment Tool "Water Consumption" to record student assessment in relation to their class work and the worksheets. Include students' completed handouts in their Water Portfolios.

Curricular Competencies

Look for evidence that students are able to:

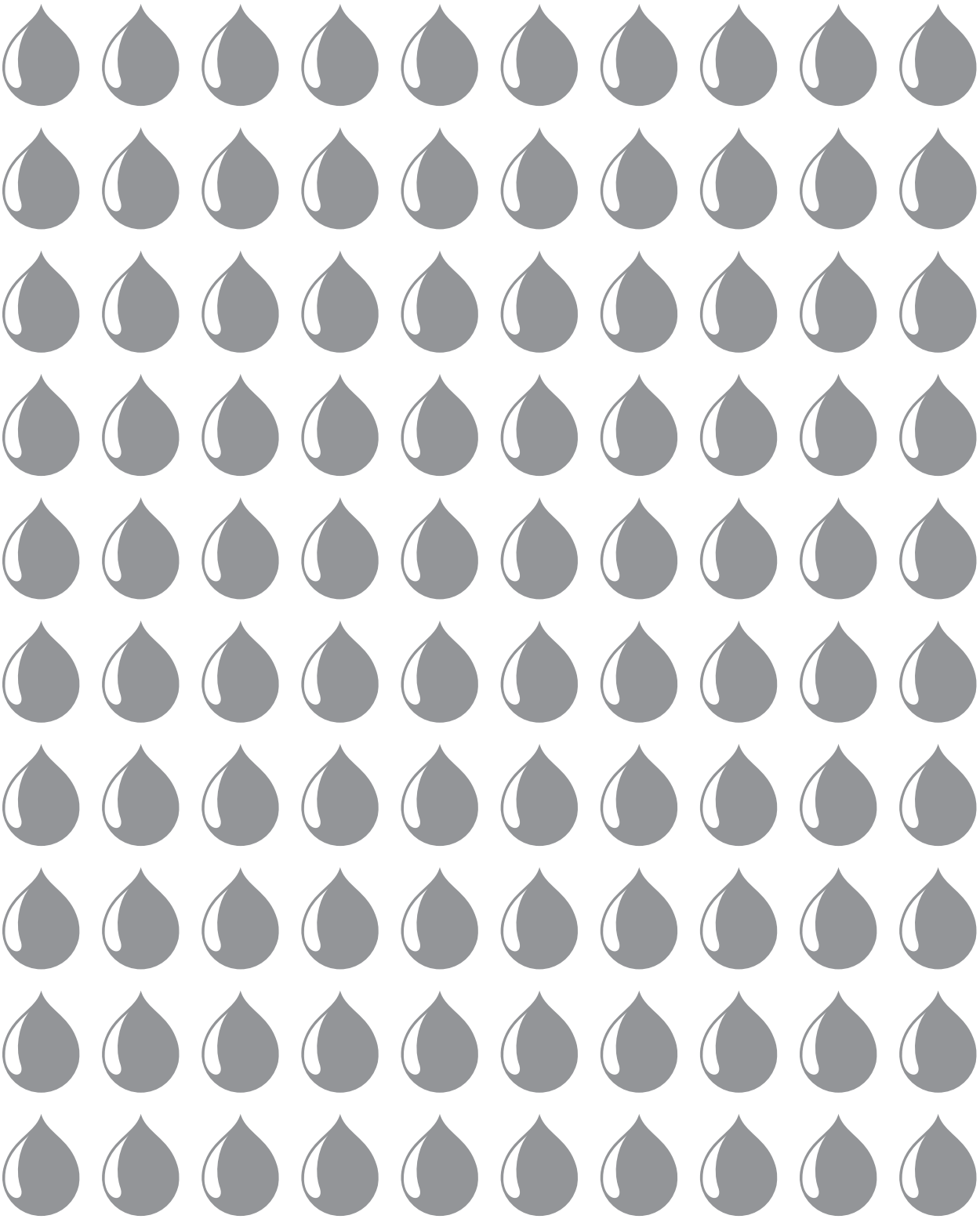
Mathematics

- Reasoning and analyzing
  - Use reasoning to explore and make connections
  - Estimate reasonably
  - Develop mental math strategies and abilities to make sense of quantities
  - Model mathematics in contextualized experiences
- Understanding and solving
  - Visualize to explore mathematical concepts
- Communicating and representing
  - Communicate mathematical thinking in many ways
  - Use mathematical vocabulary and language to contribute to mathematical discussions
  - Represent mathematical ideas in concrete, pictorial, and symbolic forms

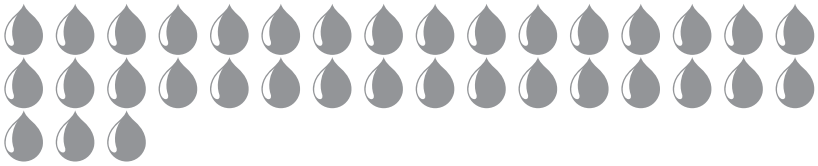
Extensions and Adaptations

- For students who have difficulty understanding the mathematical concepts represented in the graphing exercise, use comparisons of "least," "less," "more," and "most." For example:
  - Which category uses the least water?
  - Which category uses the most water?
  - Do toilets use more or less water than washing clothes?
- Challenge students to create additional mathematics questions for each other using the figures from the handout "How Much Water?"
  - For advanced students, provide an opportunity for them to compare the data represented in pictograph with the same data in a bar graph form (Teacher Resource: Home Water Consumption).
- Have students make pictographs using the data from their water logs from lesson 7 and compare with the average Canadian household to see how they are using more, less or the same amount of water.
- Take it home.

Water Pictograph



Home Water Consumption







How Much Drinking Water?

Name: _____ Date: _____

More Water	Less Water
Inefficient toilet: 13 L each flush	Efficient toilet: 5 L each flush
13 drops	5 drops
Regular shower: 20 L each minute	Low-flow shower: 10 L each minute
20 drops	10 drops
Regular tap: 14 L each minute	Tap with aerator: 6 L each minute
14 drops	6 drops
Dripping tap: 4 L each hour	No dripping tap: 0 L
4 drops	
Leaving the tap running when washing face washing face or brushing teeth: 22 L	Turning the tap on and off when washing face or brushing teeth: 4 L
22 drops	4 drops

Uses these figures to answer the following questions. Use the water drops to show your work.

1. An inefficient toilet uses how much more water than an efficient toilet? 8L

2. A regular shower uses how much more water per minute than a low-flow shower? _____

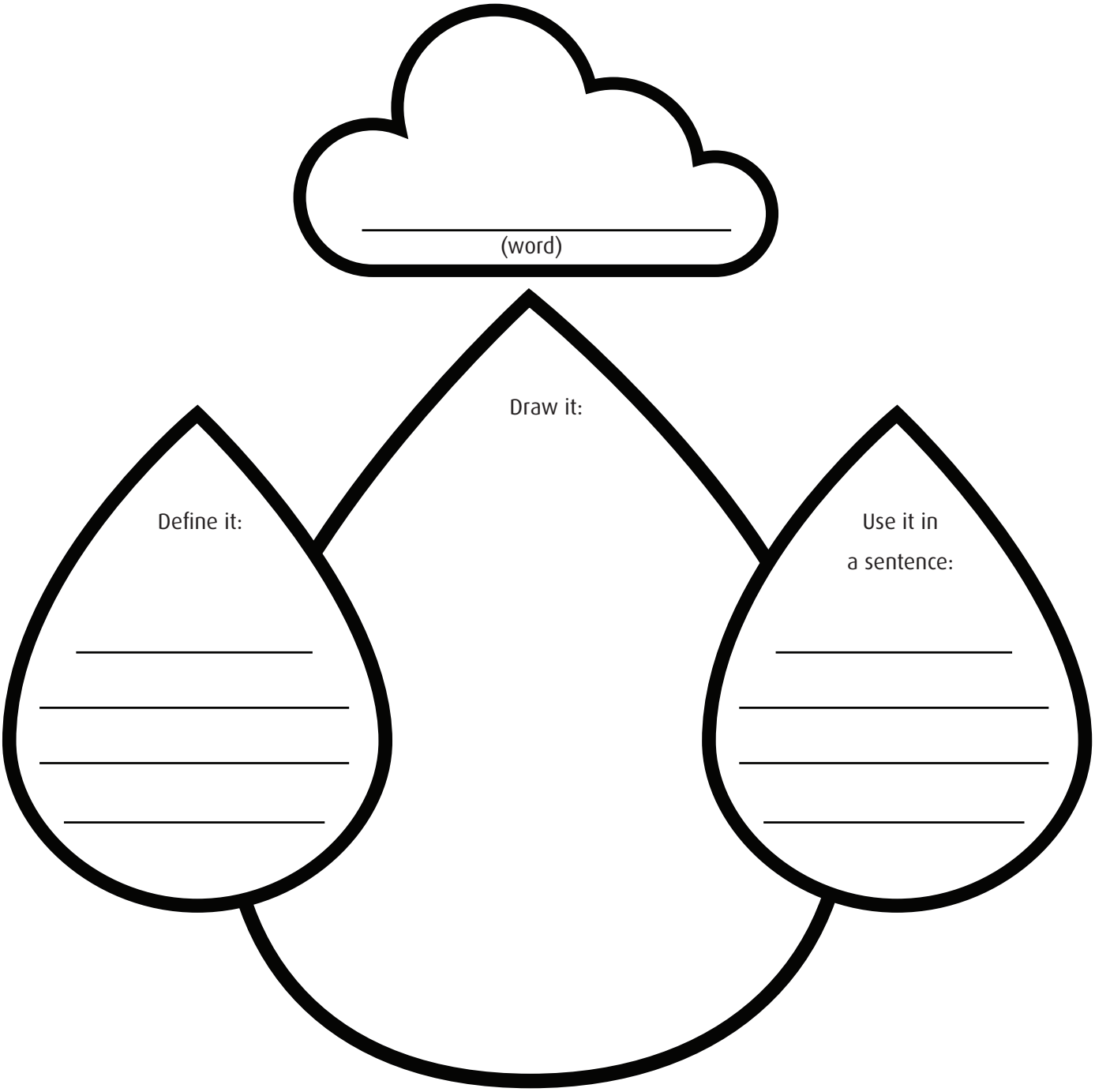
3. A regular tap uses how much more water per minute than a tap with an aerator? _____

4. How much water do you use when you use all the Less Water options? _____

5. How much water do you use when you use all the More Water options? _____

Water Word Map

Name: _____ Date: _____



Student Name	Use reasoning to explore and make connections	Develop mental math strategies and abilities to make sense of quantities	Model mathematics in contextualized experiences	Communicate mathematical thinking in many ways	Use mathematical vocabulary and language to contribute to mathematical discussions	**Notes**

Water Consumption

Date: ______________________

	Meets
	Exceeds
	In Progress

Water Consumption

Dear Parent/Guardian

Today your child completed a mathematics lesson that focused on how water is used in the home.

Information about our local drinking water including tips on how to save money and water are available at **www.crd.bc.ca/water** to help your child learn more about how water is used wisely at home. In addition, a shower flow measuring bag and toilet tank dye tablet sent home today can be used to help you determine how much water each of these devices uses.

Instructions for measuring your showerhead flow are printed on the bag. Likewise, instructions on how to use the dye tablet to test your toilet(s) for leaks are written on the packaging. There are two dye tablets in each package. If you have more than two toilets in your home, you can also conduct this test using a few drops of food colouring. *Please note- it is important that these experiments be done under adult supervision. Please use caution when removing the toilet tank lid, they are heavy and use cold water when filling the showerhead bag.*

Water Detectives

Find your water meter and watch it track water used.

Below is a demonstration we did in class today to learn about quantity of fresh and salt water on earth.

A drop in the bucket

This demonstration was used to help illustrate how little of the world's water is available fresh water:

1. Fill a 4 L jug with water and add a few drops of blue food colouring. Tell students that this represents all the water on Earth.
2. Pour out 100 mL into one of the small dishes. Explain that this represents all the fresh water on Earth. The water left in the jug is all salt water.
3. Next, from the water in the dish, pour out 70 mL into a new dish. Explain that this represents the amount of fresh water that is trapped in glaciers or buried too deep in the ground to be accessed easily by humans.
4. The remaining 30 mL—less than 1 percent of the Earth's total water supply—is left to support human needs for agriculture, drinking, and washing as well as for lakes, rivers, and fresh water ecosystems.

_____

Teacher

Water Sleuth

Every day, our water meters are hard at work measuring the tap water we use inside and outside our homes. They also track the water we don't mean to use – like leaking taps or toilets.

To find out how much water your family uses or loses, try the following activities.

Track it

First, locate your water meter box and remove the lid. It is usually concrete or metal - about 10 x 15 inches. Take care not to damage the wires! If you are unable to find your meter box, contact CRD Water Services at 250.474.9600, (option #1 for Billing staff) for the meter box location on your property.

Track the meter on three different days. 

Day of the week	Morning Meter Reading (m3)	Evening Meter Reading (m3)	Water used Evening Meter Reading - Morning Meter Reading = water used (m3)

(1 cubic metre = 1,000 litres = 220 imperial gallons)

Which day did your family use the most water? _____

Which day did your family use the least water? _____

What did you do differently on the day you used less water? _____

_____

_____

_____

Leak Detective

If you have a leak, you will need to play detective to find the source. The most likely culprits are toilets, faucets, showerheads, service lines and sprinkler systems.

Toilets that continue to run after flushing can waste 20 – 40 litres of water per hour. In one year, that's 175,000 to 350,000 litres (175 to 350 cubic metres) of water, enough water to fill a swimming pool. Plus this unused water can cost you up to several hundred dollars!

MISSION 1- CRUSH THE FLUSH

How much water are you using every time you flush the toilet? _____

1. Look for the "litres per flush" on your toilet(s). It may be located on the bowl near the tank.

Did you know? BC building code now requires new or replacement toilets be 4.8LPF (litres per flush) or less in residential properties?

MISSION 2- SLY DYE

1. Carefully remove the toilet tank lid. Place a dye tablet or some food colouring in the tank. Dye tablet provided in class or call CRD Water Services at 250.474.9684.

2. After 15 minutes, check the water in your toilet bowl. If the water is coloured, you've got a leak. Toilet repairs may require the assistance of a plumber.

Taps and showerheads *with even an irregular drip from can waste more than 35,000 litres of water or (35 cubic meters) a year. That's enough to fill a bathtub 184 times! The costs can add up quickly!*

MISSION 3- CAP THE TAP

Complete the following checklist.

Taps and showerheads by room	Is it dripping?		Is it fixed?
	Yes	No	Fixed
	Yes	No	Fixed
	Yes	No	Fixed
	Yes	No	Fixed
	Yes	No	Fixed
	Yes	No	Fixed

For more information, call the CRD at 250.474.9600 or check out our online resources:

Reading Water Meters- **www.crd.bc.ca/service/drinking-water/billing-accounts/reading-water-meters**

Saving Water Ideas- **www.crd.bc.ca/education/water-conservation/at-home/household-water-use/water-savings-tips**

Detecting Water Leaks- **www.crd.bc.ca/education/water-conservation/at-home/household-water-use/leak-detection**

Water Rates- **www.crd.bc.ca/docs/default-source/water-pdf/water-service-areas/waterrates-regional-watersupply.pdf?sfvrsn=5f7a08ca_2**

Lesson 11

Water Conservation and Protection

Learning Standards & Assessment

Time

Resources

Curricular Integration

Handouts

Letters to Parents

CRD

every drop counts

Lesson 11:

Water Conservation and Protection

Career Education

Big Ideas

- Strong communities are the result of being connected to family and community and working together toward common goals.
- Communities include many different roles requiring many different skills.

Content

- Personal development
  - goal-setting strategies
- Connections to community
  - cultural and social awareness
  - roles and responsibilities at home, at school, and in the community

35-45 minutes

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Purpose

This lesson focuses on the importance of water conservation and protection, with an emphasis on practical ways to save water at home and in the community.

Preparation

To prepare to guide students' brainstorming on what they can do to help conserve water (see Procedure step 3), read the parent handout "Water Conservation". Additional information on water consumption and conservation can be found in the resource, Household Guide to Water Efficiency (one copy included in this kit).

Photocopy (one/student):

- Assessment Tool—Water Wise Outside
- Student Handout—I Can Save Water!
- Parent Handout—Water Conservation

Procedure

Book – Raven Returns the Water

1. Read aloud "Raven Returns the Water"by Anne Cameron.
2. Review with students what they have learned about the importance of water for all living things. For example:
   - All plants and animals need water to survive.
   - People use water in many different ways: to drink, to clean ourselves, to clean our possessions (clothes, dishes, cars, etc.), to water our crops, to make everyday goods, for transportation, for recreation.
   - If people don't get enough water to drink, they can become sick or even die.

Teacher Resources

- Water Wise Community
- Parent Handout: "Drinking Water Conservation & Protection"

Student Resources

- Student Handout: "Water Wise"
- Handout "I Can Save and Protect Water! "(1/student)
- Word Maps

Lesson Resources

- KWL chart (begun in Lesson 1)
- Video, *Down the Drain and Back Again* (optional)
- Computer and projector or TV and DVD player
- Book "I Can Help Save Water."
- Book "Raven Returns the Water"by Anne Cameron
- "E Is for Environment: I Promise"by Ian James Corlett
- Teaspoon of cooking oil
- Watertight container
- Water
- Dish soap

3. Ask leading questions that encourage discussion about motives, goals and steps to achieving them. e.g.
   - Motive- Raven was thirsty
   - Goal- to find water to drink
   - Steps – go in search of water, teach Frog a lesson

Transition- How can we share the water and help to conserve and protect it?

Image Search

1. Distribute the colouring poster "Can you find ___ ways to protect and use water wisely?"
2. If desired, replay the *Down the Drain and Back Again* video Chapter 3 to explore outdoor water use.

Review the water wise actions together. See Teacher Resource "Water Wise Community"for detailed information.

Experiment- Oily water

1. Read aloud to the class the text on pages 12-13 and 14-15 of the book "I Can Help Save Water."
2. Use the "Have a Go" experiment on page 13 of the same book to demonstrate how easily water can become polluted.
3. Brainstorm common household chemicals that are often flushed "down the drain" (e.g., cooking oil, cleansers, fertilizers, pesticides). Discuss ways to reduce or eliminate these contaminants (e.g., not using the toilet as a garbage can, using environmentally. sensitive cleansers, eliminating pesticide use, using compost instead of chemical fertilizers)
4. Ask students to brainstorm some other ways they can conserve and protect water at home, at school, and in the community. Use clues and prompts to help students generate as many ideas as they can (see the Parent Handout, "Water Conservation"). Record their responses on a class list or web.

Note: If, during class discussions, students suggest that drinking less water is a good way to conserve, advise them that this is not a good idea. Not only can they endanger their health, but drinking water actually represents a very small proportion of the water we use in Canada. They can save water, however, by not leaving the tap running to get cold water—instead, they should keep a pitcher of water in the refrigerator.

Book- I Promise

1. Read aloud "E Is for Environment: I Promise"by Ian James Corlett. Review goal setting: motivation- why you want to set a goal, setting a goal and outlining steps to achieve it.
2. Have students use the student handout, "I Can Save and Protect Water!" to record their goal to help save and protect water at home, at school, and/or in the community. Provide opportunities for them to share their pledges with a partner.
3. Distribute the student handout, "I Can Save and Protect Water", and go over the task as a class.

Assessment Opportunity

Collect students' completed worksheets, and look for evidence that they can identify ways in which water can be conserved and its quality protected. Add students' completed sheets to their Water Portfolios.

Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from this lesson.

Distribute or email the parent handout, "Water Conservation". Suggest they take their pledges home to share with their parents.

Curricular Competencies

Look for evidence that students are able to:

Career Education

- Share ideas, information, personal feelings, and knowledge with others
- Work respectfully and constructively with others to achieve common goals

Extensions and Adaptations

- As an alternative beginning to this lesson, view the video, *Water Follies*, to get students thinking about water consumption and conservation.
- Read "E is for Environment: The Hunt for Red Dots All Over"by Ian James Corlett and challenge students to identify ways that the school, community or their households could save and protect water.
- Create an electronic version (e.g.PowerPoint or SmartNotebook) of all students' "I can Save and Protect Water"goals. Showcase to others.
- Set class, school or community goals. Work together to set the goal and establish steps to making it happen.
- Have students conduct experiments at home to see how much water they use for daily activities. For example:
  - Have them put the plug in the sink, then brush their teeth while leaving the water running. Have them mark the level of the water in the sink using masking tape. The next time they brush their teeth, they should turn the tap off when not in use, and mark the level of the water used. Compare the results. (Note that students should only do this experiment once to waste as little water as possible.)
  - When students have a bath, they should mark the water line in the tub (they should do this before they get in the water). When they take a shower, they should do so with the plug in, and note the level of the water. Compare the results. Which uses less water? Could they use less water by taking shallower baths? By taking shorter showers?
- Extend the concepts by reviewing what students already know about The 3 Rs—"Reduce, Reuse, Recycle,"in terms of materials such as paper, glass, and plastic. Point out that these concepts can also be applied to water. In addition, by saving paper, for example, they are also saving water, since it takes a lot of water to make paper (approximately 295,000 litres of water is required to produce 910 kilograms of paper).
- Where possible, provide opportunities for students to practice water wise actions:
  - Setup rain water collection and use for indoor plants (not for consuming).
  - Compost and use in plants and gardens to return nutrients and water to the soil.
  - Build or join a community garden.
  - Encourage litterless lunches- it takes a lot of water to produce the packaging.
- Have students share their water conservation goals with other classes in the school, challenging them to create their own water conservation plans.

- Extend learning with other local sustainability programs (See Appendix D for other resources)
  - CRD - **www.crd.bc.ca/education**
  - The Greater Victoria Compost Education Centre - **http://compost.bc.ca/**
  - Growing Schools Program - **http://lifecyclesproject.ca/initiatives/growing_schools/**
  - Growing Young Farmers Society- **www.growingyoungfarmers.ca**
  - Mr. Organic - **http://www.friendlyorganicscanada.ca/**

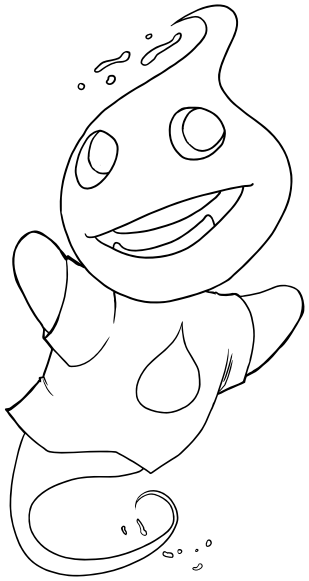
Curricular Integration

Science and Social Studies: this lesson addresses water conservation in relation to both the science and social studies curricula for this grade level.

Mathematics: use statistics related to water conservation as the basis for numeracy activities. For statistics see the Teacher Resource, "Did You Know?"(in Lesson 1).

Name: _____ Date: _____

I CAN SAVE AND PROTECT WATER!



I, _____
promise to save and protect water because:

_____

_____

My Goal is to:

_____

_____

Steps to reach my goal are:

1. _____

2. _____

3. _____

Signature: _____ ***Date:*** _____

Drinking Water Conservation and Protection

Dear Parent/Guardian,

Today your child learned about a number of different ways we can all help to conserve and protect our drinking water and set a personal goal to achieve this.

Some websites you might find useful are:

- Capital Regional District supplies drinking water to the 350,000 customers on the Greater Victoria Drinking Water System. The organization also provides water conservation, water quality and cross connection control services. To learn more about how to conserve water, save money and protect our local drinking water quality, visit **www.crd.bc.ca/water**.
- Meet Ollie the Otter, our local Watershed Warden who will take you on a learning adventure right in the middle of a watershed! Explore online for a watershed adventure. **www.crd.bc.ca/education/school-programs/for-k12-teachers/educator-guides-resources/watersheds**
- Myrecyclopedia.ca is a resource for residents of the Capital Region to identify how to reduce, reuse and recycle in the Capital Region. Residents and businesses can find convenient facility locations and get the environmental story behind the items we use in our homes and businesses. **www.myrecyclopedia.ca**
- Preventing Pollution- Knowing what not to put down your drain can also save you money. **www.crd.bc.ca/education/stormwater-wastewater-septic**
- Going Pesticide Free. **www.crd.bc.ca/education/natural-gardening**

Water Conservation and Protection at Home

In the Bathroom

- Install a water-efficient toilet, which uses 4.8 L (litres) or a duel flush model. (conservation)
- Don't use the toilet as a garbage can. (conservation/pollution prevention)
- Install a low-flow showerhead, which uses 6 to 9.5 L per minute. A regular, high-flow showerhead uses 9.5 to 18 L per minute. (conservation)
- Take less than 5 minute showers. (conservation/energy saving)
- Turn the shower off while you are lathering. (conservation/energy saving)
- Install aerators on faucets. (conservation)
- Don't keep the water running while washing your face or brushing your teeth. Turn it off when you're not using it. (conservation)
- Fix leaks in toilets and pipes. Fix drippy taps. (conservation/energy saving)
- Use household cleaners and personal care products that are easier on the environment. (pollution prevention) **www.crd.bc.ca/docs/default-source/source-control-pdf/2017recipe-card_forweb.pdf?sfvrsn=669d0aca_2**
- If it lathers, use $^1/_2$ the amount recommended. Our water is so soft that we can use much less soap than is recommended and it saves using extra water to rinse out all the suds. (conservation/water conservation/energy saving) **https://www.crd.bc.ca/education/stormwater-wastewater-septic/at-home/protecting-plumbing-treatment**

In the Kitchen

- Install aerators on faucets. (conservation)
- Don't keep the tap running to get cold water. Keep a jug of water in the refrigerator instead. (conservation)
- Scrape dishes into composter or garbage instead of rinsing the food off. (conservation/pollution prevention) **www.crd.bc.ca/education/stormwater-wastewater-septic/at-home/protecting-plumbing-treatment/fats-oils-and-grease**
- Use the dishwasher only when it's full. (conservation/energy saving)
- Save water from cooking vegetables to use in soups. (conservation)

- Steam vegetables to use less water. (conservation)
- Fix leaks in pipes. Fix drippy taps. (conservation/energy saving)

Throughout the Home

- Fix leaks in toilets and pipes. Many homes lose more water from leaky taps than they use for cooking and drinking. (conservation/energy saving)
- Fix drippy taps. (conservation/energy saving)
- Run the washing machine on cold wash and only when it's full, or install a machine that has adjustable load sizes. (conservation/energy saving)
- Use $^1/_2$ the amount of detergent recommended. Our water is so soft that we can use much less soap than is recommended and it saves using extra water to rinse out all the suds. (conservation/energy saving)
- Reduce and recycle materials such as paper, plastics, glass, and metals. All of these materials require a great deal of water to manufacture. **www.myrecyclopedia.ca**

Outside

- Plant water-efficient plants. "Native"species that are adapted to our climate are the best choice. Ask a garden centre for further suggestions, or visit one of the demonstration gardens in the area: (conservation)
  - Springridge Commons Demonstration Garden **https://fernwoodnrg.ca/fernwood-nrg-programs/food-security/gardens/spring-ridge-common/**
  - Swan Lake Christmas Hill Nature Sanctuary **www.swanlake.bc.ca/**
  - Horticulture Centre of the Pacific **https://hcp.ca/gardens_hcp/**
- Think about replacing some areas of your lawn with ground covers or herbs. These plants need less water than lawn grasses. (conservation)
- Go pesticide free. **www.crd.bc.ca/education/natural-gardening/pure** (pollution prevention)
- Don't cut the lawn too short. Between 5 and 7.5 cm (2-3 inches) is a good height. Longer grass needs less water. (conservation)
- Water less often. Most lawns receive more water than they need. The average lawn needs only a maximum of 2.5 cm (1 inch) per week during the hottest, driest weeks. Don't worry if the grass gets a little yellow—it will recover quickly. A good way to see if your lawn needs water is to step on the grass. If the lawn springs back up when you move, it doesn't need water. (conservation)
- Use recycled water from rinsing dishes, cooking vegetables, etc. to water plants (not food plants). (conservation)
- Install a rain barrel to collect rain for use in watering your garden. (conservation)
- Water early in the morning or late in the evening to avoid excess evaporation. (conservation)
- Make sure sprinklers are watering the plants, not watering the street or the driveway. (conservation)
- Use mulch around bedding plants to keep the moisture in. (conservation)
- Wash your car on gravel or grass using a bucket of soapy water instead of running the hose continuously. (Conservation/pollution prevention)
- Wash your car less often. Use the bumper sticker ("Don't wash me! I'm saving water.") to remind people that cars don't need to be kept spotless or washed everyday. (conservation)
- Use a broom instead of a hose to clean driveways and sidewalks. (conservation/pollution prevention)
- Cover swimming pools when not in use to reduce evaporation. (conservation)
- Be sure to follow all water conservation bylaws in effect. (conservation)

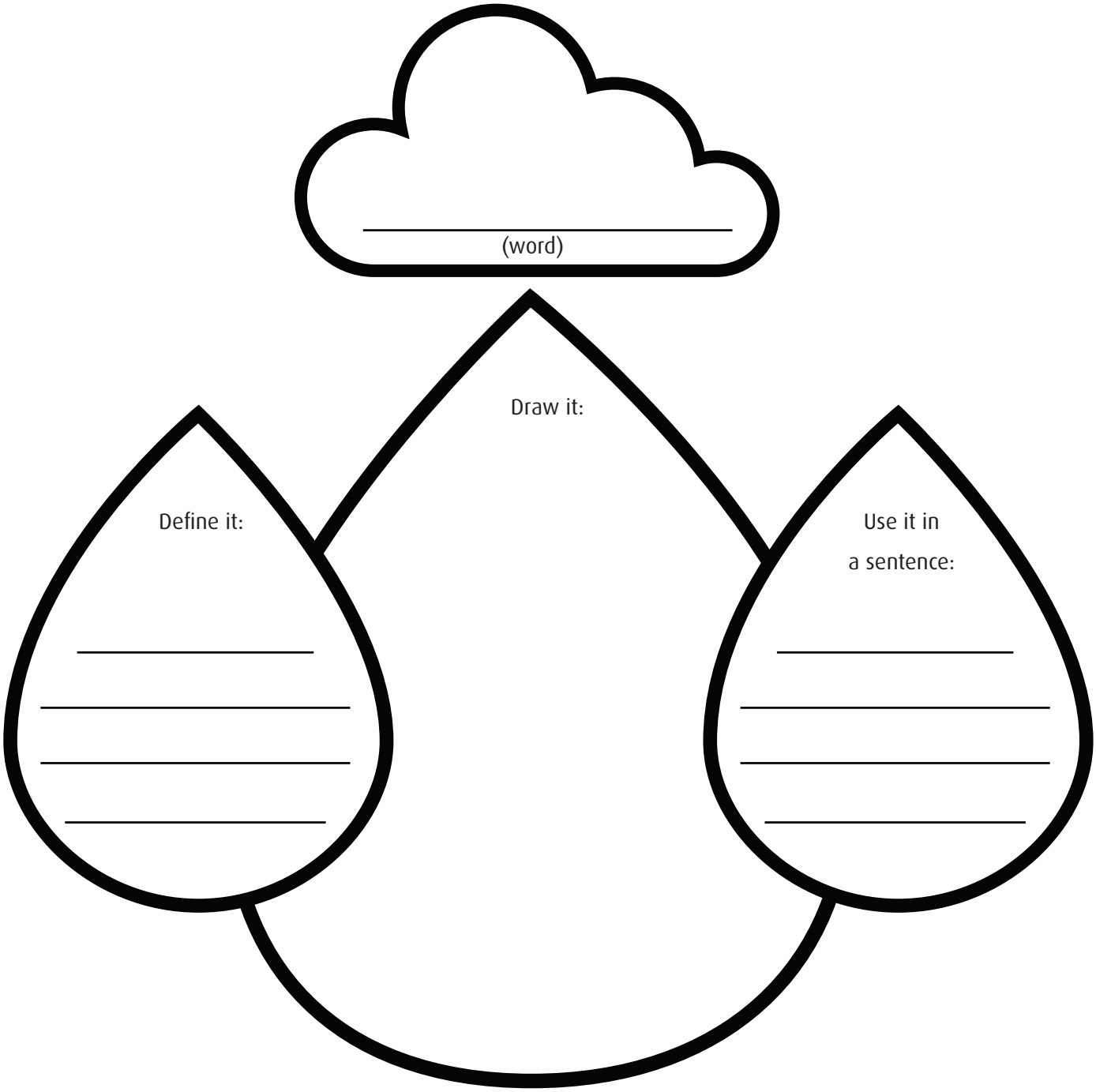
Saving water also saves money!

Water Wise Community

Saving drinking water	Protecting water
Taps off- no leaks. **Hose** - no holes. **Car washing** with a bucket and/or a hose with a shutoff nozzle. **Golden lawn**- no water needed, grass hibernates during the hot weather and will grow green again when rainfalls again. **Compost**- water in compost adds moisture to the soil. **Rainbarrel** – instead of tap water use rain water for flowers. Watch "Go Green with a Rainbarrel"video. Elementary students in the USA are explaining how to use a rainbarrel. **http://www.youtube.com/watch?v=uPfYYJF0ttw** **Native plants** – drought tolerant, don't need more than rainwater if located in the right place. **Vegetable garden**- growing your owns saves water, energy and prevents pollution just like drinking tap water instead of bottled water, because it doesn't have to travel as far or be trucked or flown in an airplane. See what your neighbours are growing.	**Outdoor tap** has a backflow preventer attached to stop dirty water getting sucked back into the hose and mixing with clean drinking water. **Car washing** on the grass - soap and water filter slowing through the ground- just like runoff water seeps into the forest of the Sooke Lake Watershed. **Pesticide Free garden or lawn**- keeps the runoff water clean. **Compost**- adds nutrients to the soil, rather than using chemicals

Water Word Map

Name: _____ Date: _____



Lesson 12

iSpy

Learning Standards & Assessment Tools

Time

Resources

Curricular Integration

Handouts

Lesson 12:
iSpy

Science

Big Ideas

- Water is essential to all living things, and it cycles through the environment.

Content

- Water sources inlcuding local watersheds
- Water conservation

60-120 minutes

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Student Resources

- Student Handout: "iSpy"

Lesson resources

- KWL chart (begun in Lesson 1)
- Book "Frog Girl", by Paul Owen Lewis

Purpose

This lesson involves an outdoor field trip to allow students to observe a local natural water source (e.g., creek, lake, beach), promoting awareness of the importance of water for all living things.

Preparation

1. Select an appropriate location for the field trip. Ideally, it should be a nearby location where students can observe both animal and plant use of water. See appendix D for list of possible field trip locations

Note: be aware of school and district protocol for leaving the school grounds (e.g., permission slips, appropriate supervision). You may wish to enlist the help of parent volunteers or other teachers to facilitate the field trip.

2. Photocopy student handout "iSpy" (one/student)

Procedure

1. Prepare students for the field trip by reminding them of the guidelines for respecting nature. Together read "Frog Girl" by Paul Owen Lewis, then review for example:
   - look, don't touch
   - be careful where you step
   - remember to take away everything you brought (leave no litter)
2. Distribute the student handout, "iSpy". Advise students that they should use this handout to take notes and make sketches of what they see on the field trip.
3. As you visit the chosen location, use prompts to guide students' observations. For example:
   - What can you see? What can you hear? What can you smell?
   - How is this water used by animals?
   - How many different kinds of plants can you see? Can you identify different types of plants? (e.g., trees, flowers, mosses, shrubs)

- Have you ever been anywhere else like this? How was it the same? How was it different?
- Do you see any signs of water being wasted or polluted? If so, what could be done about it?
- Do you see any signs of water being protected and used wisely? How?

4. When you return to the classroom, allow time for students to complete their observation sheets.

Assessment Opportunity

Collect students' completed handouts, and use conference questions, such as the following, to assess their learning:

- How are animals using water?
- What additional animals might be using this water that we didn't see?
- How are plants using water?
- What would happen to the plants and animals if this water disappeared?
- Did you see pollution in the water? Where did it come from? What could we do to stop water pollution?

Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from the field trip.

Curricular Competencies

Look for evidence that students are able to:

Science

- Questioning and predicting
  - Demonstrate curiosity and a sense of wonder about the world
  - Observe objects and events in familiar context
  - Ask questions about familiar objects and events
- Planning and conducting
  - Make and record observations
- Processing and Analyzing
  - Identify simple patterns and connections
- Evaluating
  - Compare observations with those of others
  - Consider some environmental consequences of their actions
- Communicating
  - Communicate observations and ideas using oral or written language, drawing, or role-play
  - Express and reflect on personal experiences of place

Extensions and Adaptations

- If you are unable to conduct a field trip, this lesson can be adapted using a video or book that focuses on a specific water habitat. See appendix D: Additional Resources for some suggested titles.
- If possible, repeat the field trip to the same location during the winter when the water is frozen. Have students compare what they see with the earlier observations.
- Initiate an "adopt a stream" challenge for the class or the whole school, where students take responsibility for maintaining the viability of a local stream habitat. Organizations, such as the Pacific Streamkeepers Federation and Adopt-A-Stream, can offer assistance in such challenges (See appendix D for contact information on these organizations).

Curricular Integration

- Social studies: This lesson can be modified or repeated to encourage observations of the relationships between people and the environemnent. What human activities can they see? How might these activities affect water quality, animals, the environment?
- Visual arts: Have students create a drawing, painting, or model of their field trip.
- Science: Have students look for animals using water a different points in their life cycle (eggs, tadpoles, frogs, insect larvae, birds, fish etc)
- English language arts: Have students write a postcard to a friend in another town (real or imagined) about what they have seen on their field trip. Alternatively, students can compose a journal entry or poem about the experience.
- Have students write their own legend like "Frog Girl".

iSpy

Name: _____ Date: _____

On our field trip, we went to _____

(name of lake, river, ocean)

What was the weather today? Circle one.

What was the weather yesterday? Circle one.

Draw this in the phone Viewfinder.

What did you see on the field trip?

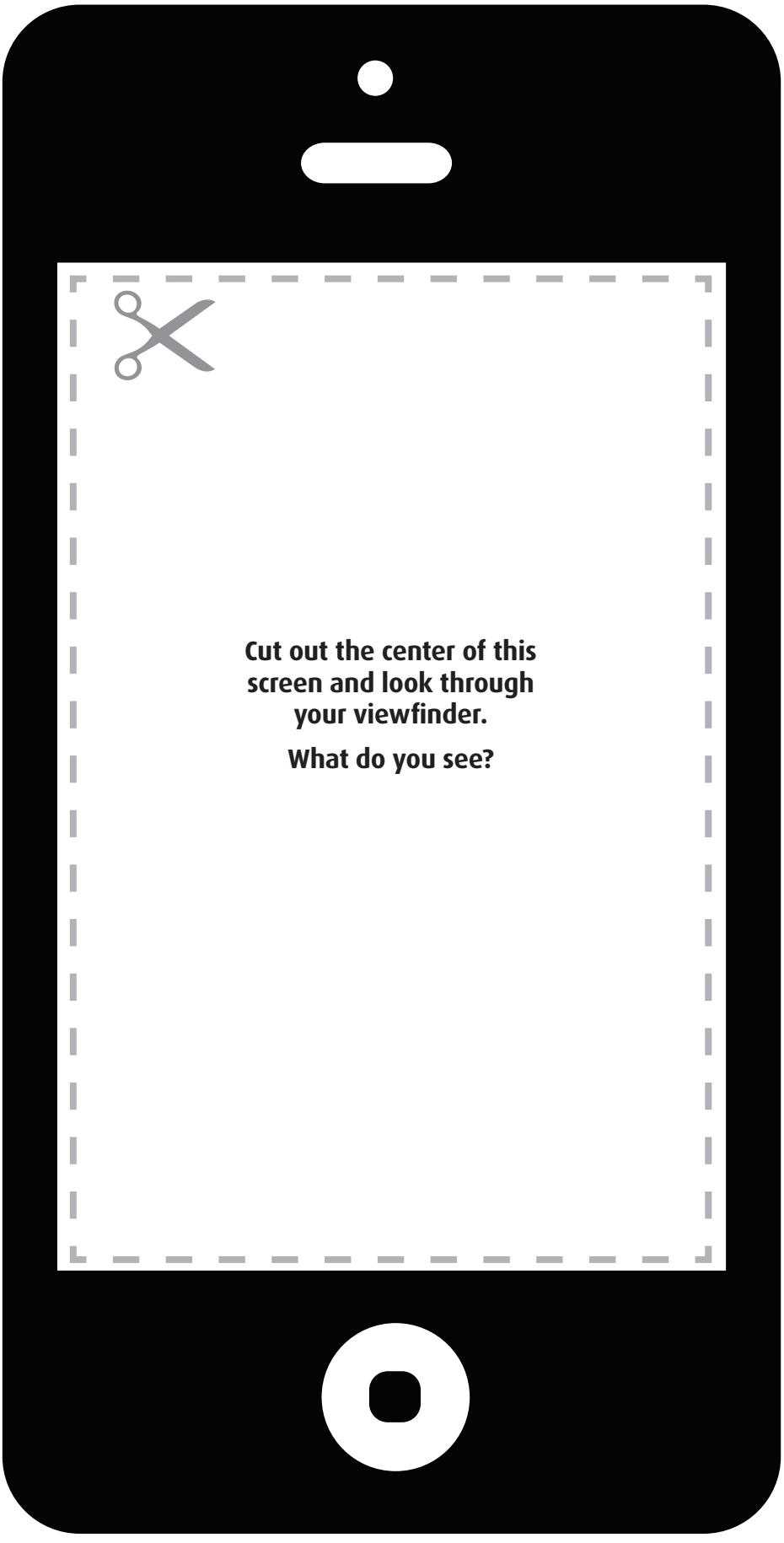
Plants I saw:

Animals I saw and animals I heard:

Draw what this place might look like if the water was gone and write a description.

My favourite thing about this place:

iSpy Viewfinder



Lesson 13

Water at Home and Abroad

Learning Standards & Assessment Tools

Time

Resources

Curricular Integration

Handouts

Letters to Parents/Guardians

Lesson 13:

Water at Home and Abroad

Purpose

In this lesson, students build on their knowledge of local water use and begin to gain understandings of the implications and the universal importance of water, and the uneven distribution and use of water globally.

Preparation

- Invite a representative from a local Aboriginal community to talk to the class about the importance of water in their traditional culture– see Procedure Step 2. To ensure proper protocol, contact your school or district Aboriginal education co-ordinators to facilitate bringing in a guest from the community.
- Photocopy student handout "My Invention" (one/student)
- Open **http://chartsbin.com/view/1455**

Procedure

Warm Up: World Water and Canada

1. Ask students to write the name of a lake, stream, creek, river or ocean on a sticky note and Indicate if it is salt or fresh water.
2. Display a world map, and help students post their sticky notes in the appropriate locations.
3. Ask students: *Compared to the rest of the world, do you think Canada has a lot of fresh water? Why or why not? Note the bodies of water on land. In Canada we have a lot of the fresh water available on Earth- however, not all of it is handy- much of it flows north away from the concentrated population or underground. Point out the Great Lakes region shared by Canada and the USA. Explain to students that the Great Lakes are the world's largest source of fresh water.*

CREATE A CLASS GOOGLE MAP

Search locations and bodies of water and drop a pin to that location for easy identification. Smoothly zoom in and out from regional perspective to global view and never lose sight of those locations. Reuse the map for later lessons.

Once logged in, click Create Map, type a title and description. Click "done". Start adding locations to your map. Search by name or address, click "save to map".

Social Studies

Big Ideas

- Local actions have global consequences, and global actions of local consequences.
- Individuals have rights and responsibilities as global citizens.
- Canada is made up of many diverse regions and communities.

Content

- Relationships between people and the environment in different communities
- Diverse features of the environment in other parts of Canada and the world
- Rights and responsibilities of individuals regionally and globally
- Diverse characteristics of communities and cultures around the world, including at least one Canadian First Peoples community and culture
- How people's needs and wants are met in communities

60-75 minutes

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Teacher Resources

- Global Water
- Water at Home and Abroad

Student Resources

- "My Invention"

Lesson Resources

- KWL chart (begun in Lesson 1)
- Map: Greater Victoria Water Supply System (included in this kit)
- Map of Canada
- Map of the world
- Pictures of people using water in various countries
- 4 L milk jug filled with water
- Book: "How Kids Are Saving the Planet" by Janet Wilson
- Book: "Salmon Boy" by Donna Joe
- Global Water
- Internet, computer and projector.

Transition: Ask students to look at where the majority of towns and cities in BC are in relation to rivers and the coast.

Visualization- In the 1700's

1. "Imagine you are travelling back in time, 100 years, 200 years, 300 years. There are no taps, no water pipes, no roads, no cars, but you do have a canoe. You need fresh water to survive- to drink, to wash. Where will you build your home?"

HISTORY OF DRINKING WATER DISINFECTION

Records indicate the Greeks were among the first to disinfect their drinking water as far back as 4000 BC.
www.excelwater.com/can/b2c/about_7.php?
www.lenntech.com/processes/disinfection/history/history-drinking-water-treatment.htm

HISTORY OF CHLORINE

In Canada, we started to add chlorine to our drinking water in 1917, more than 80 years after Great Britain and 10 years after the United States.
www.safewater.org/fact-sheets-1/2017/1/23/what-is-chlorination

2. Ask students if they know why towns and cities in BC are near rivers and the coast. *Transportation and easy access to water.*

Visualization- In the 1850's

1. "Imagine you are travelling back in time, 100 years, 150 years. There are still no taps, no water pipes and no cars, but now there are trails to springs and ponds. You lay a barrel down on its side, tying the end of a rope to one side of the barrel, then the other end of the rope to the other side of the barrel. You pull this along the trail to the pond and back home again. It's hard work, but you need water to survive. They are building roads now, so you can take the horse and cart. The trips are long and you have to make them often."
2. What could you do to make getting water easier?" *Brainstorm possible solutions such as finding another source of clean water closer to home, inventing a filter that would clean any water so you don't have to walk as far, lay pipes to bring water to you. Discuss how the first pipelines were made from hollowed trees, to bring water to the city centre. Later steel pipelines brought water right into the home. Alternately, build a well by drilling into the ground to access groundwater.*

Transition – We are lucky to have safe, clean, fresh water delivered directly to our taps- but it's not like this everywhere in the world.

Global Water Use

1. Ask students if they think that in Canada we use a lot of water compared to other countries. Optional – project the Total Water Use Per Capita by Country. **http://chartsbin.com/view/1455** *Yes, compared with many countries we do use a lot of fresh water, this is partly because we have good access to safe drinking water. But our water use is going down.*
2. Write the following figures on the board – these are the average amounts of water used residentially in each country per person per day:
   - Canada = 274 L
   - Sweden = 200 L
   - Brazil = 44 L
   - India = 39 L
   - Zimbabwe = 26 L
3. Help students find these countries on a map of the world. Display the graph found in the Teacher Resource, *Global Water*. You may also want to cut these graphs out and post them on a world map on the countries they represent.

Demonstration- Transporting Water

1. Explain that, in some countries, people have very limited access to water using as little as three litres per person per day, walking long distances every day to bring home the water they need.
2. To help students comprehend the task of transporting water, ask for a student volunteer to carry a full 4L jug once around the room. How easy was it? What would it be like if you had to carry this for several kilometres, and had to do it every day? How this could be made easier? Brainstorm ideas, example solution "Q drum" **qdrum.co.za**

Book: "Our Earth: How Kids are Saving the Planet"

1. In some countries, the fresh water available to drink is not always safe, and many people get sick or even die from drinking unsafe water. Here in the Greater Victoria area, the water that we get from the tap is disinfected so that it is safe to drink.
2. Brainstorm some possible solutions.
3. Read *"Our Earth: How Kids are Saving the Planet"* by Ryan Hreljac, 7 Canada by Janet Wilson. The story of a seven year old boy who started a well foundation to build water and sanitation projects in 16 countries. See also **www.ryanswell.ca**
4. Show images of water related inventions such as, LifeStraw or LifeSaver Bottle, portable water treatment plants, water purification tablets. Education is also very important, knowing how to keep water clean.
5. Distribute the student handout *"My Invention"* OR provide students with materials to build a 3D conceptualization of their invention.

Guest Speaker

1. Have a representative from a local Aboriginal community talk to the class about the importance of water in their traditional culture (e.g., transportation, source of food, spiritual beliefs) and/or see Extensions and Adaptations for other ideas.

Book: Salmon Boy

- Read aloud "Salmon Boy" by Donna Joe, the story of a boy who learns to live sustainably while living among the salmon people.

Assessment Opportunity

In a conference approach, ask questions such as the following:

- What it might be like to live in a country where they only had a few litres of water per day?
- What things do they do now that they would they not be able to do without enough water?

Look for evidence that they understand the role of water on their daily lives. Use criteria such as those outlined in the Assessment Tool "Water at Home and Abroad" as a checklist or rating scale to record students' learning in relation to all the activities in this lesson.

KWL Chart

1. Revisit the KWL chart, and ask students to suggest additions and modifications based on what they learned from this lesson.
2. Conclude by reminding students that, even though we live in Canada, and particularly in the Greater Victoria area where we are lucky to have good access to a clean water supply, it is still very important to conserve water every way we can:
   - The quality of our water is better when the reservoir is full.
   - In case of drought or fire.
   - To provide enough water downstream for fisheries and First Nation's ceremonial and cultural needs.

Distribute the Parent Handout "Global Water" for students to take home.

Curricular Competencies

Look for evidence that students are able to:

Social Studies

- Use Social Studies inquiry processes and skills to ask questions; gather, interpret, and analyze ideas; and communicate findings and decisions
- Explain why people, events, or places are significant to various individuals and groups (significance)
- Ask question, make inferences and draw conclusion about the content and features of different types of sources (evidence)
- Sequence objects, images, and events, or explain why some aspects change and others stay the same (continuity and change)
- Recognize causes and consequences of events, decisions, or developments (cause and consequence)
- Explain why people's beliefs, values, worldviews, experiences, and roles give them different perspectives on people, places, issues, or events (perspective)
- Make value judgements about events, decisions, or actions, and suggest lessons that can be learned (ethical judgment)

Extensions and Adaptations

- This lesson is designed for students who have some experience with using maps. If students do not already have this level of familiarity with map reading, this lesson can be simplified by eliminating the requirement of having students identify water bodies and countries themselves.
- To address additional social studies learning outcomes, engage students in simple map-reading activities. For example: What is in the north of the map? What is in the south? Is the Sooke Lake Reservoir east or west of Elk Lake?
- If you have any students who hav elived in other countries, invite them to share their stories about water

use in theose countries.

- Investigate opportunities for students to become involved in water projects in developing countries. (Appendix D: Additional Resources.)
- Show students some inventions that have been created to improve access to clean drinking water. Will need scaffolding as language can be technical.
  - Q drum: The q-drum makes carrying water simpler. See it in action in the image gallery **qdrum.co.za**
  - Michael Pritchard: Water filtration in a reusable water bottle **www.ted.com/talks/michael_pritchard_invents_a_water_filter**
  - Lifestraw- a water filtration system in a large straw like device. **lifestraw.com**
  - Water purification tablets
- **Mother Earth Water Walk**
  During the spring 2010, Anishinabe women and men walk around the Great Lakes to raise awareness about our water. *"The 11,525 miles or 18,549 kilometers were walked to call attention to the sacred gift of water, the source of our life, the source of all life. The past walks also raised awareness of the need to take care of the water, and to help our Mother Earth, who is struggling to survive and to provide for all her children. Each of the 24,113,700 steps taken was a prayer for the water, for Mother Earth, for the animals, the birds, the insects, the trees and for us, all two leggeds. Together the walks were one prayer for life."*
  April 10, 2011 Press Release
  http://motherearthwaterwalk.com/

1. Share the story of "The Nibi (water) Song" a Migizi Clan song. Listen and learn it as a class.
   www.motherearthwaterwalk.com/?attachment_id=2244
2. Introduce your students to Mother Earth Water Walks
   - Browse the photo galleries of past Water Walks
   - Share journal entries from past Water Walks
3. Plan and lead a Water Walk.
   - Plan the route
   - What will be the focus? E.g. could sing or speak "The Nibi Song" words along your water walk, or write your own class song.
   - Share your project process or outcomes with the Mother Earth Water Walk community by leaving a comment on their website's Guest Book.

- **BC Royal Museum: First Peoples Gallery**

1. Take the online virtual tour or visit the gallery in person
2. Have students put on "water detector" hats/goggles. What can they find in the exhibit that relates to water?
   - cedar wood and bark for clothes, tools, canoes, lodgings, and art needs water to grow
   - transportation on water
   - water for drinking
   - water for washing
   - water for food preparation
   - fish and shellfish live in water (food)
   - plants and berries need water to grow (food/medicinal)
   - shells in artwork

- cultural and social practices (e.g. tribal journeys, place of offering, purification ceremonies, prayer)
- medicinal plants with water have spiritual significance (spring water)
- in stories, oral histories, and dance

http://www.royalbcmuseum.bc.ca

Other related resources:

- **"Healing Circle"** by Carolyn Ali. An article retelling the experience of participating in a sweat lodge, published August 9,2006 on Straight.com.
  http://www.straight.com/article/healing-circle-0
- **University of Victoria's Centre For Indigenous research and Community-Led Engagement.**
  www.uvic.ca/research/centres/circle/
- Hear from Canadian First Nations about what water means to them. This is a video trailer for a documentary film created by the University of Victoria's Centre For Aboriginal Health Research. The video focus is drinking water quality on Reserves in Canada. *Note: First Nations Reserves within the Greater Victoria Drinking Water Area receive water from the Sooke Lake Reservoir and secondary reservoirs.*
  - Crisis on Tap Trailer. (1:14 – 2: 38) **http://www.youtube.com/watch?v=08L4Rtrt8hk**
  - Crisis on Tap- Full documentary film (0:00-2:00)
    http://www.youtube.com/watch?v=Ixmht-g2C5s

For more information about safe drinking water on reserves see:

- Indigenous Services Canada: Frequently Asked Questions- Safe Drinking Water for First Nations Act
  www.sac-isc.gc.ca/eng/1506514143353/1533317130660
- "Harper Government Introduces Updated Legislation to Protect Drinking Water in First Nation Communities"
  http://www.aadnc-aandc.gc.ca/eng/1330541162174

- **First Nations Traditional Ecological Knowledge and Water**
  - Traditional Ecological Knowledge (TEK) is:
    - » holistic knowledge (historical, cultural and spiritual)
    - » formed over generations of living in an environment
    - » collective, shared by a community
    - » passed through stories, traditions, observation and action
  - Now start to combine TEK and western planning .
  - Water is Mother Earth's blood.
  - Water is not a commodity, it is something to be taken care of.
  - It is not about cause and effect, but cycles, changes.

http://www.afn.ca/honoring-water/
https://waterbucket.ca/cfa/files/2017/09/Water-FN-Spiritual-Ecological-Perspective_2001.pdf
http://www.ocic.on.ca/wp-content/uploads/2017/07/Traditional-Knowledge-Toolkit-NAHO.pdf

Curricular Integration

- Personal planning: This lesson addresses issues of healthy living and community responsibility and well-being.
- Mathematics: Comparing water consumption figures helps students develop mathematics concepts in relation to numeracy and data analysis.
- English language arts: Have students compose a diary entry or letter from the point of view of someone living in a country with limited access to water.

My Invention

Name: _____ Date: _____

If you could invent something to help protect, conserve and/or make clean drinking water handy to everyone, what would it look like? What would it be made of? How would it work?

Draw, describe and name your invention.

My invention's name: _____

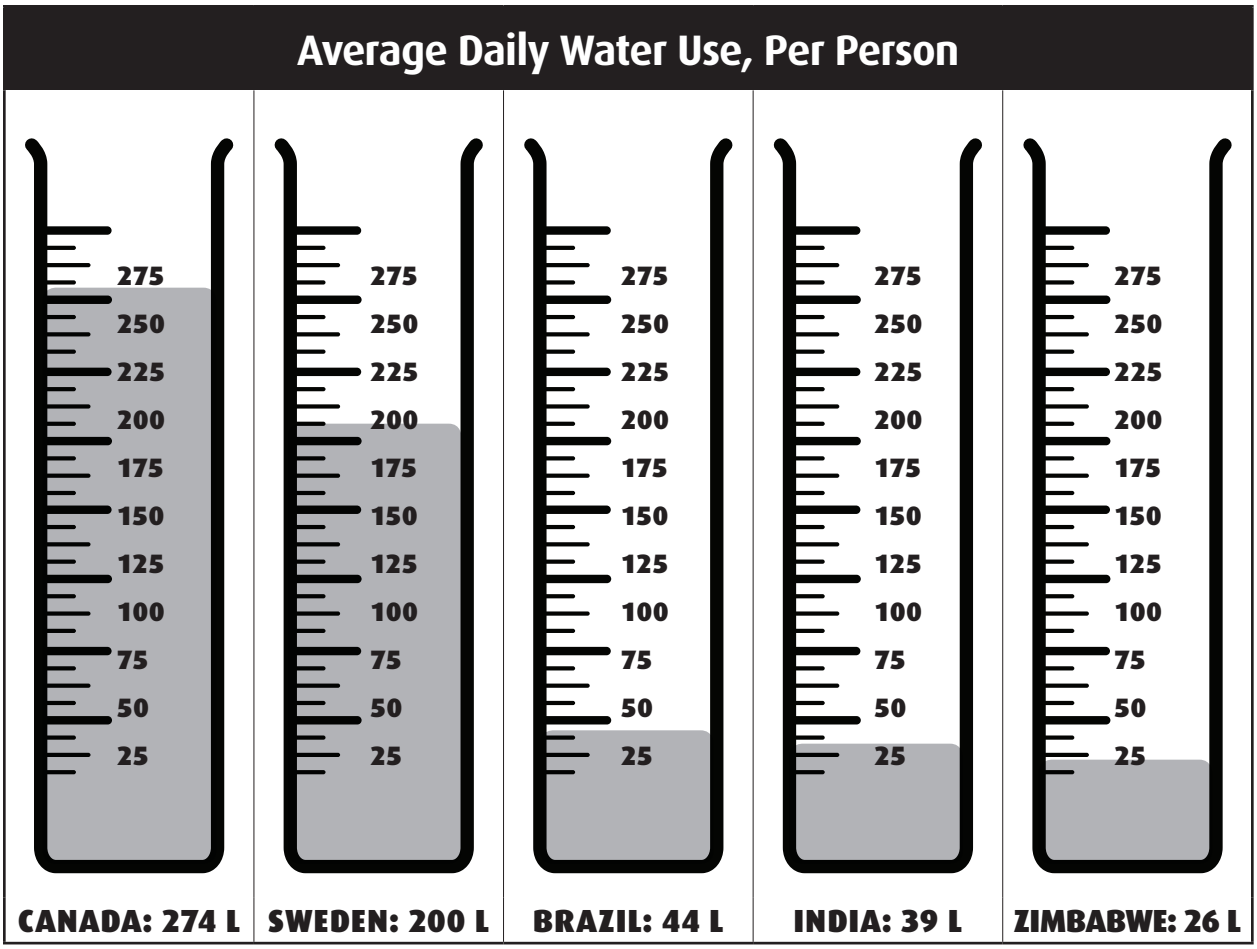
About my invention:

_____

_____

_____

Global Water



Water At home and Abroad

Student Name	SOCIAL STUDIES LEARNING Standards	Student can make connections between personal experiences and concepts discussed in class	Student can identify major water bodies	Student demonstrates understanding of how water influences human activities	Student can demonstrate understanding of the global importance of water for all humans	Other:

Water Consumption

Date: ______________________

	Meets
	Exceeds
	In Progress

Global Water

Dear Parent,

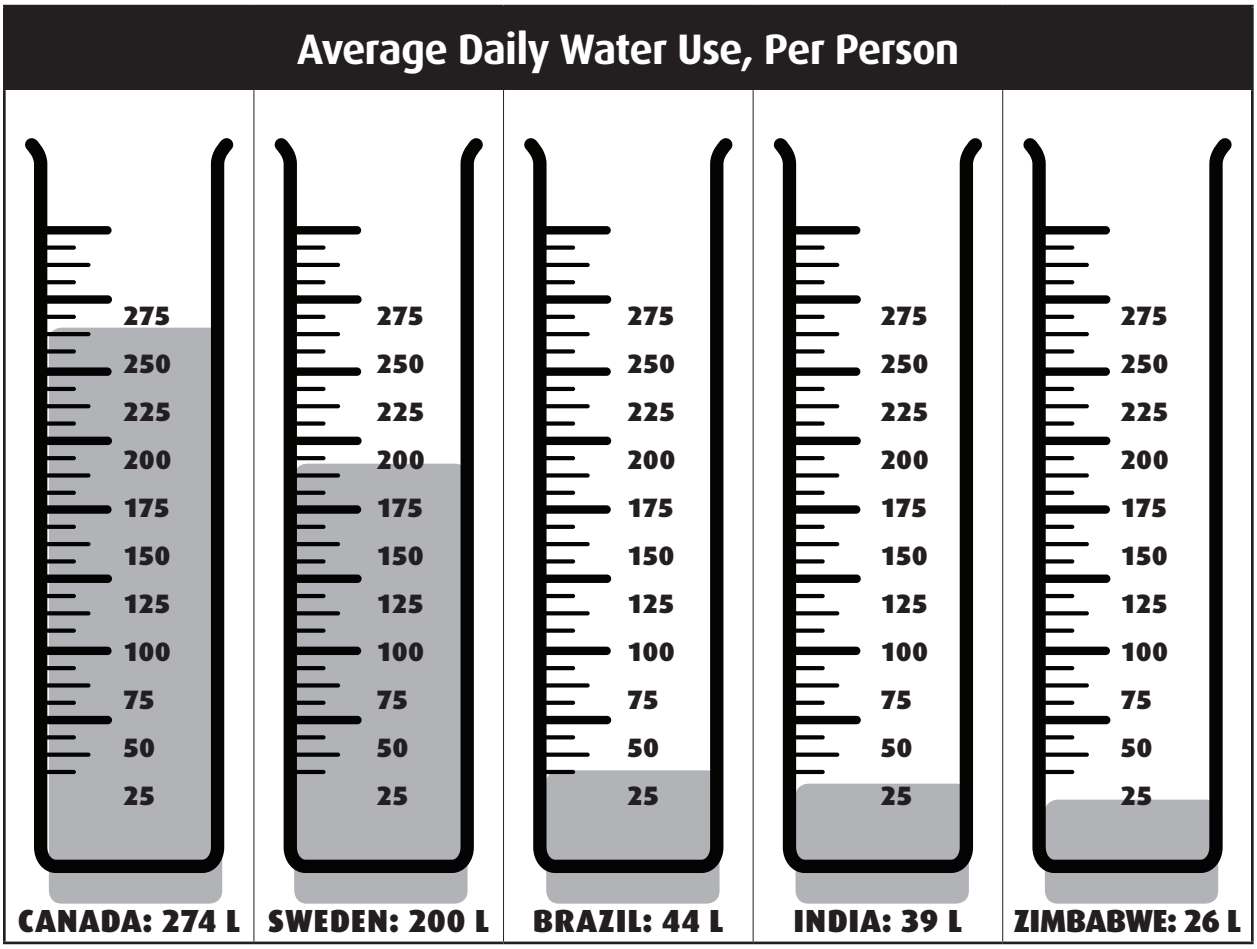
Today in class your child learned a little bit about how fresh water use in the Greater Victoria area compares to fresh water use in other parts of the world. However, this is a huge topic, one that cannot be addressed by a single lesson.

Your child also learned about inventions that are helping to make clean, safe drinking water more accessible for everyone, and came up with one of his/her own.

Here are some resources that you may enjoy exploring together:

- Water Use Calculator
  https://www.watercalculator.org/

  https://www.home-water-works.org/calculator
- Water Education Foundation (California)
  https://www.watereducation.org/water-kids



Lesson 14

Every Drop Counts

Learning Standards & Assessment Tools

Time

Resources

Handouts

Letters to Parents

Lesson 14:
Every Drop Counts

This summative lesson builds on and reinforces previous learning from a number of subject areas, with an emphasis on:

- **English Language Arts**
- **Science**
- **Social Studies**
- **Career Education**

For a full listing of all the prescribed learning outcomes addressed by this unit, refer to Appendix A.

60 mins -3 hours, depending on the end-of-unit presentation chosen

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.

Purpose

This summative lesson provides an opportunity for students to reflect on, and take pride in, what they have learned about water and water conservation.

Preparation

1. The majority of the preparation for this summative lesson is in determining what method your class will use to present and celebrate their learning. (see End-of-Unit Activity).
2. Photocopy the following (one/student):
   - **Completion Certificates** – (fill in with students' names and sign by both you and the school principal, if possible)
   - **Student Handout** – Water Portfolio: Self/Peer Assessment
   - **Summative Assessment Tool** – Every Drop Counts
   - **Parent Handout** – Every Drop Counts (or email electronic version)

Procedure

DAY ONE

KWL chart

1. Begin by revisiting the KWL chart one last time, and complete the "Learned" column if not already done. Read this column aloud as a class, and take time for students to appreciate the depth of knowledge they have acquired.
2. Check to see if there are any outstanding questions in the Wonder column. How might they go about answering these questions? Contact the CRD via email or submit a video to **www.crd.bc.ca/teacher**

Teacher Resources

- "Every Drop Counts: Summative Assessment"
- Parent Handout/email: "Every Drop Counts"
- Open House activities (optional)

Student Resources

- "Every Drop Counts"
- "Down the Drain and Back Again"

Lesson Resources

- KWL chart (started in Lesson 1)
- Book: "I Can Help Save Water"
- Book: E" is for Environment- I Promise"
- Board or screen
- Completion certificates

Water Portfolios

Distribute the student handout "Every Drop Counts". Have students go through their Water Portfolios and attach their Every Drop Counts notes.

Book- E is for Environment- I Promise

1. Read to students, *"I Promise"*
2. Have students create their own promise. What will they use as their reminder?

End-of-unit Activity

1. Advise students of the end-of-unit activity, and facilitate the process as required. Suggestions for activities include:
   - Holding an open house for other classes, parents, and community members (if you choose this option, see the teacher resource, Open House, for more information).
   - Creating a water conservation page on the school website, or adding to an existing website.
   - Writing an email, letter or postcard to a friend, relative or to staff at the CRD sharing what they have learned in this unit and the importance of drinking water conservation and protection (template provided).
   - Creating an advertising campaign using slogans such as "Do your part: every drop counts" or "If each of us saves a little, together we all save a lot"–students can create posters, buttons, flyers etc. made from recycled and recyclable materials and distribute them through the school and at home.
   - Students giving an oral presentation to the class on the most interesting things they learned.
   - Students creating a song, drama, poem, video or dance sequence to represent something they learned about drinking water conservation and protection.
2. Provide time for students to review their Water Portfolios and select the items they are most proud of or that best represent what they have learned about water conservation.

Assessment Opportunity

Conduct a summative assessment conference. For suggested questions, see *Every Drop Counts: Summative Assessment*.

DAY TWO

Following the End-of-Unit Activity.

1. To summarize the concept that every individual has a valuable role to play in water conservation, read aloud the text on pages 24-25 of the book "*I Can Help Save Water"*.

2. Present students with the completion certificates.
3. Distribute or email the parent handout "Every Drop Counts" for students to take home. Suggest that students also take home their completion certificates, as well as any other items from their Water Portfolios that they would like to share with their families.

Extensions and Adaptations

- You may choose to end the unit with a final viewing of the video, *Down the Drain and Back Again*.
- EcoStar Awards- submit an application to the Wancouver Island EcoStar Awards for an innovative project or environmental effort.
  http://ecostarawards.com/

Water Portfolio – Self/Peer Assesment

I found this interesting because...

Name: Date:

I think I could do a better job of this by...

Name: Date:

I like this because...

Name: Date:

This made me think of...

Name: Date:

I am proud of this because...

Name: Date:

This surprised me because...

Name: Date:

Later, I also learned...

Name: Date:

This reminds me of...

Name: Date:

The most important thing I learned about drinking water is...

Name: Date:

This shows that I have learned...

Name: Date:

Summative Assessment - Every Drop Counts

Name: _____ Date: _____

Suggested Conference Questions:

1. What do you think is the most important thing you learned in this unit?

2. What is the most surprising or interesting thing you learned in this unit?

3. Do you think it's important to conserve and protect our drinking water? Why or why not?

4. True or false: All living things need water to survive. How do you know?

5. What are the three states of water? (Hint: it has something to do with boiling, melting, and freezing.)

6. What are your favourite things to do with water?

7. Do you think we are lucky in Canada when it comes to drinking water? Why or why not?

8. Which items from your Water Portfolio are you most proud of? Tell me about them.

9. How do these portfolio items show me what you have learned about water?

10. Is there anything else you would like to learn about our drinking water, water conservation and protection? If so, what?

Open House

One option for an end-of-unit activity is to hold an open house, inviting other classes, as well as parents and community members if desired.

Obviously, such an event requires significant planning and organization, but can be a valuable way to celebrate students' learning and share the experience with the wider school community.

If you decide to hold an open house, consider including any of the following components:

- a viewing of the video, *Down the Drain and Back Again*
- student performance of the song, "Drip, Drip, Drop" and/or the "Water Cycle Song"
- student plays/ puppet show about conserving and protecting water and/or the water cycle
- displays of student artwork created during the lessons
- student demonstrations of water experiments they have done
- invite attendees to participate in a drinking water conservation review game (like the water relay, KooshBall questions, jeopardy etc.)
- display of water-related resources (e.g., CRD materials; books and videos listed in Appendix D)
- displays of water-saving and protecting tools and strategies (e.g., water-efficient toilet, low-flow shower head, rain barrel, water-efficient plants, backflow preventer – images available)
- display about the school and community's watershed
- presentation of completion certificates to students

Share your end-of-unit activity with us and other school. Find out how at **www.crd.bc.ca/teacher**

Every Drop Counts

Dear Parent,

Today was the last lesson in our water unit, *Every Drop Counts*. But the learning doesn't end here! To help your child build on what she or he has learned, you and your family may want to:

- go on family field trips to a creek, river, lake, pond, marsh, or beach near your home
- visit water sites when you are on vacation.
- collect articles about water and water conservation or check out weekly postings here: **www.crd.bc.ca/parent**
- continue to look for new ways to conserve and protect drinking water as a family

For more information on water and drinking water conservation and protection, you may also wish to check

out these resources at your public library, your child's school library, or on the Internet:

Books

Resource	Description
Allen, Pamela. "Who Sank the Boat?" Penguin, 1982.	This storybook about flotation uses very simple language and is heavily illustrated. 30 pages.
Allen, Pamela. "Mr. Archimides' Bath" Penguin, 1986.	This storybook about water displacement uses very simple language and is heavily illustrated.
Ardley, Neil. "The Science Book of Water", Doubleday Canada, 1991	Water related experiments and activities are explained through clear photographs and concise text.
Base, Graeham. "The Water Hole", Doubleday Canada, 2001.	This is a beautifully illustrated picture book about the need that animals around the world have for water, what happens when there are water shortages and drought, and the renewing properties of rain. Pages are interestingly perforated so that children can see the water diminishing with every turn of the page. Simple vocabulary. 20 pages.
Bullard, Lisa. "Watch Over Our Water", Learner Publishing Group, 2012.	This full colour illustrated storybook is about who uses water, why it is important to protect and conserve it, and how.
Cast, C. Vance. "Where Does Water Come From?" Barron's Educational Series Inc., Hauppauge, NY, 1992.	An illustrated story book that explains in simple language the water cycle and the ways water is treated to ensure safety. It includes some simple experiments and a glossary. 40 pages.
Cameron, Anne. "Raven Returns the Water", Harbour Publishing Co. Ltd., 1987	Tells the story of how Raven tricks a frog who does not believe in sharing to give back the water of the Earth. A lesson about sharing and effects of using all the world's water. Black and white illustrations.

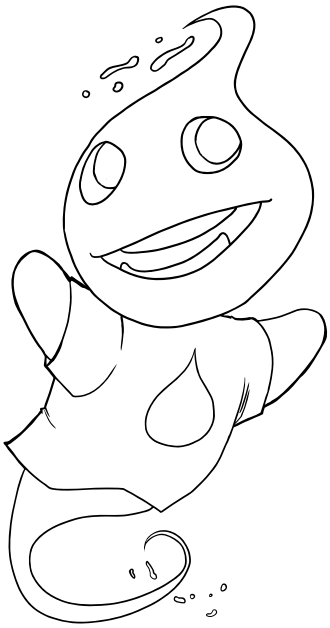
Cherry, Lynne. "A River Ran Wild", Harcourt, Brace & Co, 1992.	An illustrated story book about the natural historic beauty of the Nashua River in New England, which was subsequently polluted and then reclaimed. 28 pages.
Cole, Joanna. "Wet All Over–A Book about the Water Cycle", Scholastic–"Magic School Bus" Series. 1996.	Heavily illustrated fiction book about children being taken on a ride through the water cycle. 30 pages.
Corlett, Ian James. "E is for Environment", Atria, 2011	These read-aloud short stories touch on many environmental concerns from waste to water, providing food for thought followed by transform questions.
Joe, Donna. "Salmon Boy: Legend of the Sechelt People", Nightwood Editions, 1999.	A boy finds himself in the country of the salmon people. He observes and lives among them learning life skills and about their lifecycle.
Locker, Thomas. "Water Dance", Voyager Books, New York, 1997.	Illustrated free-verse poetry about water in its many forms.
McKinney, Babara Shaw. "A Drop Around the World", Dawn Publications, 1998.	Follow a water drop around the water cycle. Full colour. Provides a sense of time and seasons.
Morgan, Sally. "Water for All Earth Watch", Danbury CT, 200.	This book includes sections on water for life, the water cycle, salt water, rivers and reservoirs, clean and polluted water, water and farming, rain, water shortages, and what humans can do. Reading level is too high for primary students but it is well illustrated and could be read aloud. 32 pages.
Murphy, Bryan. "Experiment with Water", Two-Can Publishing, London (Published in the USA and Canada by Two-Can Publishing LLC, Princeton, NJ). 2001.	Illustrated book with basic information about water in story format, accompanied by experiments suitable for 4-9 year olds. It includes a glossary.
Nunn, Lori. "Flo & Eddy's Water Adventure", Rocky Mountain Books, 2011.	A poetic story about two pelicans that follow the water cycle on their migration route. Water facts also provided.
Resmer, Marie. "Inspector McTree Visits his Native Friends", Rhyme for Reason, Island View, NB, 1999.	This illustrated story book describes humans' relationship with Mother Earth and the need to live in harmony with the Earth, from an Aboriginal perspective.
Simpson, Caroll. "The First Beaver", Heritage House Publishing Company Ltd., 2008.	This full colour native art illustrated book shows, among others, how physical changes to an environment, like a body of water, affect others.
Slade, Suzanne. "A Raindrop's Journey", Picture Window Books, 2011	Illustrated story follows a water drop around the water cycle. Story supported by water facts.
Stewart, H.E. "The Little Hill", Tudor House Press, 2012.	A story written and illustrated by a local Victorian artist about how development changes the landscape and why we must be environmental stewards.

Strasshoffer, Craig. "Water Cycle", Science Court Investigations, 1997.	In cartoon format, this book uses a "courtroom" to determine scientific facts about water. "Evidence" graphics in fold-out format are included. Best for grade 1 or younger.
Parr, Todd. "The Earth Book", Hachett Book Group Inc., 2010.	
Strauss, Rochelle. "One Well: The Story of Water on Earth", Rosemary Woods, 2007.	"Imagine for a moment that all the water on Earth came from just one well. This isn't as strange as it sounds. All water in Earth is connected so there really is just one source..."
Wilson, Janet. "Our Earth: How Kids are Saving the Planet", Second Story Press,2010	Stories of young people from around the world making a difference for the future of our planet.

Organizations and Web Sites

Resource	Description
CRD **www.crd.bc.ca** 250.474.9600	The Capital Regional District is committed to sustaining the health and lifestyles of the residents of Greater Victoria by providing safe, clean drinking water. The website includes information about our drinking water : • Where it comes from • The quality and quantity we have • How to protect and conserve it
Environment Canada **www.ec.gc.ca/eau-water**	Government of Canada. Extensive information on a variety of topics including: water quality, water quantity, water pollution, water efficiency, water science and technology.
World Fisheries Trust **www.worldfish.org** 250.380.7585	World Fisheries Trust Environmental Education and Awareness Program includes Seaquaria in schools, Gorge Waterway Nature House and Community watershed models.

CONGRATULATIONS!



Thanks for being a water steward, conserving and protecting our drinking water because you know that Every Drop Counts.

Date: _____

Signed:_____

Appendices

A - Curriculum Organizers and Learning Standards

B - Glossary

C - Video Script

D - Supplementary Resources, Workshops and Field Trips

Appendix A:
Curriculum Organizers and Big Ideas

The following table is an overview of the BC Curriculum subjects addressed by the lesson plans in this resource. Additional subjects and topics may also be addressed, depending on the extensions and integration procedures used.

GRADE 2	Every Drop Counts Lessons																						
Subject Area	1	2	3	4	5a	5b	5c	5d	6a	6b	6c	6d	7a	7b	7c	7d	7e	8	9	10	11	12	13	14
Social Studies									✿	✿	✿												✿	✿
Career Education																					✿			✿
English Language Arts	✿	✿	✿										✿		✿				✿					✿
Mathematics																				✿				
Arts Education				✿			✿	✿										✿						
Science	✿	✿			✿	✿	✿	✿	✿				✿	✿	✿	✿	✿					✿		✿
Physical and Health Education												✿												

The following table lists BC's Curriculum subject area and big ideas touched on by the lesson plans in this resource. Additional big ideas, learning standards may also be addressed, depending on the extensions and integration procedures used.

Subject Area	Big Ideas	Lesson
Social Studies		
	Local actions have global consequences, and global actions of local consequences.	6a, 6b, 6c, 13
	Canada is made up of many diverse regions and communities.	13
	Individuals have rights and responsibilities as global citizens.	6a, 6b, 6c, 13
Career Education		
	Strong communities are the result of being connected to family and community and working together toward common goals.	11
	Communities include many different roles requiring many different skills	11
English Language Arts		
	Stories and other texts connect us to ourselves, our families, and our communities.	2, 3, 7a
	Through listening and speaking, we connect with others and share our world.	1, 7a, 7c
	Playing with language helps us discover how language works.	3, 9
	Curiosity and wonder lead us to new discoveries about ourselves and the world around us.	1
Physical and Health Education		
	Learning how to participate and move our bodies in different physical activities helps us develop physical literacy.	6d
	Having good communication skills and managing our emotions enables us to develop and maintain healthy relationships.	6d
Mathematics		
	Numbers to 100 represent quantities that can be decomposed into 10s and 1s.	10
	Development of computational fluency in additon and subtraction with numbers to 100 requires and understanding of place value.	10
	Concrete items can be represented, compared, and interpreted pictorially in graphs.	10
Science		
	Living things have life cycles adapted to their environments.	7a, 7b
	Materials can be changed through physical and chemical processes.	2, 5a, 5b, 5c
	Forces influence the motion of an object.	6a, 7c, 7e
	Water is essential to all living things, and it cycles through the environment.	1, 2, 5a-d, 6a, 7a-e, 12
Arts Education		
	Creative expression develops our unique identity and voice.	4, 8
	Dance, drama, music, and visual arts are each unique languages for creating and communicating.	4, 5c, 5d, 8

The following table lists BC's Curriculum subject area and content touched on by the lesson plans in this resource. Additional learning standards and content may also be addressed, depending on the extensions and integration procedures used.

Subject Area	Content	Lesson
Social Studies		
	- diverse characteristics of communities and cultures in Canada and around the world, including at least one Canadian First Peoples community and culture	13
	- how people's needs and wants are met in communities	6a, 6b, 13
	- relationships between people and the environment in different communities	6a, 6b, 6c, 13
	- diverse features of the environment in other parts of Canada and the world	13
	- rights and responsibilities of individuals regionally and globally	6a, 6b, 13
	- roles and responsibilities of regional governments	6a, 6b, 6c
Career Education		
	Personal Development - goal setting strategies	11
	Connections to Community - cultural and social awareness - roles and responsibilities at home, at achool, and in the local community	11
English Language Arts		
	Story/text - elements of story	3
	Strategies and processes - reading strategies - oral landguage strategies	1, 2, 3, 7a, 7c, 9
	Language features, structures, and coventions - word patterns, word families - letter formation - coventions	3, 7a, 9
	Curiosity and wonder lead us to new discoveries about ourselves and the world around us.	1
Physical and Health Education		
	- proper technique for fundamental movement skills, including non-locomotor, locomotor, and manipulative skills	6d
	- how to participate in different types of physical activities, including and dual activities, rhythmic activities, and games	6d
Mathematics		
	- number concepts to 100	10
	- benchmarks of 25, 50, and 100 and personal referents	10
	- addition and subtraction to 100	10
	- change in quantity, using pictorial and symbolic representation	10

Science		
	- metamorphic and non-metamorphic life cycles of different organisms	7a, 7b, 7e
	- similarities and differences between offspring and parent	7a, 7b
	- physical ways of changing materials	5a, 5b, 5c
	- types of forces	6a, 7c, 7e
	- water sources including local watersheds	1, 2, 6a, 7a, 7b, 7d, 7e, 12
	- water conservation	2, 6a, 7a-7e, 12
	- the water cycle	2, 5a-5d, 6a
Arts Education		
	drama: character, time, place, plot, tension	4
	music: beat/pulse, duration, phythm (music), tempo, pitch, timbre, dynamics (music), form (music), texture	5c, 5d, 8
	- processes, materials, technologies, tools, and techniques to support arts activities	8
	- a variety of dramatic forms	4
	- symbolism as a means of expressing specific meaning	5c, 5d
	- personal and collective responsibility associated with creating, experiencing, or sharing in a safe learning environment	4, 5c, 5d, 8

Appendix B:
Glossary

The following terms are defined as they relate to water conservation and other environmental topics in this resource.

Aerator

A device that attaches to the end of a household faucet to reduce water use. Depending on the type of aerator, they can blow air bubbles through the water, take all the bubbles out or make the water spray in small streams.

Aquifer

An underground layer of rock, sand or gravel where fresh water flows and is stored in the cracks and pores. Usually refers to areas that store enough water to be useful to people. A well can be drilled into this area to pump out the fresh water.

Activityto demonstrate the concept:

- Build an aquifier in a cup
  www.ksps.org/community//community/aquifer-protection/

Boil

Action of water changing from a liquid to a vapour when heated.

Climate

Climate describes weather over longer periods of time for an area. When we say the spring season is lasting longer every year, we are talking about climate.

Climate change

As a result of our actions since the industrial revolution, the increase of greenhouse gas emissions (GHG's) has changed the natural way the "greenhouse effect" controls temperatures on Earth, altering the atmosphere, water cycle and natural ecosystems.

Cloud

A visible cluster of water droplets or ice crystals suspended in the air high above the Earth's surface. Clouds are formed when water vapour cools and condenses into water droplets.

Condensation

The change water vapour goes through when it is cooled and turns into liquid water (e.g. when hot water in a covered pot is put into a refrigerator, the steam rising against the rapidly cooling lid will turn back to water droplets). This is the opposite of evaporation.

Conserve

The action of protecting something from being wasted, lost or harmed.

Conservation

The protection and preservation of resources (e.g. drinking water, energy, fossil fuel).

Reduce (use less): take less than 5 minute showers
Reuse: use the bowl of water used for washing fruit to water potted plant
Recycle: wastewater can be cleaned and then reused

Consumption

The action of using, destroying or transforming a resource into something else.

Contaminated	To be polluted or made impure by touching or mixing with harmful germs or chemicals.
Creek	A small stream of fresh water, often shallow or intermittent (does not flow year round)
Cycle	A series of events that repeat.
Dam	A wall built across a stream or river to block the flow of water.
Drain	Pipes that remove dirty (waste) water from our homes, buildings, roads and sidewalks. • Sanitary sewers remove the water we use inside our homes and buildings. • Stormdrains remove the rainwater and used tap water outside.
Disinfect	To destroy germs and make fresh water safe for humans to drink (specifically neutralization of pathogens, parasites and bacteria).
Dormant	To be asleep or resting, e.g. in the summer, a lawn naturally turns golden brown while resting and waiting for the spring rains to turn it green again.
Efficient	Describes reaching a goal or completing a task with the least amount of waste (e.g., water-efficient toilets waste less water per flush than regular toilets).
Erosion	A process, where water or air moves soil and rock from one location to another.
Evaporate	The action of liquid water turning into water vapour when heated.
Evaporation	The action of changing from liquid water into water vapour when heated. For example, as a kettle of water heats up, liquid water turns into water vapour (steam). This is the opposite of condensation.
Fog	A visible cluster of water droplets or ice crystals suspended in the air close to the Earth's surface. Fog is formed when water vapour cools and condenses into water droplets.
Freeze	The action of liquid water changing into solid water (ice) when cooled.
Fresh water	The name for water that is not salty (e.g. water in lakes, rivers, streams, and ponds, unlike the water in seas and oceans).
Greenhouse gas (GHG) emissions	We create greenhouse gasses (carbon dioxide, methane, nitrous oxide) when we burn wood, coal, oil and natural gas to generate electricity, to power vehicles, planes, boats and machines.
Groundwater	The name for water underground (below the water table) that flows through and fills the cracks and pores of rocks, sand or gravel grains.
Ice	Water in a solid state and below zero degrees Celsius.
Lake	A pool of fresh water surrounded by land.
Liquid	The state of water when it flows and conforms its shape to any container. It is neither solid nor gas.

Melt	The action of solid water turning into liquid water when heated.
Ocean	A large body of salt water that covers most of the Earth's surface.
Pollute	The action of making something unclean, not pure.
Precipitation	The name for condensed water that falls from the sky in the form of rain, snow, sleet or hail.
Pressure	Action of force on an object, such as the force of gravity which pushes drinking water through the pipes from the Sooke Lake Reservoir to our taps.
Pump	To propel or force movement using air pressure (e.g. drinking water is pumped up Triangle Mountain because the water pressure is not enough at this location).
Raindrop	The liquid form of water that forms and falls from clouds.
Reservoir	A place in which water is collected and stored. In the Capital Region, we turned Sooke Lake into Sooke Reservoir, our main reservoir for collecting and storing our drinking water; back-up reservoirs include the Butchart, Lubbe, and Goldstream Reservoirs.
River	A body of water, larger than a stream, that flows in a channel.
Runoff	The flow of rainwater, melted snow (and other sources) over land.
Solid	An object that is firm, compact and has a definite shape. The opposite of a liquid or gas.
Surface water	The name for water found above ground, including water that flows (e.g. as in streams, rivers) or stands still (e.g. as in lakes, ponds, snowpack).
Vapour	The gas state of water. Water vapour can be seen as mist, fog, or steam.
Waste	The action of using or consuming thoughtlessly or carelessly and/or items we think of as unusable, unwanted and that we discard (e.g. garbage).
Wastewater	Water we use that goes down an indoor drain to the sanitary sewer. ***Note: water that goes down an outdoor drain is referred to as stormwater rather than wastewater.***
Water cycle	A looped series of events that keeps water constantly moving above, below and on the Earth's surface. In its simplest form, the cycle includes the stages of evaporation (of liquid water into the atmosphere) and precipitation (rain, snow, etc. falling back to Earth). Also referred to as the hydraulic cycle, the full cycle also involves condensation, groundwater, percolation, cloud storage, and transpiration. **www.crd.bc.ca/education/our-environment/watersheds/watershed-basics/water-cycle**
Water table	The highest level groundwater floods in an aquifer (to form the saturated zone in the ground).
Watershed	An area of land that drains rainfall, melted snow and anything picked up by the

	water (sediment and dissolved materials) into a river, lake, reservoir or marine harbour.
Weather	Short-term changes (minutes to weeks) in precipitation, sunshine, clouds, temperature etc. When we say that today is colder than yesterday, we are talking about a change in the weather.
Well	A deep hole in the ground used to obtain drinking water.

Appendix C:
Video Script

Down the Drain and Back Again

Opening Credits

VOICEOVER

Somewhere in Greater Victoria, a tap is dripping...

Dylan, a small boy in pyjamas, is walking down the hallway, yawning. He's just awakened and is still very sleepy. In the bathroom, Sprinkle, a small, magical creature, is struggling with the shower tap, trying to turn it off and stop the drip.

SPRINKLE

(concerned)

Oh no, someone left this tap dripping all night. Doesn't look like much but it sure adds up. Leaky taps waste water and energy too.

Dylan enters the bathroom, still looking very sleepy. He doesn't notice Sprinkle, who quickly flies behind the shower rail. Sprinkle watches and gasps as Dylan walks over to the shower and turns on the water.

DYLAN

(feeling the water coming out of the shower tap)

Brr! Think I'll let it warm up a bit first.

Dylan leaves the water in the shower running and walks over to the bathroom sink. Sprinkle watches as Dylan turns on the faucet, then puts toothpaste on a toothbrush and starts to brush his teeth with the tap still running. Sprinkle looks at the shower, which is still running, then back at Dylan, who's taking his time brushing his teeth. Just then Dana (Dylan's sister) enters the bathroom with a bandage on her finger.

DANA

(mumbling)

'Morning, Dylan.

DYLAN

(his mouth full of toothpaste)

'Morning

Dana walks over to the toilet, removes the bandage and places it into the toilet and flushes. Sprinkle watches from her perch on the shower rail with a horrified expression.

DYLAN

(turning around)

Dana! Now the water will be too hot.

DANA

(shrugs)

Just wait a little longer. It'll cool down again.

Dana walks over to the sink, picks up her own toothbrush, and begins brushing.

Sprinkle stares, mouth agape as he looks back and forth between the water pouring out of the showerhead, the toilet, and the sink, where the children are brushing their teeth while letting the tap run full blast. Clearly he is shocked by all the water that's going down the drain. Finally he can't take it anymore. He flies over to turn off the shower.

DYLAN AND DANA

Huh?

Sprinkle flies over to the bathroom sink and turns off that water as well, then faces Dylan and Dana.

DYLAN

Hey! Who are you?

DANA

What are you?

Discussion Opportunity

- What do you think Sprinkle is going to say?
- How is Sprinkle feeling? Why?
- Dylan and Dana are wasting drinking water and energy. What could they do differently?

Note: Wasting water wastes energy because it takes energy to heat water. And although our drinking water is distributed using gravity, in a few instances energy is used to pump it uphill.

SPRINKLE

The name's Sprinkle. It's my job to help humans conserve and protect our precious resource... water.

DYLAN

Protect water- from what?

SPRINKLE

From being wasted and polluted.

DANA

But we're not wasting water or polluting it, we're brushing our teeth.

SPRINKLE

But you're not using the water while you're brushing; it's just going straight down the drain! And the toilet should never be used as a garbage can.

DYLAN

It's only water.

SPRINKLE

(surprised)

Only water? Water is one of the most important things there is! All living things need water to survive! Without water to drink, you wouldn't be able to survive more than a few days.

DANA

But water is everywhere. This is Vancouver Island, we're surrounded by water.

SPRINKLE

Yes, but you can't drink ocean water, it's salty! Your tap water is fresh, clean and safe to drink... and there's a lot less fresh water than ocean water.

DANA

What do you mean? Look at it all coming out of the tap!

SPRINKLE

It may seem like there is no end to tap water, but have you ever asked yourselves where your tap water comes from?

DYLAN

Not really, I just turn on the tap and there it is- clean, fresh water.

SPRINKLE

You're lucky, not everyone in the world can do that. But tap water isn't endless. It's up to all of us to conserve it and make sure it stays clean so there is enough for all living things.

DANA

So, where does our drinking water come from?

DYLAN

And how do we keep water clean?

SPRINKLE

(Aha moment)

How would you like to go on an adventure to discover the answers?

Discussion Opportunity

- What adventure do you think Sprinkle has in store for Dylan and Dana?
- Where do you think they will go?
- What do you think they will learn?

DYLAN

Yes!

DANA

Sure!

Sprinkle waves her hand and suddenly Dylan and Dana are turned into water drops hanging from the bathroom sink faucet.

DANA

Hey! What have you done to us?

SPRINKLE

I've turned you into water drops! You're going on a trip around the water cycle to find out why it's important to use your fresh tap water wisely.

DYLAN

(as he and his sister are elongating, being pulled down by gravity)

Here we go!

Dylan and Dana drip from the tap and fall down the drain.

CHAPTER 2

Dylan and Dana are sliding down through an intricate network of drainpipes. The drains are surrounded by earth and rock.

DYLAN AND DANA

Aaagh!

Dylan and Dana flow down the drain. They drop down into water flowing through a lateral pipe. Dylan narrowly misses another clearly defined water drop. Dylan and Dana are now in a much larger drain, with some air above them. Also in the water is garbage, including the bandage Dana flushed (e.g. dental floss, cigarette butts) and organic matter (e.g. vegetable peelings, coffee grinds, the remains of food that have not been scraped off plates. Floating on the surface of the water are dark, shiny oil slicks, gobs of fat, patches of greenish-brown scum, and clumpy piles of yellow-brownish foam.

WATER DROP #1

(as Dylan narrowly misses landing on him)

Hey!

Dylan and Dana look at the other drop, startled, as it drifts past. Then they almost bump into the bandage. Startled, they move away from it, then are swept by the current of the water toward a dark, shiny oil slick up ahead. Another drop of water floating alongside sees where they're heading and calls out a warning.

DYLAN

Oh sorry... Where are we?

WATER DROP #1

We're underground, in the sanitary sewer.

DANA

What is all this stuff?

WATER DROP #1

Leftover food, tissues and other garbage humans flush down the drain. It's too bad, 'cause there are better places to put this stuff.

Another drop of water floating alongside sees where they're heading and calls out a warning.

WATER DROP #2

Hey, you two! Look out for that cooking oil slick! You don't want to be coated in that stuff or bring it where we're going.

Discussion Opportunity

- Where do you think they are going?
- Why do you think the water drop tells Dylan and Dana to stay away from the oil?
- Why do you think this could be a problem? (see Notes below)
- Why do you think people flush garbage down the drain?
- Where should the garbage have gone instead of down the drain? (see Notes below)
- Have you or anyone you know ever flushed anything other than human waste and toilet paper down the toilet?
  - What was it?
  - What could they have done with it instead?

Notes:

- Anything that goes down an indoor drain can end up in our ocean (sanitary sewer) or our groundwater (septic system). Drains outdoors (storm drains) are connected to our streams, creeks and other waterways. Help protect the plants and animals in these sensitive ecosystems.
- Only human waste and toilet paper should be flushed down the toilet. Anything else could upset septic systems and wastewater works preventing them from working properly (e.g. block pipes, cause backups into our homes, streets and the environment) or could pass through them causing pollution (e.g. medication, oil and other chemicals)
- Leftover or expired medication and vitamins should be returned to pharmacies. **www.crd.bc.ca/education/stormwater-wastewater-septic/at-home/protecting-plumbing-treatment/medication-return-program**
- Leftover food should be composted or placed in the garbage. **www.compost.bc.ca/education/factsheets/**
- Toilet paper experiment. Stir a piece of toilet paper in a glass of water. What happens? It is better if the toilet paper stays somewhat intact, this will reduce clogging of septic systems.

Extension:

Look for other ways to reduce, reuse and recycle an item you think might be wrongly flushed down the drain **www.myrecyclopedia.ca**

DYLAN

(panicking)

Aagh! What's happening?

DANA

I don't know!

Dylan and Dana see a metal screen up ahead. Water Drop #1 drifts past in to the long pipe on the other side of the screen. Bandage and other solid debris are caught on the screen. Some oil passes through and other dissolved material.

WATER DROP #1

End of the line! We're out of here!

Dylan, Dana and the other water drops shoot out underwater from a port in the deep sea pipe, swirling round with the force of the current. Looking back they see jets of water drops coming out of multiple ports in the pipe.

Background Information

SANITARY SEWERS IN GREATER VICTORIA

This scene represents preliminary treatment- where wastewater is screened to separate out coarse solids (rocks, rags, plastics, etc.) and grit (sand and gravel) down to 6mm sized particles in effect at the CRD's Clover Point and Macaulay Point Facilities. The screened material is normally trucked to Hartland landfill. The screened wastewater called effluent, is pumped out through a deep-sea outfall (pipe) into the ocean. Secondary Treatment (Saanich Peninsula Facility) also removes dissolved organic substances.

- For information about Clover and Macaulay Point Facilities see: **www.crd.bc.ca/about/what-we-do/stormwater-wastewater-septic/wastewater-treatment/macaulay-clover-point**
- For information about the Saanich Peninsula Facility see: **www.crd.bc.ca/about/what-we-do/stormwater-wastewater-septic/wastewater-treatment/saanich-peninsula**
- For information about changes to wastewater treatment in Greater Victoria see: **www.crd.bc.ca/project/wastewater-treatment-project**

Key messages:

- Anything that goes down an indoor drain can end up in our ocean (via sanitary sewer) or our groundwater (via septic system).
- Do not use your drains for garbage disposal- instead recycle, compost, or place items in the garbage. To find out the best way to dispose of most items see **www.myrecyclopedia.ca**
- Collect cooled cooking fats, oils and grease in a sealable container and discard with household garbage or compost where facilities exist. **www.myrecyclopedia.ca**
- Return unused or expired medications to participating pharmacies. **www.crd.bc.ca/medications**

Dylan and Dana gape as a school of salmon swims past them. Then they, the other water drops begin to turn the same bluish-green colour as the ocean around them. They are now salt water drops.

DYLAN

Where are we? What's happening? Why do I feel so salty?

WATER DROP #2

You're in the ocean, of course.

WATER DROP #1

Yeah! Most of the Earth's surface is covered by ocean water.

DANA

I didn't realize that our homes were connected to the ocean.

WATER DROP #1

Do you mean humans' homes? Yes, the water cycle connects all homes of all living things on land and in the ocean.

DANA

I wonder how we will get back home.

WATER DROP #2

You're in the ocean. You are home, here with all the marine animals and plants.

DYLAN

No, you don't understand. We need to get back to land.

WATER DROP #2

Well, you're in luck. It looks like the current is taking us to the surface.

The current carries them upward through the water. Orcas swim past.

DANA

(just as they're all getting sucked in)

Oh no! The whale is going to drink us!

WATER DROP #1

Won't be the first time.

They're sucked in, then the orca swims upward.

Discussion Opportunity

- How do marine animals use water?
- What other animals use water?
- What else uses water?
- What happens to the garbage that goes down the drain? Do you think it is good for the marine life- plants and animals?
- Why was it not the first time the whale drank the water drop? Water cycle... goes around.

The orca surfaces and blows air out of its blowhole, sending Dylan, Dana and the other water drops up in a spray. Then the whale submerges and they fall back down on to the water's surface. In the background is the Victoria skyline.

DYLAN

Look! It's Victoria.

WATER DROP #2

Yeah, that's where I just came from. Thousands of humans live there.

DANA

That's where we live! I wonder how we'll get back there.

WATER DROP #1

What's your hurry? We've only just returned to the salty sea. The ocean is where almost all of us water drops hang out.

DANA

Yeah, but we're not water drops. We're human children.

The two other drops look at each other confused.

DYLAN

Uhhh, anyways... so, how do water drops like us get back to land?

WATER DROP #2

Well, your best bet is to relax, hang out here on the surface and warm up a little. Ah...

The two other drops stretch out, relax and enjoy the sunshine. Dylan and Dana watch them impatiently.

DANA

Phew, it's getting hot... hey!

Dana starts to get fuzzy around the edges, her greenish colour fades to dark blue and rises up above the surface of the water.

DYLAN

(as he gets fuzzy around the edges, his greenish colour fades to dark blue and begins to rise as well)

What's happening to us?

WATER DROP #1

(also getting fuzzy around the edges)

You're evaporating. Don't worry, it's all part of the water cycle.

DANA

(nervous as she continues to rise)

I don't think I want to evaporate!

WATER DROP #2

(as it and Water Drop #1 also rise)

Relax. The sun's just turning you into water vapour, that's all.

DYLAN

Hey, I don't feel salty anymore!

WATER DROP #2

Yup, we're fresh water again. Woohoo! Not many of us water drops get to be fresh water at the same time.

They float upward.

Discussion Opportunity

- What do you think is going to happen next?

Discovery Activity

Could pause the video here, and continue with lessons 5b-d

Vocabulary

- Evaporation
- Water vapour

The drops of water vapour continue to rise. We can see the ocean, harbour and city beneath them. An air current comes and sweeps them even higher.

DANA

(shivering)

It's cold up here. I'm freezing!

DYLAN

Me too!

WATER DROP #2

Not yet you're not, though you will be if we get high and cold enough.

WATER DROP #2

Hey, look! There's a small cloud. Hello! Can we join up with you?

WATER DROP #3

(in vapour form, part of the cloud)

Why not? The more the merrier.

Dylan, Dana and the other two drops drift over to join the cloud, which floats toward land. The city of Victoria passes by underneath. There are many cars on the roads. They pass over a residential area.

DANA

Look! There's our home!

DYLAN

I wonder when we'll get down there again!

WATER DROP #1

(looking down)

Can't get down there yet, we're not high enough!

WATER DROP #2

We have to get higher, so we can get colder. When that happens we'll condense into raindrops and fall to the ground.

WATER DROP #1

But I can't see why you're eager to get down there. Look at all the fresh water being wasted.

Below him, Dylan and Dana see people outdoors in their yards, involved in different water wasting activities: one woman is watering a wide brilliant green lawn. There's a leak in her garden hose, out of which a fine stream of water is spraying and causing a puddle. A child is running through a sprinkler that's spraying as much water on the sidewalk and road as it is on the lawn itself. Down the street, a man is washing his truck while letting the garden hose run constantly. A stream of water runs down the gutter and into a stormdrain. Painted beside the drain is the silhouette of a fish (indicating that the drain empties into a stream used by salmon). Big garbage cans, no blue boxes or blue bags, no composter. Looking beyond the city, we see the network of local lakes and rivers that empty into the ocean. Looking closely, we can see that the water levels are low.

DYLAN

But just look. There's lots of water everywhere... isn't there?

WATER DROP #1

Sure, there's lots of water but most of it is in the ocean and that's all salty! There's not nearly as much fresh water in the lakes and rivers.

Looking back at the community, see golden lawns, a child playing in a shallow wading pool in the shade, a neighbour washing the car bucket and sponge on a gravel surface (no runoff), a garden of native plants and vegetables- carrots, kale, green onions, tomatoes, a P.U.R.E. sign in the garden, a composter, blue box and blue bag, a rainbarrel and a biker drinking from a reusable water bottle or water fountain.

WATER DROP #1

Now that's a community I would want to rain on- look at all that fresh tap water being used wisely.

DYLAN

Aren't those lawns dead?

WATER DROP #2

No, they are dormant; resting like the trees and plants do in the winter. They will grow green again when more of us rain down during the fall.

DANA

How come nobody is watering those flowers?

WATER DROP #2

That's because they're native plants. They are used to the climate here, so they don't need extra tap water to survive, just us raindrops...whenever we fall.

Discussion Opportunity

- Describe a time you noticed someone using tap water wisely.
- Does your family or someone you know use less tap water outside like the people in this community?
- Can you think of one thing you could do at home to use less water outside your home.

WATER DROP #2

It's nice to see humans using water more wisely. There's not much fresh water available in the world.

DANA

Yeah, because most of you, I mean us, are hanging out all salty in the ocean. Right?

WATER DROP #2

That's right. There are not many of us fresh water drops out here at once.

WATER DROP #1

When we are fresh water, most of us are far away from here in glaciers- frozen solid.

WATER DROP #2

Some of us flow as liquid in lakes and rivers, but many places we flow are not handy, deep underground or in faraway places.

WATER DROP #1

Leaving the rest of us as vapour, floating in the air waiting to condense into clouds and fall as rain, snow or hail...

In the distance the air is thick with pollution . Heavy traffic fills the streets below. An industrial facility is spewing smoke into the air through its huge chimneys.

DYLAN

Hey, what's that ahead?

WATER DROP #1

That's pollution. It's coming from the machines humans use that run on gas and oil.

Transition the view to reflect changes. Less smog, buses replace cars and less smoke from the factory chimney.

WATER DROP #2

Humans are trying to make less pollution and save energy. Even the factory has reduced its waste.

DANA

Look- It's working!

WATER DROP #1

It definitely helps. I know they'll keep finding ways to make a difference.

Meanwhile, the cloud continues to rise. One by one the water vapour drops condense and become liquid water drops again.

Chapter 3

Discussion Opportunity

- What can you do to help save energy and make less pollution?
  Use less energy, take shorter showers, turn the tap off while brushing your teeth, turn off lights, and drink tap water (in our region the emissions created for 1 bottle of water is approximately the same as 1,333 cups of tap water).
- Have you, your family, your school, your community or someone you know already started to make changes? What were they?

Background Information

WATER, ENERGY AND CLIMATE CHANGE

Climate Change- Since the industrial revolution, the increase of greenhouse gas emissions (GHG's) has changed the natural way the "greenhouse effect" controls temperatures on Earth, altering the atmosphere, water cycle and natural ecosystems. We create GHG's when we burn wood, coal, oil and natural gas (to generate electricity, to power vehicles, planes, boats and machines). Our actions are causing our climate to warm up.

- Regional Change in Climate- It is anticipated that our region will have:
  - long-term warming (all seasons will be warmer, river temperatures will increase)
  - extreme weather (flooding, droughts, storms and erosion)
  - changes to precipitation patterns (more rain and less snow in winter and drier summers)
  - rising sea levels which may erode land and intrude freshwater aquifers
  - Although our agricultural season may be longer, pests normally killed by cold winters may survive. **www.nrcan.gc.ca/earth-sciences/climate-change/community-adaptation/assessments/84**
- Can we help? Yes, efforts to reduce GHG emissions will help influence long-term climate change and its impacts. However, as a result of our historical emissions the Earth will continue to warm for decades to come.
- Our goal- to reduce community GHG emissions by 33% by 2020 (approx. 495,000 tonnes)
- World CO2 Levels **www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide**

BUSINESSES AND WATER POLLUTION

In the Capital Region, there are laws that limit what and how much can flow down the drain into the sanitary sewer (CRD Sewer Use Bylaw) or the stormdrain (Municipal Bylaws). CRD staff work with businesses to reduce their waste and change how they dispose of it. CRD staff also test wastewater quality, watch for any changes to aquatic and marine life and work to restore natural habitats.

DANA

(turning into a water drop)

Hey! I'm a water drop again.

WATER DROP #2

That's right! And soon we'll be raindrops. I wonder where we'll land.

Below them are the Potholes of the Sooke River where people are swimming.

DYLAN

(looking down)

Look! Those are the Sooke Potholes! We've been swimming there before.

DANA

(wistfully)

Oh, I wonder if we'll ever get home.

WATER DROP #2

Ooh, we're going to start raining any time now! I hope I fall in a forest. I just love helping plants and trees grow.

WATER DROP #1

Oh! Oh! Here I go! Goodbyeeeee! See you next time!

She falls out of the cloud. Other drops fall. They're excited, eager to see where they'll end up. Finally it's Dylan and Dana's turn. Water Drop #2 falls with them. They drop through the air toward the forest and creek below.

DYLAN AND DANA

(falling)

AAAGH!

WATER DROP #2

Why are you screaming? We're raining-now we can refill freshwater lakes, streams and rivers. Yahoooo!

Dylan and Dana look down at the ground rushing up to meet them, then at each other.

DYLAN AND DANA

AAAGH!

Water Drop #2 lands on the outstretched frond of a fern growing on the bank of a creek just as Dylan and Dana land in the creek itself (Rithet Creek, which runs into the Sooke Lake Reservoir). Dylan and Dana begin to drift downstream.

WATER DROP #2

Bye! I hope you find your way home!

Dylan and Dana float quickly downstream. Most of the creek bed is exposed; the creek itself is a small channel of water threading its way through the centre of it. As they float they pass a bear.

DYLAN

Gee, there sure isn't a lot of water in this creek.

DANA

Yeah, I know. I guess it hasn't been raining much lately.

DYLAN

And I always thought that all sunshine and no rain was a good thing.

They see a small fish caught in a puddle that's cut off from the main creek channel.

DANA

Not for everyone, I guess.

The creek carries them into the Sooke Lake Reservoir, where they continue to float along the surface of the water.

DANA

Where are we now? Is this a lake?

DYLAN

(looking at the nearest shore)

Look! There's a sign!

DANA

(pronouncing it slowly)

Sooke Lake Res-er-voir. I wonder what a reservoir is?

WATER DROP #4 comes drifting up to them.

WATER DROP #4

You must be newcomers. A reservoir is where humans store fresh water they will use as tap water.

DYLAN

Sure is quiet around here!

View of the reservoir and surrounding area.

WATER DROP #4

That's because the Sooke watershed is protected. All the land around here that drains water into the reservoir is closed to humans, well except for the watershed caretakers.

DYLAN

Why?

WATER DROP #4

It helps keep the water clean.

DANA

Is that why nobody is swimming, fishing or boating in the reservoir?

WATER DROP #4

That's right. Less chance of disturbing or polluting the fresh water. There are no houses or factories near the reservoir either.

Discussion Opportunity

- Did anything surprise you?
- Do you drink tap water at home?
- What is a watershed?
  A watershed is an area of land that drains rainfall and melted snow (and anything the water picks up like sediment and dissolved materials) into a river, lake, reservoir or marine harbour.
- Do you know which watershed you live in?
  There are over 300 watersheds in the Capital Region.

For more information about:

- Our Drinking Water
  www.crd.bc.ca/service/drinking-water/watershed-protection

  www.crd.bc.ca/service/drinking-water/watershed-protection/greater-victoria-water-supply-area
- General Watershed information
  https://www.crd.bc.ca/education/our-environment/watersheds/watershed-basics
- CRD Watershed Maps

  www.crd.bc.ca/education/our-environment/watersheds/watershed-maps-flow-diagrams

Extension

Have students draw a picture of a recreational lake and compare with a lake used as a reservoir.
Locate your school's watershed. See lesson 6b

DANA

Looks like there's a lot of fresh water stored here.

WATER DROP #4

The humans cleared some of the forest and raised the dam so the reservoir would hold more rainwater. That's how this reservoir gets filled: by rain. It flows into the reservoir in creeks

and streams. Still, humans have to keep using tap water wisely.

DYLAN

But you said they have more room in the reservoir now.

WATER DROP #4

True, but it doesn't always rain enough to fill the reservoir. And with more humans moving to Greater Victoria using and drinking water from the reservoir, it's important they continue to use water wisely.

The children look and see that the top of the shoreline looks new, and notice the water marks around the shore of the reservoir indicate that the water level is low (full is 186.75 meters). A lot of the surrounding shore is actually reservoir bed that, in wetter times, would be covered in water.

DYLAN

(concerned)

Well, if all this reservoir water gets used up can't we, I mean, can't the humans, just find some more somewhere else?

WATER DROP #4

Well, they do have a back-up- a group of smaller reservoirs along Goldstream River.

DYLAN

(relieved)

Phew.

WATER DROP #4

It holds enough water for 30 – 90 days.

DYLAN

(disappointed)

Oh.

WATER DROP #4

Humans couldn't just keep using more and more fresh water. Eventually they would use it all up. And then what would happen to the animals, fish and plants?

DANA

(pensive)

Humans aren't the only ones that need fresh water to survive.

DYLAN

(remembering what Sprinkle said)

All living things need water to survive.

WATER DROP #4

(pleasantly surprised by their understanding)

That's right! As long as humans use tap water wisely, they are taking care of the environment- making sure there is enough fresh water in the reservoir for their neighbours, plants, fish and animals, especially during those hot summer months.

DANA

Why is the summer different than any other season?

WATERDROP #4

In the summer, we rain less often.

Discussion Opportunity

- Backup reservoirs hold enough water for 30- 90 days. In the summer, the backup system would not last as long as the winter. In the summer months, we receive less rain and we use twice as much water.
- What do you think we are doing in the summer that uses more water than in the winter? (watering plants) **www.crd.bc.ca/education/water-conservation/at-home/outdoor-water-use**

Extension

Measure how much it rains for one month in the fall, winter, spring and summer. Can you see a difference?

Visuals

- Water Watch- weekly photos of the Sooke Lake Reservoir and water levels. **www.crd.bc.ca/about/data/sooke-lake-reservoir/sooke-lake-reservoir-photos**
- Maps of the watershed **www.crd.bc.ca/about/document-library/documents/maps/water-supply-area** **www.crd.bc.ca/education/our-environment/watersheds/watershed-maps-flow-diagrams**

Suddenly Dana realizes something.

DANA

(eyes widening with excitement)

Hey! You said this water is used by humans. How does it get to humans?

DANA

(hopefully)

Maybe we can find a way to get home!

View of the intake tower.

WATER DROP #4

Well, if you want to go see the humans, your best bet is to go through the tower over there. That'll take you to the disinfection plant where the water gets cleaned so humans can drink it without getting sick.

Now if you want to go on an adventure through the forest, wait by the spillway for enough rain to push you over the edge- though that might take a couple of years. Or come with me over Deception Dam and down Sooke River. That fresh water is used for First Nations fisheries.

DANA

(excitedly)

Thanks, maybe next time!

DYLAN

Let's go!

Discussion Opportunity

- Change the ending- write, draw or act a new ending to this story. What adventure would Dana and Dylan have if they went down the Sooke River and into the ocean?
- Read a related First Nation legend, such as
  - *"Salmon Boy, A Legend of the Sechelt People"* by Donna Joe
  - *"First Beaver"*, by Caroll Simpson

Chapter 4

Dana and Dylan hurry across the surface of the water toward the intake tower. They're sucked in, and then travel through pipes to the treatment plant where they proceed through the disinfection process. As they travel through the pipes, the water is first exposed to a UV light, then chlorine, then ammonia.

Finally Dylan and Dana are released along with a stream of water into another series of pipes. Finally, they're back in their own bathroom again, hanging from the faucet.

DYLAN

Hey! We're back in our own bathroom again!

Then he and Dana look down and see the dark drain hole beneath them.

DYLAN

(worried)

Uh, oh! We're going to go down the drain again!

DANA

Turn off the tap! Hello! Somebody turn off the tap!

SPRINKLE

Don't worry, I have you. Welcome back.
Dana and Dylan are magically transformed, back in their human form.

DYLAN

What a trip!

DANA

What a drip, you mean! It's nice to be back in solid form again though.

SPRINKLE

Well, did you learn lots on your first tour of the water cycle?

DYLAN AND DANA

Yes!

DYLAN

I see now why it's important to protect our fresh drinking water.

SPRINKLE

And are you going to keep on using water like you were before?

DYLAN AND DANA

No way!

DANA

I'm going to use it wisely and keep it clean.

DYLAN

Because... all living things need water to survive.

SPRINKLE

Sending you on a trip through the water cycle was the best way to show you why we should conserve and protect fresh water and always use it wisely.

DANA

(placing a piece of dental floss resting on the sink into the garbage beside the toilet and making sure the sink taps are also tightly turned off)

Well, it worked for me.

DYLAN

(looking at the shower tap, which is still dripping)

Me too. Let's ask Dad to fix this leaky shower head.

She walks over to the window and looks outside, then jumps in alarm. A sprinkler in the yard is holed and spraying water on the sidewalk.

DANA

Oh no! Someone's left the sprinkler running in the hot sun!

DYLAN

Let's go turn it off and tell our neighbours what we've have learned about being waterwise!

The two children look at each other in alarm and then run out of the bathroom. Dylan turns back and turns off the lights. Sprinkle watches them go with an amused expression.

SPRINKLE

Looks like my job here is done.

Sprinkle flies out of the bathroom window and disappears.

End Credits

Discussion Opportunity

- What did Dana and Dylan learn?
- What do you have in common with Dylan and/or Dana?
- What will you remember about water?

Sing-along song, "Drip, Drip, Drop"

Appendix D:

Additional Resources

The following resources may provide additional support for teaching the subject of water and drinking water conservation and protection. For the most current list, see **www.crd.bc.ca/teacher**.

It is important to note that the print, video, and multimedia resources cited here may not have undergone the Ministry of Education resource evaluation process. Schools should consult their district resource evaluation policies, as well as the ministry guidelines contained in the Catalogue of Learning Resources. **www.bced.gov.bc.ca/irp_resources/catalogue_of_learning_resources.htm**

Teacher Lesson Plans and Activities

Resource	TOPIC				FORMAT					
	Water Cycle & Weather	Forms of Water	Water & Living Things	Other	Hardcopy	Online	Audio	Video	Printable	Fee
A Drop of Water: A book of science and wonder	•	•			•					•
A Teacher's Guide to "A Drop Around the World."	•	•		•						•
BC Green Games	•	•	•	•	•	•	•		•	
Backyard Biodiversity and Beyond: A Handbook for Students and Teachers.			•		•					•
Classroom Events Through Poetry		•			•					•
Earth Explorations	•				•	•	•		•	•
Outdoor Activity Study Kits	•					•			•	
Primarily Earth	•				•	•	•		•	•
Project WET	•	•	•		•					•
Salish Sea: A Handbook for Educators	•				•					•
Salmonoids in the Classroom			•			•			•	•
Smart Exchange	•	•	•	•		•				
Storm Drain Marking Program			•		•			•		
Stream to Sea	•	•	•		•	•			•	
The Water Source Book and Thirstin's Water Cycle Activities	•	•				•			•	
Water Action Projects	•	•	•	•		•			•	
Water Cycle	•	•	•			•		•		
Water Education Posters	•					•			•	
Water Footprint Calculator			•			•				

Resource: **A Drop of Water: A book of science and wonder**

By: Wick, Walter (1997)Scholastic Press, New York.

Grade: 2-4

Description: The most spectacular photographs ever created on the subject of water appear in this unique science book by Walter Wick. The camera stops the action and magnifies it so that all the amazing states of water can be observed.

To Order: ISBN 0-590-22197-3

Resource: **A Teacher's Guide to "A Drop Around the World."**

By: Malnor, Bruce and Carol. (1998) Dawn Publications

Grade: 3-6

Description: A series of lesson plans to be used in conjunction with the children's book "A Drop Around the World". Focus is on both scientific concepts and sustainability of water. The book contains three components: Water Magic, World Habitats, and Skill for Living.

Resource: **BC Green Games**

By: Ministry of Education

Description: BC Green Games is a province-wide competition for students, designed to motivate environmental action, enable sharing, and reward and celebrate the green efforts of schools in B.C. View the prize-winning projects and register your school to participate.

www.bcgreengames.ca/

Resource: **Backyard Biodiversity and Beyond: A Handbook for Students and Teachers.**

By: Wild BC; Binder, D. Guy, S. & Penn, B. (1999)

Grade: Grades K-7

Description: Five modules and a community action tool kit cover topics such as endangered species, global thinking/local action, wildlife, ecology, and exploring biodiversity through poetry, art, family, and First Nations. Contains a section on water in the ecosystem. Available in French.

To Order:
#102-2957 Jutland Road, Victoria, BC V8T 5J9
250.940.9786

Toll Free: 1.800.387.9853 ext. 4

https://hctfeducation.ca/product/backyard-biodiversity-beyond/

Resource: **Classroom Events Through Poetry**

By: Swartz, Larry. Stenhouse Pub (1993)

Grade: Primary

Description: Contains several suggestions for teaching words that express the sound of water: lap, gurgle, splash, rain, drip, etc. Includes ideas for integration with English language arts vocabulary development; good supplement for ESL students.

To Order: ISBN 1-55138-008-0

Resource: **Earth Explorations**

By: AIMS Education Foundation (2012)

Grade: Grades 2-3

Description: Students investigate Earth's resources and some conservation methods. The water cycle, daily patterns, and fossils are also addressed.

To Order:
AIMS Education Foundation
1595 S Chestnut Ave, Fresno, CA
93702-4706

Toll Free: 1.888.733.2467

Downloadable PDF
http://store.aimsedu.org/aims_store/books/digital-books/earth-explorations-pdf-version.html

Hardcopy and CD
http://store.aimsedu.org/aims_store/books/earth-explorations.html

Resource: **Outdoor Activity Study Kits**

By: Environmental Educators Provincial Specialist Association

Description: a list of environmental, place-based, sustainability, outdoor, experiential, and Aboriginal education resources.

http://eepsa.org/resources/links/

Resource: **Smart Exchange**

By: Smart

Grades: K-12

Description: Find lesson plans for your SMART Board and connect with teachers. Customize existing lesson plans to meet your instructional needs.

http://exchange.smarttech.com

Resource: **Primarily Earth**

By: AIMS Education Foundation (2008)

Grade: Grades K-3

Description: Students explore many different aspects of weather, including temperature, clouds, precipitation and the water cycle. Observing and recording are emphasized throughout.

To Order:
AIMS Education Foundation
1595 S Chestnut Ave, Fresno, CA
93702-4706

Toll Free: 1.888.733.2467

Downloadable PDF
http://store.aimsedu.org/aims_store/books/digital-books/primarily-weather-pdf-version.html

Resource: **Project WET**

By: Wild BC

Grade: K-12

Description: A water science and conservation education program. Incorporates a variety of formats such as large and small group learning, laboratory investigations, discussion of local and global topics, and involvement in community service projects.

To Order:
#102-2957 Jutland Road, Victoria, BC V8T 5J9
250.940.9786

Toll Free: 1.800.387.9853 ext. 4

https://hctfeducation.ca/product/project-wet/

NOTE: Available only through a teacher training workshop.

Resource: **Salmonoids in the Classroom**

By: Department of Fisheries and Oceans Canada

Grade: Primary

Description: This learning resource, which focuses on salmon, biology, and stewardship, encourages an ecological approach, integrating science with social studies. Part of the Stream to Sea Program.

To Order:

Download
www.pac.dfo-mpo.gc.ca/education/resources-ressources-eng.html

Resource: **Storm Drain Marking Program**

By: Department of Fisheries and Oceans Canada

Grade: Primary

Description: Carried out in urban areas under sponsorship of Fisheries and Oceans Canada this program gives children an active role in protecting their environment by marking storm drains with bright yellow fish and circulating information to advise residents that these drains empty into local creeks. A video (for children) and manual (for teachers or leaders) are available.

To Order:
DFO Representative- Lower Vancouver Island and Southern Gulf Islands
5245 Trans Canada Highway
Duncan V0R 2C0
1.250.746.5137

www.pac.dfo-mpo.gc.ca/sep-pmvs/index-eng.htm

Resource: **Stream to Sea**

By: Department of Oceans and Fisheries (DFO) Canada

Grade: Primary

Description: The goal of the Stream to Sea education program is to help students become aquatic stewards. Key concepts include aquatic ecosystems, sustainability and stewardship. Program materials include lesson plans, posters, brochures and services.

www.pac.dfo-mpo.gc.ca/education/index-eng.html

Resource: **The Water Source Book and Thirstin's Water Cycle Activities**

By: US Environmental Protection Agency (EPA)

Grade: K-3

Description: Water lesson plans, games and activities.

To Order:
Download and Print
http://water.epa.gov/learn/kids/drinkingwater/teachers_k-3.cfm

Resource: **Water Action Projects**

By: Resources for Rethinking

Description: Classroom resources reviewed by teacher for teachers. Lesson plans, videos, activities and other resources for various environmental topics. For water specific activities use the search funtion, Theme: Water.

http://resources4rethinking.ca/en/

Resource: **Water Cycle**

By: Bill Nye the Science Guy

Grade: -

Description: Explanation of the water cycle, forms and properties of water using demonstrations and experiments. Complexity varies. Suggest selecting sections for viewing. 23 minutes

To view:
www.youtube.com/watch?v=nr5n0rzbC-Y

Resource: **Water Education Posters**

By: USGS

Description: General information related to water including water use and groundwater. Note: some details included in these posters may not reflect infrastructure and processes in the Capital Region.

To order/download:

http://water.usgs.gov/outreach/OutReach.html

Resource: **Water Footprint Calculator**

By: Grace Communications Foundation

Description: Easy to use. It does focus on statistic for the United States however still a good tool to get an idea of individual water consumption. Some questions will not apply to students however can apply question to the family e.g. driving.

www.watercalculator.org/

Resource: **Connecting Students with their Watersheds: A workbook for community leaders**

By: Wild BC. Husbey, W. & Finlayson, A. (2001)

Description: A workbook for community leaders to inspire volunteers and develop local watershed stewardship project plans. Each module guides you through creating a personal project.

To order:
#102-2957 Jutland Road, Victoria, BC V8T 5J9
250.940.9786
Toll Free: 1.800.387.9853 ext. 4

https://hctfeducation.ca/product/connecting-students-with-their-watersheds/

Teacher Professional Development and Workshops

Resources	TOPIC				FORMAT					
	Water Cycle & Weather	Forms of Water	Water & Living Things	Other	Online	In-school	In-person	Hardcopy	Printable	Fee
CRD Regional Community Atlas				·	·	·		·	·	
Connecting Students with their Watersheds: A workbook for community leaders	·	·	·					·		
Environmental Learning and Experience Guide					·			·	·	
Every Drop Counts				·	·	·		·	·	
Project WET Workshop	·	·	·	·	·	·				·
Recycling Reenergized				·	·			·	·	
Smart Learning Space				·	·		·			·
Stream to Sea			·			·				
Various workshops and conferences				·		·	·			
Water Stewardship: A Guide for Teachers, Students, and Community Groups.			·		·				·	

Resource: **CRD Regional Map**

By: Capital Regional District

Description: Customize a regional map using layers- locate drinking wells and watersheds using the Natural Areas Atlas layer. Remove the base map and create a blackline master for students.

https://maps.crd.bc.ca/Html5Viewer/?viewer=public

Resource: **Environmental Learning and Experience Guide**

By: Ministry of Education

Description: is a multimedia document that helps all K-12 teachers integrate environmental learning principles into their teaching.

www2.gov.bc.ca/assets/gov/education/kindergarten-to-grade-12/teach/teaching-tools/environmental-learning/environ_learning_exper.pdf

Workshop: **Every Drop Counts**

By: Capital Regional District (CRD)

Description: An interactive, professional development workshop for teaching "Every Drop Counts" in the classroom.

250.360.3133

Workshop: **Project WET Workshop**

By: Wild BC

Description: The Project WET workshop provides educators an opportunity to receive the Project WET Curriculum and Activity Guide, try a variety of activities in the Project WET Activity Guide first hand, and learn about water as a vital shared resource http://wildbc.org/index.php/programs/project-wet/.

To book:
Email: wildbc@hctf.ca

www.hctfeducation.ca/workshops/

Workshop: **Recycling Reenergized**

By: Capital Regional District (CRD)

Description: An interactive, professional development workshop gives educators more tools for teaching the 3R hierarchy - Reduce, Reuse, Recycle - in the classroom, making them meaningful to students' lives. Participants receive a 3R educator manual which links activities to specific grades and IRPs, as well as to informative Websites and local programs.

To order/book:
250.360.3133
education@crd.bc.ca

www.crd.bc.ca/education/school-programs/for-k12-teachers/educator-training-programs

Resource: **Smart Learning Space**

By: Smart

Grades:K-12

Description: The SMART Learning Space is a virtual learning environment loaded with highly innovative interactive learning experiences that will enhance your ability to teach, support learning and improve student outcomes.

http://exchange.smarttech.com/#tab=0

1.866.518.6791
smarttech.com/contacttraining

Resource: **Various workshops and conferences**

By: Environmental Educators Provincial Specialist Association (EEPSA)

Description: EEPSA is committed to promoting networking, curriculum support, and leadership in environmental education. Conferences and workshops vary, see online events calendar.

www.bctf.ca/eepsa/

Resource: **Water Stewardship: A Guide for Teachers, Students, and Community Groups.**

By: BC Ministry of Environment, Lands and Parks; McClaren, M., Fulton, K. & McMahen, C. (1995)

Grade: 3-6

Description: Intended for a range of ages, the school material includes key concepts for water stewardship, sample curriculum web planning, some activities for different age groups, assessment ideas, and a list of other resources.

To order:
Download
https://hctfeducation.ca/product/water-stewardship-a-guide-for-teachers-students-and-community-groups/

Class Workshops and Field Trips

Resource	TOPIC				FORMAT					
	Funding	Water and Waste	Water cycle	Water and living things	Online	In-school	Field Trip	Hardcopy	Printable	Fee
3R School Program						•	•			
Compost School Programs						•	•			•
Eco Learning Hive					•					
Field Trip Funding							•			
Gorge Waterway Nature House							•			•
Living Watersheds						•	•			•
Parks School Programs						•	•			•
Shaw Ocean Discovery Centre School Program							•			•
Stream of Dreams Watershed Education Program			•	•		•				•

3R School Program

Host: Capital Regional District – Environmental Partnerships

Location: Hartland Learning Centre
Hartland Landfill and Recycling Facility
1 Hartland Ave.

Description: Interactive workshops and interpretive tours that support BC Ministry of Education learning outcomes for social studies, personal planning, language arts, science and math. Students discover the connection between water and waste through place-based experiential learning workshop and tour of the facility.

250.360.3133
education@crd.bc.ca
www.crd.bc.ca/education/school-programs/for-k12-teachers/field-trips/3r-programs

Compost School Programs

Host: Greater Victoria Compost Education Centre

Location: In-class or 1216 North Park Street Victoria

Description: Through action-based activities, students learn the importance of composting for reducing waste and improving our soil, water and air.

250.386.9676
info@compost.bc.ca
www.compost.bc.ca/education/school-programs/

Eco Learning Hive

Description: A listing of local southern Vancouver Island organizations offering environmental education programs.

www.ecolearninghive.org/program-search

Field Trip Funding

Host: DayTrippers

Description: Daytrippers, a non-profit children's charity, raises funds for trips to recognized educational and cultural institutions for Canadian school groups in lower-income and far-reaching areas.

http://daytrippers.ca

Gorge Waterway Nature House

Host: World Fisheries Trust

Location: Gorge Park, Esquimalt

Description: The Gorge Waterway Nature House provides students and the public with a unique hands-on opportunity to explore the ecology of the Salish Sea and surrounding area. Located in Esquimalt Gorge Park, adjacent to marine and freshwater environments of the marine waterway and the restored Gorge Creek, and surrounded by a remnant of native forest, the location is ideally suited for environmental education programs.

778.430.7585
info@worldfish.org

https://worldfish.org/projects/local/nature-house

SeaChange Marine Conservation Society

Location: various

Description: Living Watersheds includes year round explorations of our local watersheds. Programs provide exciting outdoor adventures to primary and middle schools that are integrated with curricula and community experiences. Classroom and field outings combine hands-on learning with physical activities such as rowing, treasure hunts and beach games. Teachings from traditions of local First Nations communities are also included. Programs include Opening Minds with Water, EcoRowing and Seaquaria in the Classrooms.

250.652.1662
seachange@shaw.ca

https://seachangesociety.com/

Parks School Programs

Host: Capital Regional District – Parks

Location: Various parks; some in-class workshop may be available

Description: It's time to get out of the classroom and into the parks! Each Spring (April-June) and Fall (October-November), Regional Parks offers a wide variety of nature programs (marine and forest) to support your efforts in the classroom, and engage your students with the natural world.

250.360.3338

www.crd.bc.ca/education/school-programs/for-k12-teachers/field-trips/park-interpretive-programs

Shaw Centre For the Salish Sea School Program

Host: Shaw Ocean Discovery Centre

Location: 9811 Seaport Place, Sidney

Description: A Salish Sea Aquarium. Offers a range of environmental education programs focused on the Salish Sea ecosystem. All programs incorporate the school curriculum and are directly linked to grade-specific BC Ministry of Education Prescribed Learning Outcomes.

250.665.7511 ext. 105
groups@salishseacentre.org

www.salishseacentre.org/school-programs/

Stream of Dreams Watershed Education Program

Host: Stream of Dreams Mural Society

Description: Stream of Dreams instructors present the Watershed Education and Dreamfish Painting workshops, helping students to understand their connections to water and fish habitat and how to make behavioral changes to protect streams, rivers, lakes and our one ocean.

streamofdreams.org

A Drop Around the World

McKinney, Barbara Shaw. (1998) Dawn Publications

Description: This book follows the journey of a rain drop and its unique role on Earth in touching every plant, animal, and human life. The journey takes us through all forms of the substance-solid, liquid, and vapour-and the ever-changing terrains and mediums. Suitable for ages 4-8. 32 pages.

A Raindrops Journey

Slade, Suzanne. (2011) Picture Window Books

Description: Follow a raindrop around the watercycle. Full colour, full page illustrations support text.

A River Ran Wild

Cherry, Lynne. (1992) Harcourt, Brace & Co.

Description: An illustrated story book about the natural historic beauty of the Nashua River in New England which was subsequently polluted and then reclaimed. 28 pages.

Student Resources

Resources	TOPIC						FORMAT							
	Water Cycle & Weather	Forms and Properties of Water	Water & Living Things	Pollution	Drinking Water	Conservation	Book	Games and Activities	Online	Audio	Video	Printable	Fee	DRC/CRD
A Drop Around the World	•		•				•						•	
A Raindrops Journey	•	•				•	•							
A River Ran Wild				•		•	•						•	
Abalone Rescue			•			•		•	•					
About Water: Who Sank the Boat?		•					•						•	
Chlorine Science Center			•					•	•			•		
E is for Environment					•	•	•							•
The Earth Book						•	•							•
Frog Girl			•			•	•							
Hydro to Home- The Energy Story								•	•					
I Can Help Save Water	•		•	•	•	•	•							•
Journey of The Blob	•			•		•			•		•			
The Little Hill						•	•							
Look Inside a Watershed			•	•				•	•			•		
Mr. Archimides' Bath		•					•						•	
Nature Crafts and Quizzes			•					•	•			•		
No-Know Game				•	•	•		•					•	
Our Earth: How kids are saving the planet					•	•	•							•
Raven Returns the Water			•			•	•							•
Ryan's Well			•		•						•		•	
Salmon Boy: A Legend of the Sechelt People			•			•	•							
Watch Over Our Water	•			•		•	•							
Water Dance		•					•						•	
The Water Hole			•				•						•	
Water Sense Kids						•		•	•					
The Water Source Book and Thirstin's Water Cycle Activities	•	•							•			•		
Watershed Word Search and Maze			•	•				•	•				•	
Watershed World								•	•					
Wet All Over: A book about the water cycle	•		•				•							
Where does Water Come From?	•				•		•						•	

About Water: Who Sank the Boat?

Allen, Pamela. (1982) Penguin

Description: Very simple language, heavily illustrated, to get children thinking about flotation. 30 pages.

Chlorine Science Center

The American Chemistry Council

In this colouring book story, the Chlorin8tor, armed with his Electron Grabber tool and trusty sidekick, Little Hector, The Disinfector, battle harmful germs that invade pool water and make swimmers sick.

https://chlorine.americanchemistry.com/Chlorine-Benefits/Health-and-Safety/Water-Germs-Busted-By-Chlorine.pdf

E is for Environment

Corlett, Ian James. (2011) Atria Books

Description: Short stories with suggested follow up discussion questions.

The Earth Book

Parr, Todd. (2010) Little, Brown Books for Young Readers.

Description: Eco-friendly picture book with ideas of how we can help protect and conserve the Earth and why. Brightly coloured illustrations.

Frog Girl

Lewis, Paul Owen. (1997) Walrus books.

Description: A girl goes on an adventure to solve the disappearance of the frogs. Full colour, full page illustrations. A portion of proceeds is donated to the Haida Gwaii Rediscovery Program.

Power of Falling Water

BC Hydro

Learn how the rain and snow that falls in our province is harnessed as energy, how it makes its way to our homes and ultimately how it powers our lifestyles.

https://schools.bchydro.com/activities/130

I Can Help Save Water

Smith, Viv. (1999) Franklin Watts

Description: Water facts and information and at home experiments.

Journey of The Blob

Host: National Film Board of Canada

Description: In this dialogue-less video, a boy has to decide about how to dispose of a green blob he has concocted. He dumps it in a stream and the story follows the blob through the water cycle and raises questions about environmental responsibility and the consequences of our decisions. Suitable for children ages 5 to 12.
1.800.267.7710

9 minutes 50 seconds

www.nfb.ca/film/journey_of_the_blob/

The Little Hill

Stewart, H.E.. (2012) Tudor House Press

Description: Learn how one hill changes over time, with the seasons and human development.

Look inside a Watershed

By: Capital Regional District

Description: In this colouring poster, discover ways to improve the quality of stormwater.

www.crd.bc.ca/docs/default-source/Partnerships-PDF/a-look-inside-a-watershed-colouring-poster.pdf?sfvrsn=252c88c9_0

Mr. Archimides' Bath

Allen, Pamela. (1986) Penguin.

Description: Very simple language, heavily illustrated, story about water displacement.

No-Know Game

Water Education Foundation

Plastic mounted board game that teaches children and adults about the source of their drinking water, what pollutants water may encounter as it moves through the watershed, and how to avoid contributing to nonpoint source pollution.

www.watereducation.org/product/no-know-game

Our Earth: How kids are saving the planet

Wilson, Janet.(2010) Second Story Press

Description: Young people are doing amazing things for our planet. Here are true stories of kids from around the world who each had an idea that started small and turned into something big.

Raven Returns the Water

Cameron, Anne. (1987) Harbour Publishing Co.

Description: A Native American myth to read together. Learn why all the water in the world disappeared. Some black and white illustrations.

Ryan's Well

By: Real to Reel Productions

Description: Ryan's Well is about a young boy's determination to make a difference in the world. Through perseverance and determination, Ryan Hreljak raised over $70,000 to improve the lives of his pen pal Jimmy Akana, his family and his friends in Angola, Uganda by building a well. Advertised audience is grades 4-adult, but could be used with grade 2 students with some modifications.

50 min

www.r2r.ca/ryanswell.html

Salmon Boy: A Legend of the Sechelt People

Joe, Donna. (1999) Nightwood Editions

Description: Learn about salmon in this legend as a boy spends a year living among the salmon people.

Watch Over Our Water

Bullard, Lisa. (2012) Lerner Publishing Group

Non-fiction picture book.

Water Dance.

Locker, Thomas. (1997) Voyager Books, New York.

Description: Illustrated free-verse poetry about water in its many forms.

The Water Hole.

Base, Graeham. (2001) Doubleday Canada.

Description: This is a beautifully illustrated picture book about the need that animals around the world have for water, what happens when there are water shortages and drought, and the renewing properties of rain. Pages are interestingly perforated so that children can see the water diminishing with every turn of the page. Simple vocabulary. 20 pages.

Water Sense Kids

Environmental Protection Agency

Move the water-efficient hero Flo through water pipes and answer water-efficiency question while avoiding water-wasting monsters.

http://www.epa.gov/watersense/kids/games.html

The Water Source Book and Thirstin's Water Cycle Activities

By: US Environmental Protection Agency (EPA)

Grade: K-3

Description: Water lesson plans, games and activities.

To Order:

Download and Print:
http://water.epa.gov/learn/kids/drinkingwater/kids_k-3.cfm

Play online:
http://water.epa.gov/learn/kids/drinkingwater/gamesandactivities.cfm

Watershed Word Search and Maze

By: Capital Regional District

Description: This colouring poster and activity sheet related to stormwater includes a word search and maze.

www.crd.bc.ca/docs/default-source/es-watersheds-pdf/watershed-k-12-education/watershed-warden-colouring-sheet-print-bw-11x17.pdf?sfvrsn=2

Wet All Over: A book about the water cycle

Col, J. and Degen, B. (1996) Scholastic

Description: Ms. Frizzles class (the Magic School Bus) goes on a tour of the water cycle.

Where does Water Come From?

Cast, C. Vance. (1992) Barron's Educational Series Inc., Hauppauge, NY.

Description: An illustrated story-book which explains in simple language the water cycle and the ways water is treated to ensure safety. It includes some simple experiments and a glossary. 40 pages.

Community Events

Resource	TOPIC			FORMAT					
	Water Cycle & Weather	Forms and Properties of Water	Water & Living Things	Online	In-school	Field trip	Hard Copy	Printable	Fee

Community Events									
Capital Regional District- Parks			·	·					·
Compost Education Centre			·	·					·
UN World Water Day			·	·					·
Water Week Canada			·	·					·

Capital Regional District- Parks

Whether you're 6 or 60, CRD Regional Parks has a nature outing and event for you- for every season. Join a park interpreter for a guided walk, hike, drop-in event or canoe adventure. See the calendar for an outing and event that piques your natural curiosity and discover your 30 + regional parks and trails. Participate or encourage your students' families to participate in a CRD Parks events.

www.crd.bc.ca/parks-recreation-culture/parks-trails/crd-regional-parks/events

Compost Education Centre

1216 North Park Street, Victoria

The Victoria Compost and Conservation Education Society promotes composting, organic gardening, conservation, local food production, and urban sustainability. Youth, community and certificate programs available.

250.386.9676
info@compost.bc.ca

www.compost.bc.ca

UN World Water Day

International World Water Day is held annually on 22 March as a means of focusing attention on the importance of freshwater and advocating for the sustainable management of freshwater resources. Host your own event- posters, t-shirt templates and more provided online. Share your event photos and stories.

www.unwater.org/worldwaterday/

Organizations and Web Sites

Capital Regional District

250.360.3000

www.crd.bc.ca

CLIMATE CHANGE

The CRD's Climate Action Program (CAP) acts as a regional hub and facilitator on climate change issues, working with local governments, non-profit societies, public institutions and the private sector to help reduce emissions today and plan for climates of tomorrow.

For information about:

- Climate change in our region
- Government action
- Personal Action- at home, at work, at school

250.360.3253
www.crd.bc.ca/project/climate-action
www.crd.bc.ca/about/what-we-do/sustainability/climate-change-a-priority

DRINKING WATER

The CRD is the bulk (wholesale) water supplier to the 340,000 consumers in the Greater Victoria Drinking Water System and the retail water supplier in the West Shore Communities and Sooke. The organization also provides system wide water conservation, water quality and cross connection control services. For information about the Greater Victoria Drinking Water System including:

- water supply
- water quality and protection
- water rates
- water efficiency
- 250.474.9600

www.crd.bc.ca/water/

REGIONAL PARKS

CRD Parks protects and manages more than 13,000 hectares of spectacular and easily accessible natural areas in 33 regional parks and trails on southern Vancouver Island and the Gulf Islands.

For information about:

- School and community nature programs
- Park and conservation information
- How to get involved

250.478.3344

www.crd.bc.ca/parks

RESOURCE MANAGEMENT (GARBAGE, RECYCLING AND COMPOSTING)

Hartland landfill is owned and operated by the CRD and is located about 14 km northwest of Victoria. It is the only solid waste disposal facility in the Capital Region, serving 340,000 people. The operation is a multi-purpose facility providing collection for recycling, household

hazardous waste, salvageable items as well as yard and garden waste collection and processing, controlled waste disposal and landfill service to commercial and residential customers. Also on site, is the Hartland Learning Centre a classroom for place-based learning.

For information about:

- Hartland landfill and recycling facility
- Recycling and the Blue Box Program
- Household Hazardous Waste
- Kitchen Scraps and Composting
- Hartland Learning Centre school programs and tours

250.360.3030

www.crd.bc.ca/service/waste-recycling

www.myrecyclopedia.ca

HARBOURS AND WATERSHEDS

The CRD works alongside local governments and the community to maintain healthy watersheds, protect creeks, harbours and near shore recieving environment. For information about:

- watershed protection
- stormwater flow and quality
- wild life and plants
- ecosystems
- volunteer opportunities

https://www.crd.bc.ca/education/our-environment

STORMWATER, WASTEWATER AND SEPTIC

The CRD operates trunk sewer systems in the capital region. These trunk systems are the large sewer lines to which municipal sewer lines connect for sewage disposal. The trunk systems include pump stations, lift stations and wastewater bypass locations.

For information about:

- treatment facilities
- preventing pollution (source control)
- septic systems
- marine science and research

www.crd.bc.ca/wastewater/facilities.htm
www.crd.bc.ca/service/stormwater-wastewater-septic

Government Organizations

BC MINISTRY OF EDUCATION: ENVIRONMENTAL LEARNING

Resources to assist K-12 educators in incorporating environmental sustainability ideas and concepts into their teaching

www2.gov.bc.ca/gov/content/education-training/k-12/teach/teaching-tools/environmental-learning

DEPARTMENT OF FISHERIES AND OCEANS (DFO)CANADA

Fisheries and Oceans supports educators in British Columbia and the Yukon who teach their students to understand, respect and protect freshwater, estuarine and marine ecosystems, and to recognize how all humans are linked to these complex environments with the Stream to Sea education program.

www.pac.dfo-mpo.gc.ca/education/index-eng.htm

ENVIRONMENT AND CLIMATE CHANGE CANADA

Extensive information on a variety of topics including:

- Water **www.canada.ca/en/environment-climate-change/services/water-overview.html**
- Nature and wildlife **www.ec.gc.ca/nature**
- Weather **www.ec.gc.ca/meteo-weather**
- Climate Change **www.canada.ca/en/services/environment/weather/climatechange.html**

MINISTRY OF ENVIRONMENT - WATER STEWARDSHIP DIVISION

Access information related to water in British Columbia from drinking water to water power projects.

www.env.gov.bc.ca/wsd/

School District

WATER SCIENCE FOR SCHOOLS

From the US Geological Survey. For teacher background reading level too high for students. Contains extensive information about the water cycle and the presence and location of the Earth's water supply (bodies of water, groundwater, glaciers and ice caps, weather, etc.).

http://ga.water.usgs.gov/edu/mearth.html

Other Organizations

ACORN NATURALISTS

Educational resources including professional development resources, hands on activities and materials for a range of environmental topics.

155 El Camino Real, Tustin, CA, 92780, USA.

1.800.422.8886

www.acornnaturalists.com/store/Freshwater-Studies-C65.aspx

AIMS EDUCATION FOUNDATION

Math and Science resources including activity books, E-activities and AIM magazine for purchase and download.

http://store.aimsedu.org/aims_store/

BC GROUNDWATER ASSOCIATION

Information related to groundwater in BC. Background information for teachers.

http://bcgwa.org/

BC HYDRO

Plans and delivers the clean energy required to meet British Columbia's growing demand for electricity, operating 31 hydroelectric facilities and three thermal generating plants. The Power Smart program includes incentives to encourage customers to use less power.

www.bchydro.com

ECO LEARNING HIVE

A listing of local organizations offering environmental fieldtrips and programs.

www.ecolearninghive.org

ENVIRONMENTAL EDUCATORS PROVINCIAL SPECIALIST ASSOCIATION (EEPSA)

EEPSA is committed to promoting networking, curriculum support, and leadership in environmental education. Conferences, grants, publications and resources available.

http://eepsa.org/

FISHERIES AND OCEANS CANADA

Stream to Sea. Lesson plans, resources and programs that help students become aquatic stewards.

www.pac.dfo-mpo.gc.ca/education/index-eng.htm

PACIFIC STREAMKEEPERS FEDERATION

Pacific Streamkeepers Federation is a non-profit society helping streamkeepers take action through support, education, and building partnerships. Event calendar, resources and workshops available online.

www.pskf.ca

RESOURCES FOR RETHINKING

Description: Classroom resources reviewed by teacher for teachers. Resources for Rethinking provides teachers access to lesson plans, curriculum units and other teaching resources that integrate environmental, social and economic spheres through learning that is interdisciplinary and action oriented. We call this learning Education for Sustainable Development or ESD.

http://r4r.ca

UNICEF CANADA

Among other services, Unicef sponsors water and sanitation projects in developing nations.

www.unicef.ca

WATER FOR PEOPLE

Water For People is a non-profit organization that helps people in developing countries improve quality of life by supporting the development of locally sustainable drinking water resources, sanitation facilities, and hygiene education programs

www.waterforpeople.org

WILD BC

WildBC offers a variety of dynamic hands-on workshops, learning resources and programs for educators. Through these professional development opportunities there are opportunities and strategies for hands-on learning about a variety of environmental topics including British Columbia's fish, wildlife, habitat, ecology, climate change, action projects and much more.

https://hctfeducation.ca/wildbc/