



Water Audit Lesson 2		Grade 8, Science and Technology
Critical Learning		Guiding Questions
<ul style="list-style-type: none">• Water is fundamental to our way of life and also to the ecosystems upon which our lives depend.• For this reason, we all have to take responsibility for maintaining our water supply.		<ul style="list-style-type: none">• What is our personal responsibility related to water?• Do our personal conservation efforts match our use of water? Should they?• How can scientists ensure that data collection is reliable?
Curriculum Expectations		
Relating Science and Technology to Society and the Environment 1. Assess the impact of human activities and technologies on the sustainability of water resources. 1.1 evaluate personal water consumption, compare it with personal water consumption in other countries, and propose a plan of action to reduce personal water consumption to help address water sustainability issues		Learning Goals Students will be able to: <ul style="list-style-type: none">• evaluate their personal daily water consumption• identify countries that have similar and different water consumption• complete a plan to reduce personal water consumption• use scientific and technological terminology in oral and written work
Developing Investigation and Communication Skills 2. Investigate factors that affect local water quality 2.6 use appropriate science and technology vocabulary, including water table, aquifer, potable, and freshwater, in oral and written communication 2.7 use a variety of forms (e.g. oral, written, graphic, multimedia) to communicate with different audiences for a variety of purposes		
Instructional Components and Context		
Readiness <ul style="list-style-type: none">• Basic map and atlas skills• Reflective response	Terminology <ul style="list-style-type: none">• Verify (<i>test truth or accuracy of something</i>)• Audit (<i>examine and verify</i>)• Reliable (<i>accurate</i>)	Materials <ul style="list-style-type: none">• Personal Water Audit handout• A short video about water conservation• Water Portfolio

Water Audit Lesson 2

Grade 8, Science and Technology

Minds On (Elicit and Engage)

Pause and Ponder

Whole Class → Using Terminology

Use **Share One-Get One** with words introduced and included in the word wall in Lesson 1.

Whole Class → Establishing Purpose

Brainstorm ways that students and/or their family use water in a typical day, e.g., showering, watering the lawn, doing dishes, laundry. Students (1) estimate how much water they think their family uses in a day, and (2) brainstorm how they might go about verifying the accuracy of their estimate.

Introduce the water audit activity. Explain that the timeline, e.g., Friday-Saturday-Sunday, to complete the audit allows for usual weekend activities such as doing laundry and washing dishes at family meals

QuickTip

Brainstorming is an intense problem-solving strategy that rapidly generates ideas without editing or evaluating them.

A for L Provide oral feedback on students' ideas for verifying the accuracy of the estimate.

Action! (Explore and Explain)

Whole Class → Understanding the Process

Ask students if they consider themselves reliable and what that means. Discuss issues of reliability in data collection, the differences between students' situation and that of scientists, and the students' need to collect data accurately without altering their regular patterns of personal water use.

Distribute a water usage organizer (**Personal Water Audit**). Orient students to the table:

- the left-hand column lists types of water use
- the type of information in each column
- how to read across rows and down columns to locate the intersection point in which to enter information

Review the method for calculating water consumption, **modelling** an example with a **Think Aloud**.

QuickTip

Add key vocabulary to the **Word Wall** throughout the unit. Use words regularly.

QuickTip

Document Use: The Personal Water Audit is an example of an **intersected list**.

Support learning about reading text types by using the **Strategy Implementation Continuum**.

Consolidation (Elaborate, Evaluate, Extend)

Whole Class/Pairs → Viewing

Model how to create a **mind map** of **comprehension strategies**. Cue students to practise strategies while viewing a video, e.g., **Water Follies: A Soak Opera**, a 7-minute video by Stan Phillips and Associates, 1977, which shows students how not to conserve water.

In pairs, students capture what they heard/saw in a mind map, each making a personal copy. Discuss how a video communicates information, how techniques emphasize and make messages memorable, how various representations of information reinforce learning. (This is relevant to later lessons.) Return portfolios. Students label, date, and insert their mind map in their *Why do I care? Water Portfolio*.

A for L Provide oral or written feedback on the mind map content.

QuickTip

A **RAFTS** graphic organizer could be used to structure discussion of video.

Homework and Next Lesson Connection

Students complete the water audit.

On the following Monday, engage students in a shared data analysis, e.g., look for usage patterns across students and for anomalies. Discuss the implications of these, e.g., What water usage is most frequent? What are some ways in which each of us can reduce the amount of water that we use? List suggestions on chart paper.

QuickTip

To ensure full participation in the shared data analysis, provide students who have not completed their personal water audit with a simplified version, created as a sample.

Minds On

Share One-Get One

Prepare cards with terms on one side and informal explanations on the other. Each student draws one card. On a signal, students mingle and on a second signal, meet a partner. One student asks the other the term; the partner responds. The first student either confirms or provides the answer. Partners reverse roles and exchange cards. Repeat.

The Share One-Get One strategy is a low-risk activity that can be used to review terminology and energize students in 3-4 minutes.

Model

Modelling is a component of explicit instruction that is particularly helpful for struggling learners. According to the gradual release of responsibility model for instruction, modeling is done by the teacher and students observe (I do, you watch). This is followed by shared practice (I do, you help) and guided practice (you do, peers help), and finally independent practice (you do, I help if necessary). See the **Strategy Implementation Continuum** for a detailed chart of this framework.

Think-Aloud

Think-Aloud is an instructional scaffold that models thinking processes, making the invisible visible. In a Think-Aloud, the teacher verbalizes how effective readers process the text, e.g., by monitoring comprehension and using strategies to construct meaning. While teachers can think aloud at any point in an instructional sequence, Think-Alouds are frequent during the modeling phase of the gradual release model and during Read-Alouds.

See **Think Literacy Subject-Specific Examples : Language/English, Grades 7-9, Engaging in Reading: Reading Between the Lines/Inference**, page 3.

Think-Aloud is a form of explicit instruction that requires teachers to be aware of their own thinking processes and that helps student think about their thinking. Developing metacognitive awareness is an important aspect of learning.

See **Metacognition Guide**.

Action!

Intersected Lists

Document Use*: **The Personal Water Audit** is an example of an intersected list. These kinds of tables are common in daily life, e.g., for bus schedules or invoices, because they efficiently summarize a lot of information. Lists of various kinds are frequently used in science.

A simple list groups related items under a label. These lists may be verbal or graphic; horizontal, vertical or spatially arranged; organized or random. An example of a simple list would be a list of materials for a lab or a list of instructions.

A combined list places two or more simple lists side-by-side so that corresponding items are side-by-side. An example of a combined list would be a list of states of water with corresponding explanations and percentage.

An intersected list is a matrix or a table, which arranges labels along two dimensions, e.g., across the top and down the left-hand side. Intersected lists are an efficient way of summarizing information in three simple lists. To locate information in an intersected list, students locate the appropriate labels and follow the column and row to where they intersect. Examples of intersected lists are schedules or maps.

*Locating information in and interpreting tables, and entering information into tables is referred to as "Document Use." Document use is one of the 9 Essential Skills of Human Resources and Skills Development Canada.

See **Essential Skills** and **Essential Skills Profiles**.

For information on lists, see the following:

Document Use at Work (Combines Document Literacy & Language of Documents in one publication). **SkillPlan: BC Construction Industry Skills Improvement Council**. See Resources, Publications

Strategy Implementation Continuum

This instructional sequence is based on the gradual release of responsibility model. **Modelling** and think-alouds which make thinking process visible to students is a form of explicit instruction, in which students observe and teachers demonstrate. Think alouds require teachers to be aware of their own thinking processes. Move from there to **guided practice**, in which the teacher guides students through the process. Students help the teacher instead of watching. See **Strategy Implementation Continuum**.

Consolidation

Mind Map

Bennett and Rolheiser (2001) identify critical attributes of mind maps:

- a central image representing the subject
- main themes radiating like branches from that central image
- a key image or key word for each branch
- connections between the image and branches
- use of colour

Bennett, Barrie and Rolheiser, Carol (2001). *Beyond Monet: The Artful Science of Instructional Integration*. Ajax, ON: Bookation. p. 289.

See also books by Tony Buzan, e.g., (2006) *The Mind Map Book*.

Comprehension Strategies

Strategies include: reading with a purpose, previewing, making and adjusting predictions, and using a graphic organizer to hold thinking.

For reading comprehension strategies, see **Think Literacy Cross-Curricular Approaches, Grades 7-12**, pages 7-95. Many of these are applicable to viewing and listening.

For listening strategies, see the **Listening Guide**.

Anchor Charts

An anchor chart is a strategy for capturing students' voices and thinking. Anchor charts are co-constructed. By making students' thinking visible and public, they "anchor," or stabilize and scaffold classroom learning. Anchor charts should be developmentally appropriate and clearly focused, accessible, and organized.



RAFT

RAFT (Role, Audience, Format, Topic) or **RAFTS** (Role, Audience, Format, Topic, Strong Verb) is a graphic organizer used for planning. Students use this tool to explore the role they will take on as creators, the audience they will address, the varied formats for their product, and the topic.

A RAFT establishes a context for writing by focusing on the dynamic connections between author, audience, topic, form, and purpose that are at the heart of communication. As with other graphic organizers, RAFT provides a framework to consider the various components (i.e., Role, Audience, Format, and Topic) as well as the relationships between them. RAFT can be used as a planning tool for media, written, and oral communication.

See **Student Success DI Package 2007, DI Cue Cards: Structures – RAFTs**

See **Think Literacy Subject-Specific Examples, Language/English, Grades 7-9, Generating Ideas: Setting the Context**, pp. 32-37.

RAFTS

Role Who wrote, produced, or sponsored the text?	
Audience For whom is the text created?	
Form What kind of text is it and what are its features?	
Topic What is the text about?	
Strong Verb What is the purpose of the text, e.g., to persuade? Explain?	

Personal Water Audit

This lesson is adapted from **How do we use it?** Environment Canada. Accessed: January 30, 2009.

Type of Use	Amount of water per use	Number of uses per day	Calculation (# of uses per day x amount per use in L)	Total amount of water used per day
Toilet flush	15-19 L	Day 1	_____ x _____ =	
		Day 2		
		Day 3		
Shower (5 min.)	100 L	Day 1		
		Day 2		
		Day 3		
Tub bath	60 L	Day 1		
		Day 2		
		Day 3		
Hand washing (with tap running)	8 L	Day 1		
		Day 2		
		Day 3		
Teeth brushing (with tap running)	10 L	Day 1		
		Day 2		
		Day 3		
Outdoor watering	35 L/min	Day 1		
		Day 2		
		Day 3		
Automatic dishwashing	40 L	Day 1		
		Day 2		
		Day 3		
Dishwashing by hand	35 L	Day 1		
		Day 2		
		Day 3		
Washing machine	225 L	Day 1		
		Day 2		
		Day 3		
				Grand Total