



Lesson 10

Indoor Water Consumption



Learning Standards & Assessment



Time



Resources



Curricular Integration



Handouts



Letters to Parents

CRD

every drop counts



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.

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
3. 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.



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

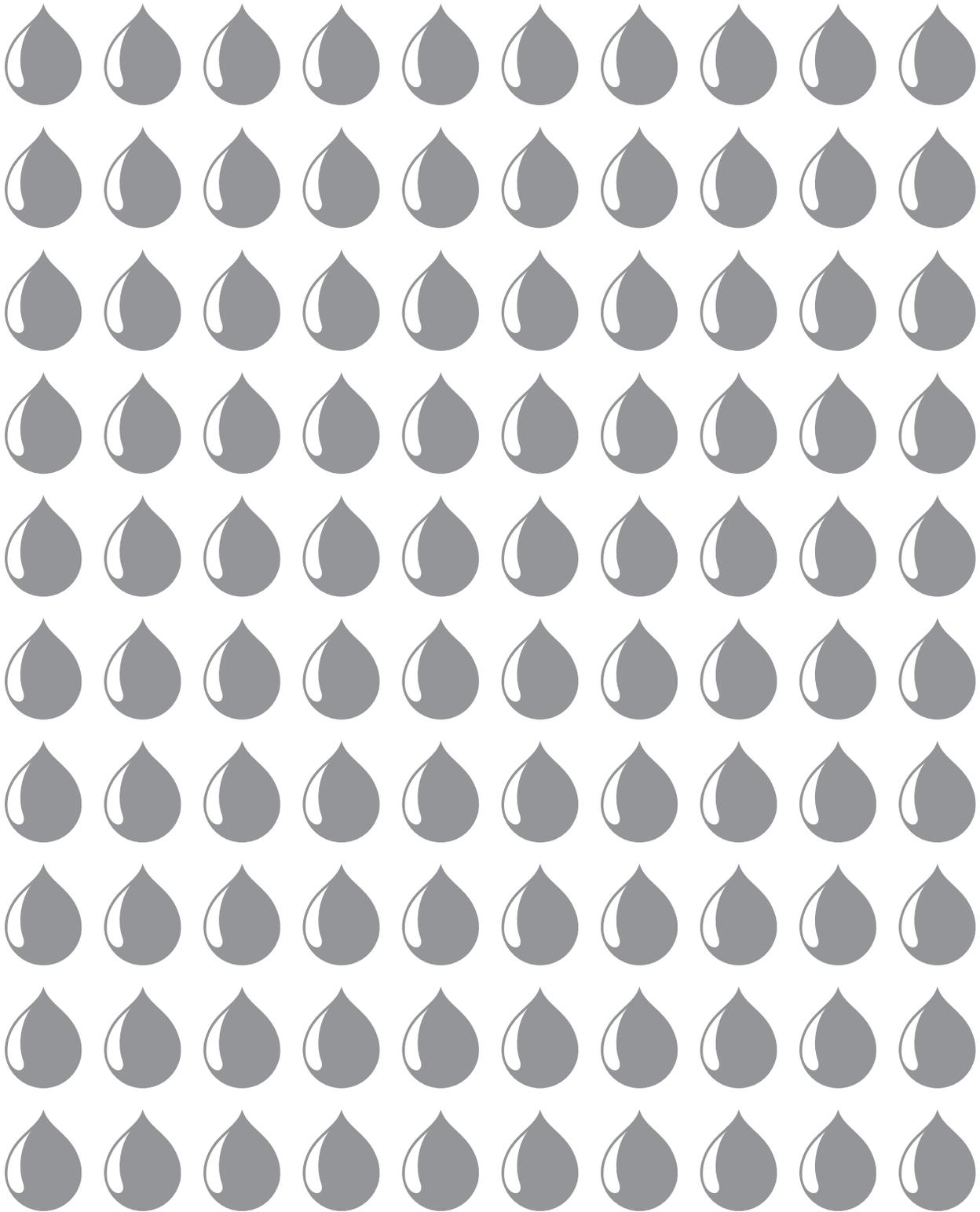
- ▶ Reasoning and analyzing
 - Use reasoning to explore and make connections
 - Estimate reasonably
 - Develop mental math strategies and abilities to make sense of quantities
 - Model mathematics in contextualized experiences
- ▶ Understanding and solving
 - Visualize to explore mathematical concepts
- ▶ 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.

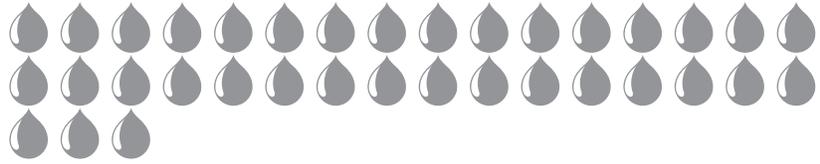


Water Pictograph





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
Regular shower: 20 L each minute 	Low-flow shower: 10 L each minute
Regular tap: 14 L each minute 	Tap with aerator: 6 L each minute
Dripping tap: 4 L each hour 	No dripping tap: 0 L
Leaving the tap running when washing face or brushing teeth: 22 L 	Turning the tap on and off when washing face or brushing teeth: 4 L

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? _____

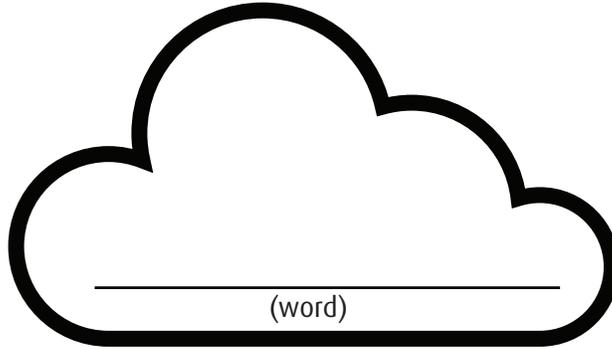


5. How much water do you use when you use all the More Water options? _____



Water Word Map

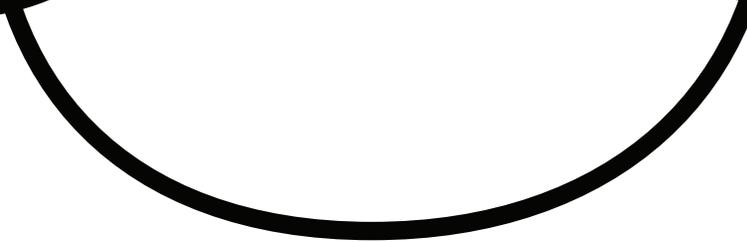
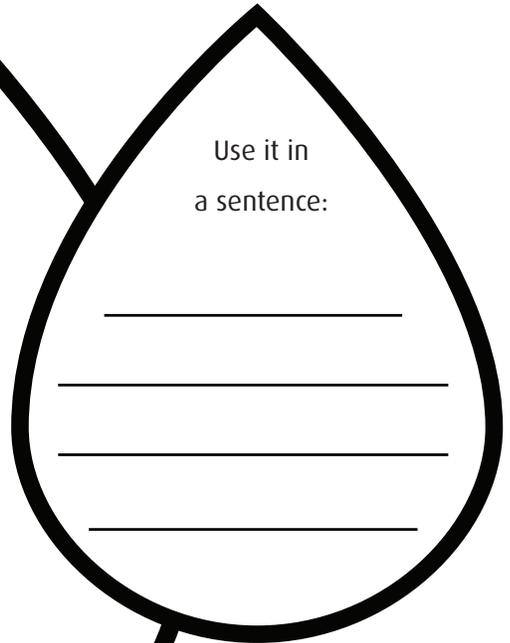
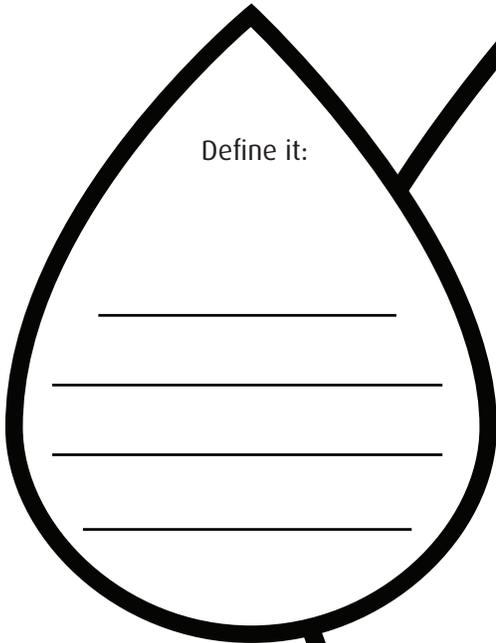
Name: _____ Date: _____



Draw it:

Define it:

Use it in
a sentence:





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

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