WATER SYSTEMS

PDF & DIGITAL FORMATS

2 Peas and a Dog

Middle School Teaching Resources

RESOURCE INCLUDES

- ✓ Ontario Curriculum Aligned
- ✓ Detailed Lesson Plans
- ✓ Readings, Videos, Graphic Organizers, Group Work, Projects, Rubrics
- ✓ Hands-On Science Labs
- ✓ MP3 Audio Files
- ✓ Answer Keys
- ✓ Quizzes & Unit Test
- ✓ Print & Digital Formats

INCLUDED LESSONS

- Introduction - Science Safety
- Water Introduction - Water Usage, Consumption, and Importance
- Unit Vocabulary
- The Water Cycle & States of Water
- Watersheds
- How Human and Natural Factors Cause Changes in the Water Table Readings & Inquiry Project
- Factors That Affect Glaciers and Polar Ice Caps
- Atmospheric Conditions and Bodies of Water
- Mid-Unit Water Systems Quiz
- Virtual Water Treatment Plant Investigation
- Testing Water Samples Experiment (3 Options)
- Investigating Local Water Issues Research, Article, and Video
- Agriculture and Ecosystems
- Nestlé Bottled Water Case Study
- Building a Water System Device
- Human Impact on Water Consumption Stations & Case Study
- Innovative Water Technology
- Water Systems Unit Test
- Sub Plans/Unit Review - Bill Nye Videos

UNIT ORGANIZATION

GRADE 8 WATER SYSTEMS ONTARIO CURRICULUM ALIGNMENT

Lesson	2007 Curriculum	2022 Curriculum
INTRO & 1: Vocabulary	2.6	A1.5
2. The Water Cycle & States of Water	3.1	E2.1
3. Watersheds	3.2	E2.2
4A & B: Human & Natural Factors Cause Changes in the Water Table	3.3	A1.1, E2.3
5. Factors that Affect Glaciers & Polar Ice Caps	3.4	E2.4
6. Atmospheric Conditions & Bodies of Water	3.5	E2.5
7. Quiz	3.1–3.5	E2.1 – E2.5
8. Virtual Water Treatment Plant	2.2	E2.7
9. Testing Water Samples	2.1, 2.3	A1.2, A1.3, A1.4, E2.6
10A & 10B. Investigating Local Water Issues	2.4, 2.6, 2.7	A1.1, A1.5, E1.2
11. Nestle Bottled Water	1.2, 2.4	A1.1
12. Building a Water System Device	2.5, 2.6, 2.7	A1.2, A1.3, A1.5
13. Global Water Systems	1.1	E1.1

CURRICULUM ALIGNMENT

LESSON OVERVIEW

Lesson	Activity Type	Name	Suggested Time
Intro & #1	Class Discussion QR Code Scavenger Hunt	Unit Vocabulary	1 – 2 classes
#2	Whole Class Readings & Videos Cut and Match	The Water Cycle & States of Water	1 – 2 classes
#3	Whole Class Readings & Videos Fill in the Blank	Watersheds	1 – 2 classes
#4A	Whole Class Readings & Videos	Human & Natural Factors Cause Changes in the Water Table	1 – 2 classes
#4B	Inquiry Project	Human & Natural Factors Cause Changes in the Water Table Inquiry	5 – 7 Classes
#5	Whole Class Readings & Videos Jigsaw	Factors that Affect Glaciers & Polar Ice Caps	1 – 2 Classes
#6	Whole Class	Atmospheric Conditions & Bodies	1 – 2 Classes

UNIT PLAN

LESSON #2

The Water Cycle

Lesson Overview:
Students will learn about the water cycle as a fundamental geographic unit, and explain how it relates to water management and planning.

Materials Needed:
- ❑ Reliable Technology (internet, computer and projector)
- ❑ Photocopy a class set of each reading and note-taking sheet:
  - The Water Cycle – reading
  - Label each part of the water cycle – activity
  - States of Water – reading
  - The Water Cycle and States of Water – graphic organizer
- ❑ Teachers can also use the provided digital version of this lesson to reduce photocopying.

Teacher Instructions:
1. As a class, watch this video on the Water Cycle.
2. When finished, read the Water Cycle article aloud as a class.
3. Have students label the Water Cycle diagram to show their understanding of the cycle.
4. After students complete this exercise, read the article "States of W… …er.

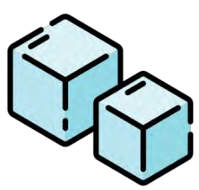
LESSON PLANS

WHAT'S INSIDE?

STATES OF WATER

Conditions of Water

Water is critical for life. Think about all the times in a day that you use water – to drink, to brush your teeth, to shower, to wash your clothes, to cook, etc. Just as water helps with these daily tasks, did you know there are many other states and uses for water on Earth? Water can be found as a **solid, liquid,** or **gas.**



Solid Wa

When wa ample, an ice cube ove quickly and are , water is a solid in glaciers, snow, and polar ice caps.

Liquid Water

The liquid in oceans, rivers, lakes, and aquifers is a liquid form of water. The particles of water are always moving. Water as a liquid also exists as both salt water and fresh water. Salt water occupies roughly 97% of the Earth's surface water.

Gaseous Water

Water can also be a gas when it is in the atmosphere, which is largely through water vapour. The particles in gases are very far apart and move slowly, making it difficult to see water as a gas. Water vapour can sometimes be felt as moisture in the air.

SCIENCE VOCABULARY WORD #1

Using a phone or a tablet, scan the QR code below to find the hidden word.

Fold and glue onto paper

Water Table

Fold and glue onto paper

Water Table Location

In point form, explain each part of the water table.
Draw a picture if it helps under each tab.

Fold and glue onto paper

Fold and glue onto paper

Natural Impacts

ARTICLES

ENGAGING ACTIVITIES

WHAT'S INSIDE?

SAMPLE ANSWERS

Group	Topic	Possible Answers
3	Overuse of Wells	• This is a human factor. • B… w… I… w… u… w… • O… s… T… o… • T…
4	Bottled Water	• T… • T… d… lo… • T… o… p… b… w… b… • W… a… fr…

ANSWER KEY

1. **Cape Town, South Africa** was the first major city to almost run out of water.
2. By **2040,** most of the world won't have enough water to meet year-round demands.
3. We rely on earth's **1%** of fresh water to drink and use.
4. Most of the fresh water sources, especially in places like Mexico City, come from **ground water.**
5. Personal water use accounts for 8% of water. The rest of the water consumption goes to industry and **agriculture.**
6. One **hamburger** takes 1,650 litres of water to create.
7. …s might decide it's …ructure.
8. …t the need to **desalinate**
9. Raising prices of water would have the biggest impact on individuals with **low incomes**.
10. **Day 0** refers to a day where residents in South Africa would no longer have access to water.
11. There are many actions that people can take to conserve water, but also to be aware that water has **value.**

NESTLÉ CASE STUDY ASSESSMENT

	Level 1	
Science Content Crite…		❑ Nestlé case study information is inaccurate or …
▪ Accur… scienc… techn… conter… terminology.		… information is detailed and demonstrates extensive understanding of the content from the articles and videos.

Comments:

WATER TESTING LAB

After you have tested the water and completed the observation chart, it is time to work on the lab report.

Lab Report Requirements

- ❑ Testing Quality of Water Chemical Characteristics …servation Chart
- …e findings from the water samples (e.g., …ples different? The same? Which …u draw based on these findings?)
- …ons
- … this lab? Why or why not?
- …ns did you encounter?
- …any surprises?
- …commend this lab to future students?

Level 2	Level 3	Level 4
Student had some of the … missing key elements. Some elements are complete.	Student had the … Lab report is complete. Some elements could use more detail.	Student had the required materials for the water testing lab. Student took on a leadership position during the lab. Lab report is well-written and organized. Attention to detail is demonstrated.

ANSWER KEYS

LABS & CASE STUDIES

TEACHER FEEDBACK

"This is a fantastic resource! It was an incredible time saver as I was new to teaching intermediate and was a bit overwhelmed with where to start. This resource was very well laid out, clearly followed the curriculum, and included detailed and clear lesson outlines, relevant activities and experiments, and quizzes to check for understanding. It was also very helpful to have the digital and print options for hybrid teaching." - Val C.

INTRODUCTION

SCIENCE SAFETY RULES

1. LISTEN
- ✓ To ALL the teacher's
- ✓ Know the location of

2. ATTIRE
- ✓ Wear safety goggles
- ✓ Tie-up any loose ite
- ✓ Wear closed-toe, co

3. READ CAREFULLY
- ✓ Any labels of chemic sym
- ✓ The

4. TOO
- ✓ Han
- ✓ Inf there is a spill.
- ✓ Do not taste test any

5. CLEAN-UP
- ✓ Thoroughly wash all u
- ✓ Wash hands with soa

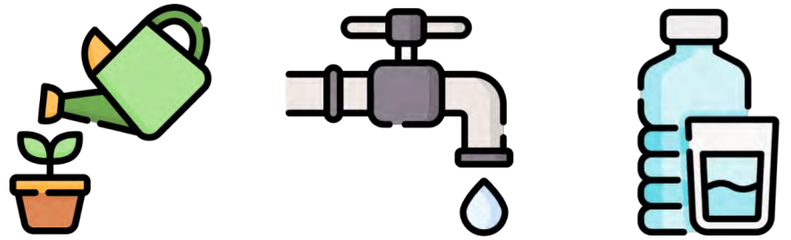
SAFETY RULES QUIZ

Complete the following true/false questions on safety:

1. When you clean up, wash your hands with just water.	T	F
2. Before you begin, you must listen to ALL the teacher's instructions.	T	F
3. Remember to tie-up any loose items (e.g. hair, clothing, jewellery, etc.).	T	F
4. Feel free to taste test items in the science room.	T	F
5. Knowing where the safety eyewash station is located	T	F
	T	F
	T	F
s.	T	F
8. Wear open-toe shoes, and use gloves/goggles as needed.	T	F
9. Read labels on chemicals used carefully (e.g., WHMIS symbols).	T	F
10. Do not tell the teacher if there is a spill or if an item is broken/faulty.	T	F

SCIENCE SAFETY RULES

INTRODUCTION TO WATER



Water

Water is everywhere - in our taps, bottles, homes, communities,

WATER USAGE, CONSUMPTION, & IMPORTANCE

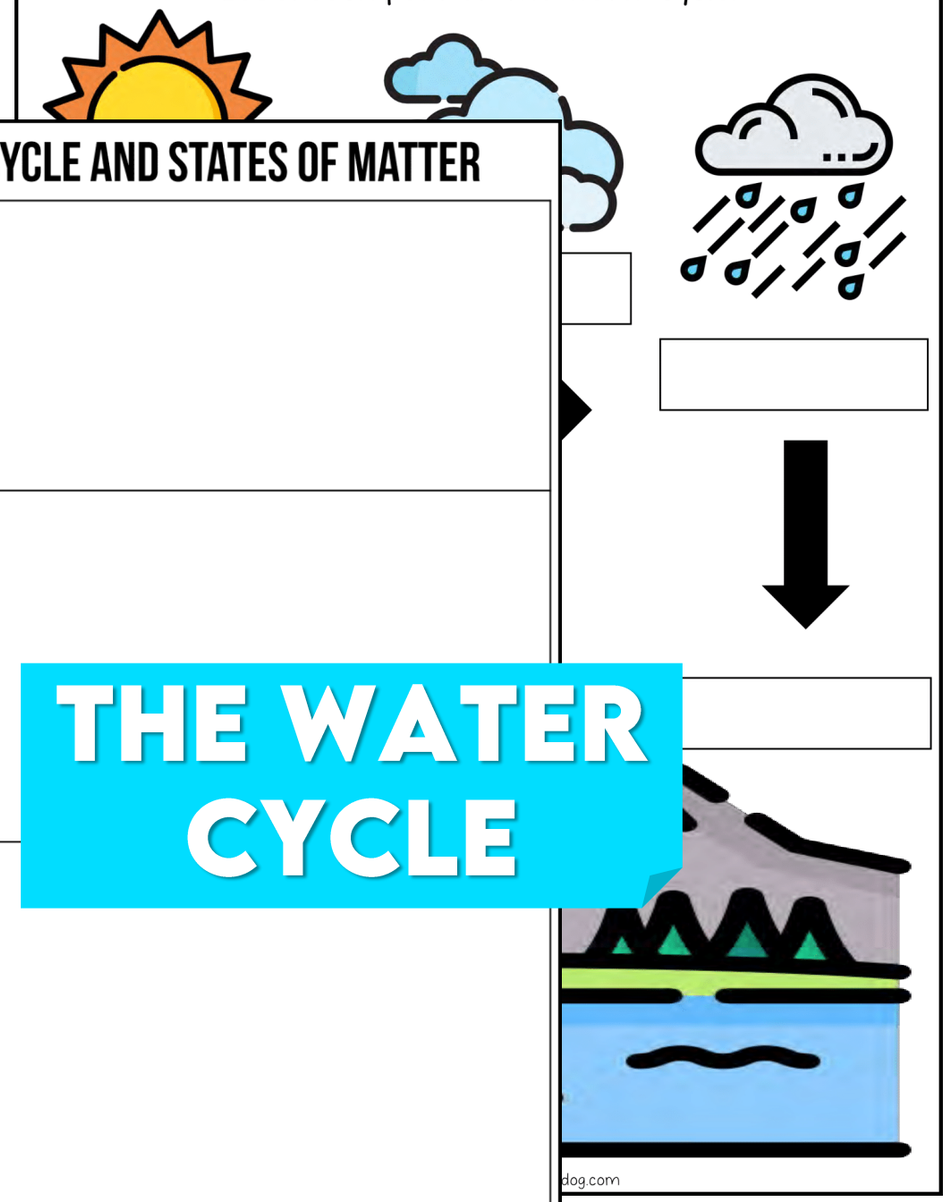
LESSON 1 & 2

SCIENCE VOCABULARY WORD #1

Using a phone or a tablet, scan the QR code below to find the hidden word.

UNIT VOCABULARY

Label each part of the water cycle.



THE WATER CYCLE AND STATES OF MATTER

What is the water cycle? Explain the key parts.	
Provide an example of water as a solid, liquid, and gas.	
How do you think water can move from a solid to a liquid?	

THE WATER CYCLE

LESSON 3

WATERSHEDS

WHAT IS A WATERSHED?

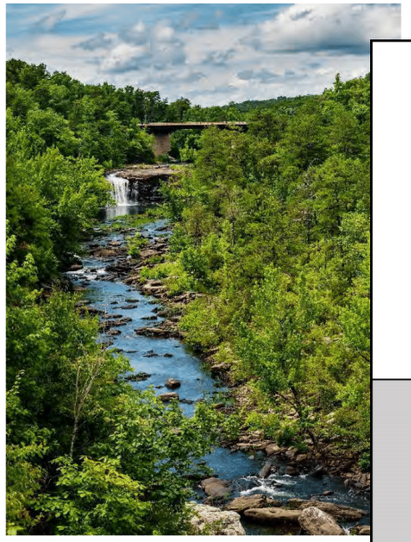


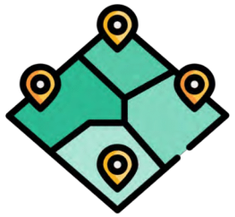
Photo of a watershed in Little River Canyon in Alabama.

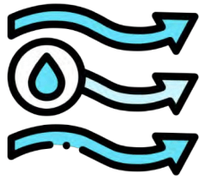
Why are watersheds impor
Watersheds are important
our land would be consister
goes into the land also helps
and animals thrive.

How many watersheds exis
In Canada, rivers flow and

1. The Pacific
2. The Arctic
3. The Atlantic
4. Hudson Bay
5. The Gulf of Mexico

WHAT IS A WATERSHED?





What is a watershed?	
Why are watersheds important?	
How many watersheds exist in Canada?	

DON RIVER WATERSHED

Photo of the Don River in Toronto, Ontario.

ershed?
located in the Greater Toronto Area. In
million people who live in this watershed.
38 kilometres. The watershed ends at Keating Channel until it meets either the Toronto Bay or Lake Ontario.

What are some of the Don River's watershed features?
Some of the Don River's features include its numerous walking paths, its vast green spaces, as well as its fish species. The fish in the Don River tend to be smaller and can adapt well to their polluted environment and high temperatures.

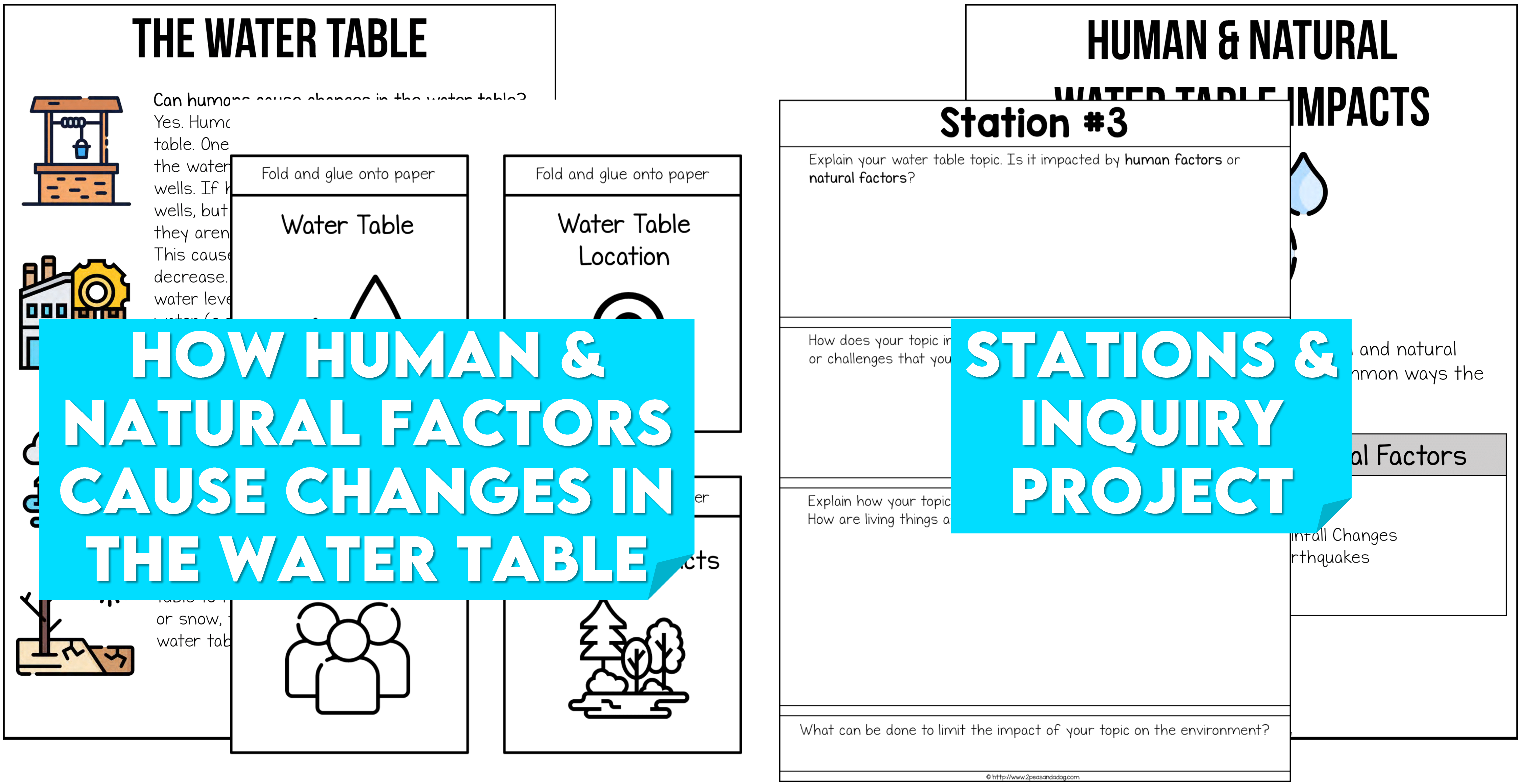
DON RIVER WATERSHED

locate the Don River.

Don River watershed? How

d around the Don River
n't able to flow or drain
g and erosion within the
vater comes the potential
micals may drain into the
act the water's ecosystem.
managing storm water,
atural features.

LESSON 4A & 4B


THE WATER TABLE
Can humans cause changes in the water table?
Yes. Huma
table. One
the water
wells. If h
wells, but
they aren
This cause
decrease.
water leve
or snow,
water tab
Fold and glue onto paper
Water Table
Fold and glue onto paper
Water Table Location
HOW HUMAN & NATURAL FACTORS CAUSE CHANGES IN THE WATER TABLE
HUMAN & NATURAL WATER TABLE IMPACTS
Station #3
Explain your water table topic. Is it impacted by human factors or natural factors?
How does your topic in
or challenges that you
Explain how your topic
How are living things a
What can be done to limit the impact of your topic on the environment?
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STATIONS & INQUIRY PROJECT
and natural
mmon ways the
al Factors
infall Changes
rthquakes

LESSON 5 & 6

GLACIERS & POLAR ICE CAPS

How are glaciers and polar ice caps formed?
Glaciers
through
of the sn
compres
in ice cap

Why do
affect
There a
First, be
(freezin
of snov
temper
and ice
and as
falls as
to melt

Why do
affect their sizes?
The size of glaciers and ice
Humans are producing more
greenhouse gases, which ca
up. This rise in temperature
and ice caps to warm up an

GLACIERS & POLAR ICE CAPS

How are glaciers and polar ice caps	
change impacted the size of glaciers?	
What are some of the ways in which climate change has impacted water in our local and global lives?	

FACTORS THAT AFFECT GLACIERS & POLAR ICE CAPS

WEATHER VS. CLIMATE

VIDEO ACTIVITY

and it is important to
to the video, circle the
for each sentence.

with how (cold/dark)
ndition of the
our planet. In this
te/yearly)
nate is the
riod of time in
lightning are
particular
y sunny, this
d sunny
uma, the
ause this is its
go away quickly.

WEATHER & CLIMATE BY WATER

Instructions: To show your understanding of weather and climate, draw a line to match the correct statements or vocabulary terms with their correct definitions or ideas.

Weather	Weather patterns over a long period of time.
Microclima	The measure of heat an object or
Body of W	
Climate	
Temperat	
Heat Capa	
Hurricanes	Small pockets of cities/regions that experience different weather than nearby areas because of their proximity to bodies of water.

ATMOSPHERE CONDITIONS & BODIES OF WATER

LESSON 7 & 8

LESSON #7

Lesson Overview:
Students will demonstrate t
past few lessons with a quiz

Materials Needed:
- ❑ Photocopy a class set or
  Water Systems Quiz

Tea
1.
2.
3.

© htt

MID-UNIT WATER SYSTEMS QUIZ

Name: _____

Complete the following True/False questions on water systems by circling the correct answer.

1. Sunlight heats water and turns it into transpiration.	T	F
	T	F
	T	F
shed.	T	F
6. The water table is always visible to humans.	T	F
7. Glaciers and polar ice caps are formed through ice and compressed snow.	T	F
8. Weather indicates a country's average temperature.	T	F
9. Living near bodies of water makes it much colder in the winter and summer.	T	F
10. A material's heat capacity refers to how much heat it can absorb or release.	T	F

/10

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MID-UNIT WATER SYSTEMS QUIZ

K-W-L CHART

Municipality Water Investigation

WATER TREATMENT PLANT			L
What is the name of the municipality?		to pic?	What new things did I learn about this topic from the investigation?
How do parti munic process (e.g., obta it, and t			
How do munic manag wat (e.g., How distribut do they measure consumption?)			
What is waste water? What are some of the ways in which this municipality disposes of waste water?			

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VIRTUAL WATER TREATMENT PLANT INVESTIGATION

LESSON 9

WATER TESTING LAB

After you have tested the water and completed the observation chart, it is time to work on the lab report.

Lab Report Requirements

- ❑ Testing Quality of W
- ❑ Testing Water Obse
- ❑ A discussion on the
  how are the samp
  conclusions can you
- ❑ Conclusion Questio
  - Did you enjoy t
  - What problem
  - Were there ar
  - Would you rec

Criteria	Level 1	
Water Testing Lab	Student was unprepared during water lab. Student did not participate in the lab.	s rec wa p th n
Water Testing Lab Report	Lab report is incomplete. Several required elements are missing.	L ele e

TESTING WATER OBSERVATION CHART

Water Sample (e.g., fresh, pond, bottled, etc.)	Hypothesis (e.g., what do you think the water will be / look like?)	Chemical Compound and Results (e.g., pH, salinity, chlorine)

WATER TREATMENT FACILITY DIAGRAM

Using the space below, draw a diagram of a water treatment facility plant. When you're finished, ensure that you've labelled it properly.

WATER TREATMENT FACILITY DIAGRAM

After you've drawn your diagram, you are going to complete a small report that highlights what you've
ent plant.

eatment plant you drew.
in the water (e.g., salinity,

t plant obtains, treats,

or why not?
ounter?

lab to future students?

Level 3	Level 4
Student's diagram was complete and included labels and relevant vocabulary.	Student's diagram was thoroughly completed and included extensive vocabulary and labels relevant to the water facility.
Lab report reflection is complete. Some elements could use more detail.	Lab report reflection is well-written and organized. Attention to detail is demonstrated.

TESTING WATER SAMPLES EXPERIMENTS (3 OPTIONS)

LESSON 10A & 10B

WATER ISSUES

Ph

Why are there local water is
Ontario is surrounded by the
th
On
wa
wa
Fli
Th
wa
te
wa
resulted in a high level of le
water. Many people become
bottled water, since their to
near Sarnia and Windsor, On

LOCAL WATER ISSUES RESEARCH

Name of the City/Area	
Where does the water come from? How is water used water? Why have they become issues?	

INVESTIGATING LOCAL WATER ISSUES

WATER KNOWLEDGE 3, 2, 1 CHART

3 New Things I L Fr L	
2 I Know More About From This Lesson	
1 Question I Still Have About This Lesson	

AGRICULTURE AND ECOSYSTEMS

LESSON 11 & 12

NESTLÉ CASE STUDY PART 2

Watch the video "How Nestlé Makes Billions Bottling Free Water." As you watch the video, record your thoughts and any new information that is presented about the company.
source. In the video, the term
people who are Indigenous to t

Write down new facts that you learned about Nestlé's bottled water	
Do you have any questions about Nestlé?	

NESTLÉ CASE STUDY ASSESSMENT

- ❑ Nestlé case study information is inaccurate or incomplete.
- ❑ Nestlé case study is basic and requires more details.
- ❑ Nestlé case study information is relevant to the topic.
- ❑ Nestlé case study information is detailed and demonstrates extensive understanding of the content from the articles and videos.

Comments:

NESTLÉ BOTTLED WATER CASE STUDY

CREATING A WATER SYSTEM DEVICE

You are going to be designing, building, and testing a water system device that performs a function or meets a need. Alongside the
a presentation to showcase

are going to create.
te the graphic organizer, where
ing process.

observations about your device
ents, etc.)

ction/meets the

ur experience.

ets a need.

a testing process,

on the process.

g.com

MY WATER SYSTEM DEVICE

Name of device (e.g., water filtration, irrigation model, water desalination system)	
How is this device going to work? Whicl How	
Whicl will wh	
How device? What steps will you take?	

DESIGNING & BUILDING A WATER SYSTEM DEVICE

LESSON 13 & 14

WATER CONSUMPTION INTERVIEWS

You are tasked with finding one student to interview about their water consumption. After, we will compare our findings to see any emerging trends or patterns

Student Name (doing the int
Interviewee's name (being

1. Do you leave the tap on br
2. Do bo
3. Do
4. Do be water bottle?
5. Do you stop the shower through to conserve wat
6. Do you drink bottled wat
7. Do you shut off the tap between washing dishes
8. Do you know where your comes from?

PERSONAL WATER CONSUMPTION

Personal Goal	What steps can I take to reduce my water consumption?
Comparing Water Consumption	How does my water consumption compare to another country's water consumption?

al? Which steps

Teacher Signature:

Parent/Guardian Signature:

MEDIA SOURCES AND WATER ISSUES

on, report, infographic, poster,
ia sources address issues
ater sustainability.

untries. Each source (e.g.,
sites) all reveal different
urces say? How do they

trient management system
stems. What do different

nmunities
nunities. Many
hey?

ow these people

the websites, videos, or books

fographic, etc.).

g.com

MEDIA SOURCES AND WATER ISSUES GRAPHIC ORGANIZER

Sou
remem
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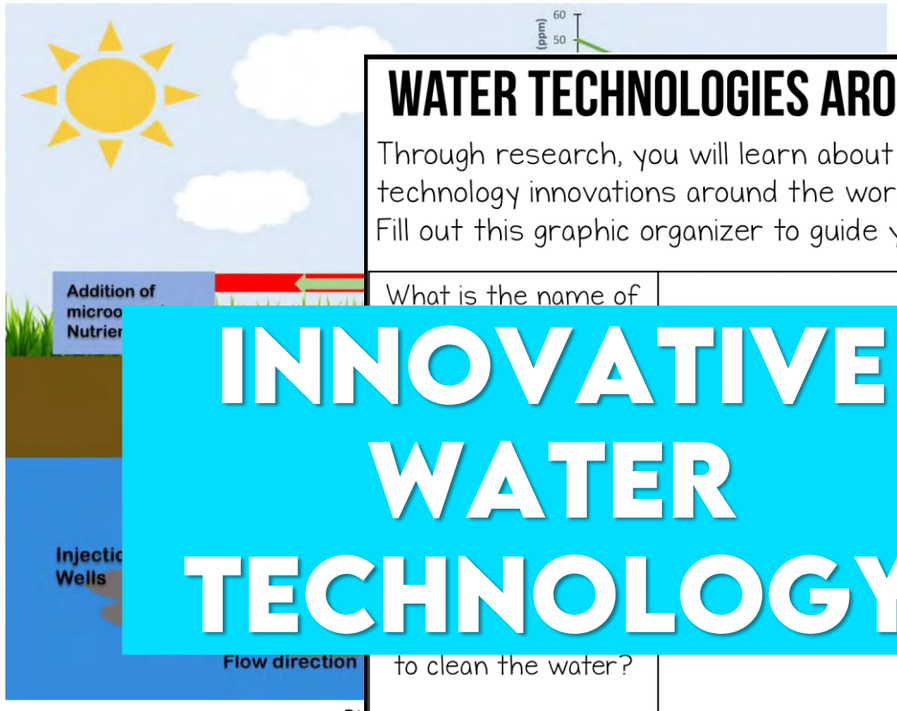
vides, or

HUMAN IMPACT ON WATER CONSUMPTION

HUMAN IMPACT ON WATER SYSTEMS

LESSON 15 & 16

WATER TECHNOLOGY INNOVATIONS



Bioremediation

Bioremediation is an innovati
to clean up or remove conta
often used to clean up oil sp
in the water, and the microc
oil from the water. This tech
time to complete, and desig
lot of experience and knowle

WATER TECHNOLOGIES AROUND THE WORLD

Through research, you will learn about some of the water technology innovations around the world or in your local area. Fill out this graphic organizer to guide your research.

What is the name of to clean the water?	
What are the advantages of this method?	
What are some of the disadvantages of this method?	

INNOVATIVE WATER TECHNOLOGY

UNIT TEST /20

Name: _____ Class: _____

Multiple Choice Instructions: Select the correct answer from the different options.

1. _____ happens when water vapour goes up in the atmosphere and then cools, transforming into droplets of water.
A) Evaporation
B) Condensation
C) Precipitation
D) Transpiration

WATER SYSTEMS UNIT TEST

3. Situated between the saturated and unsaturated zone is the _____.
A) Glaciers
B) Salt water
C) Water Table
D) Watershed

4. Weather patterns in a particular area over a long period of time is referred to as _____
A) Microclimates
B) Glaciers
C) Temperatures
D) Climates

BONUS FILES

BILL NYE - OCEANOGRAPHY

Name: _____ Class: _____

❑ Equator	❑ Atlantic Ocean
❑ Heat	❑ Heavier
❑ Egg	❑ South
❑ North	❑ Heat
❑ Sink	❑ Air
❑ Salt	❑ Currents

1. Wind and rain make
amounts of _____

2. Salt water is _____
water out of the w

3. Ocean _____
over the world.

4. Water in the ocean
_____.

5. The sun warms the water most at the _____ and expands and flows toward the cold _____ pole.

6. The _____ _____ has the most powerful currents in the world.

7. In the video, an _____ was able to float in salt water, but it sunk in fresh water.

BILL NYE – THE WATER CYCLE

Name: _____ Class: _____

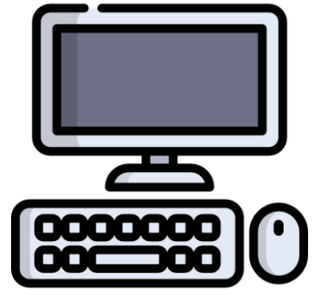
Statement	True or False
Water is always moving all around the Earth.	
When heated, water molecules slow down.	
Puddles cannot evaporate.	
on.	
as	
ation occurs.	
Condensation is the opposite of evaporation.	
Water vapour does not need a place to stick to.	
Snow is formed when water droplets falling from a cloud freeze on the way down and make snowflakes.	

SUB PLANS OR UNIT REVIEW

LESSON FORMATS

PDF

✓ Individual & Whole Unit



DIGITAL

✓ Google Slides

RESOURCE CAN BE USED IN-PERSON OR ONLINE