Workbook Preview

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Grade 8 Science Unit

Water Systems

E1 - Relating Science and Technology to Our Changing World
E2 - Exploring and Understanding Concepts

	Curriculum Expectations	Pages
E1.1	assess the social and environmental impact of the scarcity of fresh water, and propose a plan of action to help address fresh water sustainability issues	14-15, 37-48, 72-73, 76-85, 101-105
E1.2	demonstrate an understanding of First Nations, Métis, and Inuit knowledges and values about water, connections to water, and ways of managing water resources sustainably	106-109
E1.3	assess the impact of scientific discoveries and technological i	10-117
E2.1	i r t	55-56, 98
E2.2	d i	29
E2.3	explain how human activity and natural phenomena cause changes in the water table	30-32, 35-41
E2.4	identify factors, including climate change, that have contributed to the melting of glaciers and polar ice-caps, and describe the effects of this phenomenon on local and global water systems	42-48, 55-56
E2.5	explain changes in atmospheric conditions caused by the presence of bodies of water	50-60, 63-69
E2.6	describe various indicators of water quality, and explain the impact of human activity on those indicators	72-73, 76-85
E2.7	explain how municipalities process water and manage water usage	86-98, 101-105

Preview of 90 pages from this product that contains 191 pages total.

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STEM INVESTIGATION AND COMMUNITICATION SKILLS

Water Systems





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Grade 8 Science Unit

Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages
A1.1	use a scientific research process and associated skills to conduct investigations	34, 122-123, 125
A1.2	use a scientific experimentation process and associated skills to conduct investigations	61-62, 74-75, 118-119
A1.3	use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems	33-34, 70-71, 99-100
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials	33-34, 61-62, 70-71, 74-75, 99-100, 118-119
A1.5	communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes	33-34, 61-62, 70-71, 74-75, 99-100, 118-119
A2.1	write and execute code in investigations and when modelling concepts, with a focus on automating large systems in action	121, 123, 126
A2.2	identify and describe impacts of coding and of emerging technologies, such as artificial intelligence systems, on everyday life, including skilled trades	120-123, 125-126
A3.1	describe practical applications of science and technology concepts in various occupations, including skilled trades, and how these applications address real-world problems	120-125
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	120-124
A3.3	analyse contributions to science and technology from various communities	120-125

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WATER SYSTEMS



PREVIEW

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Name: _____ 8

Key Terms

Define Research the meaning of each of the key terms

Glaciers	
Ice Sheet	
Watershed	
Global Water Cycle	
Well Water System	
Freshwater	
Aquifer	

PREVIEW

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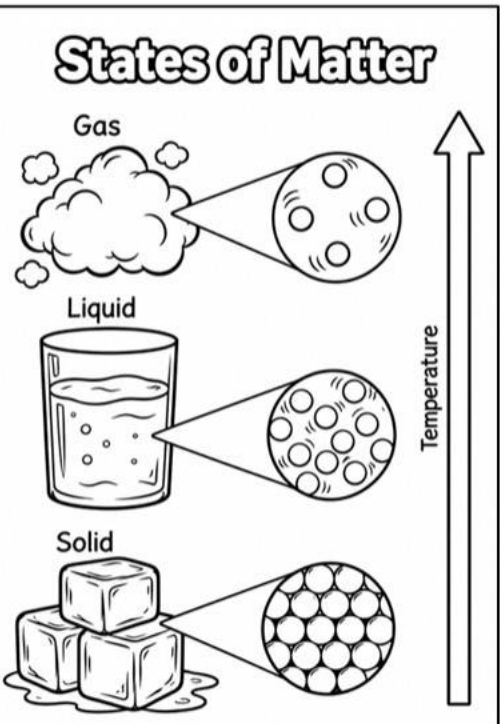
Curriculum Connection
E2.1

Three States of Water

Three States of Water

Water in our environment can be found in three different states of matter – liquid, solid, and gas. **Matter** is anything that has mass and volume, meaning it takes up space. Water is an example of matter that can change through the three states of matter.

In our environment, when heat is added or removed from water it is possible for it to change states. For example, on a hot day, the sun's heat energy could turn liquid water into water vapour, a gas. Alternatively, if a cold front moves in overnight, the removal of heat from liquid water could turn it into solid ice.



PREVIEW

Liquid Water in our Environment

As a liquid, water exists in many forms. We have saltwater in our oceans, and freshwater in lakes and rivers. The liquid form of water returns to the earth's surface through precipitation.

When heat is added to liquid water, the warm air causes water becomes a gas. The process is called evaporation and it helps explain why puddles disappear. Evaporation happens when the surface of a liquid is exposed to air. When heat is removed from liquid water on a cold day, the liquid will turn into solid ice. We've all observed this when a puddle has frozen.

Solid Ice in our Environment

Solid ice is frozen water, meaning we can find ice forming on lakes, rivers, and oceans in cold temperatures. Permanent ice is ice that doesn't change states, even in summer due to being exposed to cold temperatures.

Almost 90% of the earth's permanent ice is found in Antarctica, while the remaining 10% is found surrounding Greenland. The Antarctic Ice Sheet extends almost 14 million square kilometres! That is 4 million square kilometres larger than the region of Canada!

Gas – Water Vapour in our Environment

Water as a gas is vapour, and it is in the air all around us. We can't see water vapour. When we boil water, we will see water changing from a liquid to a gas. The vapour we "see" is actually the cooling of vapour that is becoming a cloud called steam. This small cloud is just like the clouds we see in the air.

Humidity is the measure of how much water vapour is in the air. A weather report will include the humidity for that day as a percentage. This is called relative humidity. If the relative humidity is 25%, it means the air is 25% saturated (full) of water. It could hold 75% more water, but nothing more.

Name: _____ 10

Curriculum Connection
E2.1

Questions

Use information from the text to support your answer.

1) How does water change states in the environment?

2) Where [illegible] found in each of the three states of matter below?

Liqui[illegible]	
Soli[illegible]	
Gas	

PREVIEW

Making Connections

In your loca[illegible]mer[illegible]o you see the three states of water?

True or False

Circle whether the statement is true or false.

1) A solid will turn into a liquid through evaporation.	True	False
2) The removal of heat from liquid water will change it to a gas.	True	False
3) Adding heat to ice will change it to a liquid.	True	False
4) We can see water in its gaseous state.	True	False
5) Humidity tells us how much water vapour is in the air.	True	False

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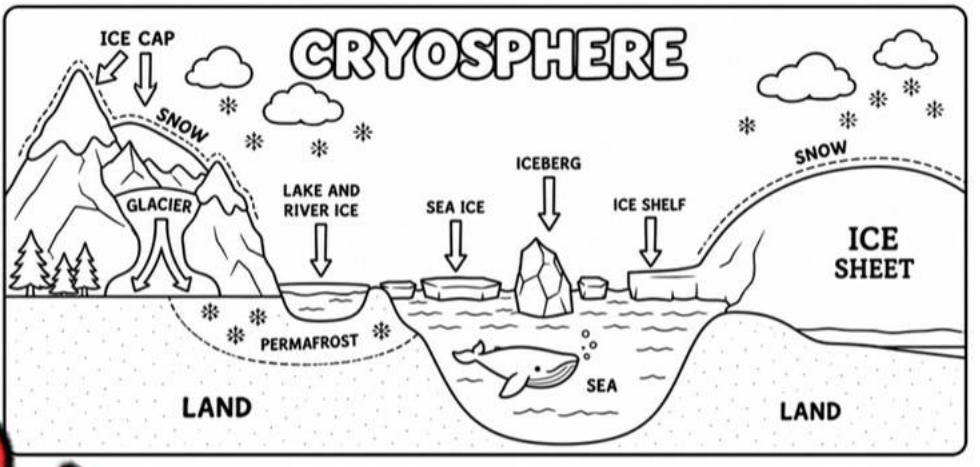
Curriculum Connection
E2.1

Cryosphere - Glaciers

What is the Cryosphere?

The **cryosphere** is the part of the earth's surface that has solid water – ice. The cryosp is made up of regi d the world temper es belo



This is the free or liqu r. The cryosphere is made up of different forms of glaciers, including i s, ic nd river ice, sea ice, icebergs, and ice shelves.

What are Glaciers?

A **glacier** is a slow moving, large ass o y zen over a long period of time.

- Ice Sheet – Ice sheets are the large of gla s ts are the size of continents as they must be bigger than 50,00 e kil The only ice sheets on Earth are in Antarctica and Greenland. How , d ge 20,000 years ago, two ice sheets covered most of the northern pa h A (Canada).
- Ice Cap – Ice caps are smaller than ice sheets, as they are s th kilometres. Most ice caps are found near the north and south po . Canada has the Devon Ice Cap on Devon Island in Nunavut. It covers 12,000 k
- Icebergs – Icebergs are floating pieces of ice that are more than 15 metres long that are found in oceans or lakes. Icebergs are created when they break off a larger glacier. Icebergs are made of freshwater, as they begin their live on land.
- Sea Ice – Sea ice is frozen ocean water; therefore, it is made of saltwater. Sea ice floats on the ocean's surface. It covers about 7% of the earth's surface and 12% of the world's oceans.
- Ice Shelf – Ice shelves are permanent floating sheets of ice that are connected to a landmass. When ice breaks off an ice shelf, it can become an iceberg.

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Curriculum Connection
E2.1

Questions

Use information from the text to support your answer.

1) What is the cryosphere? What is part of the cryosphere?

2) What i[illegible]? [illegible]ow are some glaciers formed?

PREVIEW

Order

Put the glaciers below in [illegible]om s[illegible]t (1) to largest (6).

Iceberg	Ice Cap	Ice Sheet	[illegible]elf	[illegible]	Lake/River Ice

Multiple Choice

Circle the best answer.

1) The largest glacier is an	Ice cap	Ice sheet
2) An ice sheet must be larger than	100,000 km^2	50,000 km^2
3) A glacier that is smaller and is made of freshwater	Sea Ice	Iceberg
4) The regions in our cryosphere must be below	0°C	-5°C
5) Sea Ice is made of	Freshwater	Saltwater
6) Which glacier is attached to a landmass?	Ice Shelf	River Ice
7) Glaciers are...	Moving	Still

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Curriculum Connection
E2.1

The Sun and The Water Cycle

The Sun and The Water Cycle

All living things on Earth need water to survive. Water is not made in nature; it is recycled through the water cycle. The Sun's heat energy drives the water cycle.

Water exists on the Earth in all three of its states, liquid, solid as ice and as water vapour. Water changes easily from one state to another by evaporation, melting, freezing, sublimation, condensation and deposition. Each of these changes requires a transfer of energy.

Evaporatio process of water changing from a liquid into water vapour. It is the most common water moves back into the water cycle.

Melti lid ice becoming liquid by adding heat.

Freezin the pr coming solid ice by loss of heat.

Sublimation: is om solid ice to water vapour without first becoming liquid. Sublimati ed by gy being absorbed.

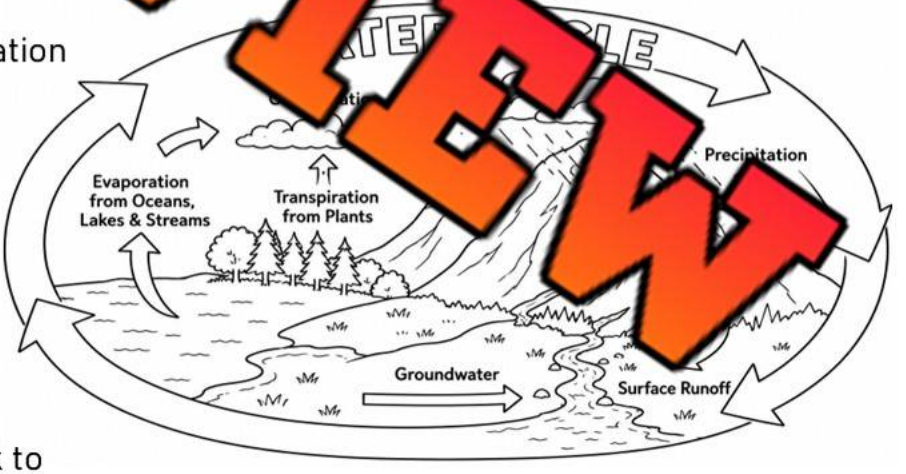
Condensation: is the p urning into liquid. This happens when the vapour is cooled.

Deposition: is the process wh va directly into a solid without becoming a liquid first. This happe s hig e where temperatures are very low. Another example is frost. Depositio esult o

PREVIEW

The Water Cycle

Melting, evaporation and sublimation happen when heat energy is absorbed. Condensation, freezing and deposition happen when there is a decrease in the heat energy (heat loss) in the water particles.



In the water cycle, water moves from the surface of the Earth into the air and back to the surface of the Earth over and over again. This continued movement of water is only possible because of heat energy from the Sun. Without the Sun's heat energy, water would not evaporate and all water on Earth would freeze.

When water molecules are heated, they exchange freely with the air in a process called evaporation. Ocean water is constantly evaporating, increasing the temperature and humidity of the surrounding air to form rain and storms that are then carried by trade winds. In fact, almost all rain that falls on land starts off in the ocean. The tropics are particularly rainy because heat absorption, and thus ocean evaporation, is highest in this area.

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Curriculum Connection
E2.1

True or False

Circle whether the statement is true or false.

1) Melting, evaporation and condensation happen when there is heat loss in the water particles.	True	False
2) The water cycle recycles the same water repeatedly.	True	False
3) Water evaporates and forms clouds, which are moved by winds. This is one way water moves from one place to another.	True	False
4) Deposition is when water is deposited into an ocean.	True	False
5) Most of that falls on land started in the ocean.	True	False

Summaries

Su the reading by writing the important information.

Questions

Use information from the text to suppo an

1) What are the 6 processes that change water from one state of ma t er?

2) How does the heat transfer from the Sun drive the water cycle?

PREVIEW

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Curriculum Connection
E2.1

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Match each the region to the correct description.

Evaporation	❑ Water vapour changes directly into solid ice
Condensation	❑ Solid ice changes directly into water vapour
Sublimation	❑ Liquid water changes into water vapour
Deposition	❑ Water vapour changes into liquid water

Name: _____ Mark

Match each the region to the correct description.

Evaporation	❑ Water vapour changes directly into solid ice
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Name: _____ Mark

Match each the region to the correct description.

Evaporation	❑ Water vapour changes directly into solid ice
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Deposition	❑ Water vapour changes into liquid water

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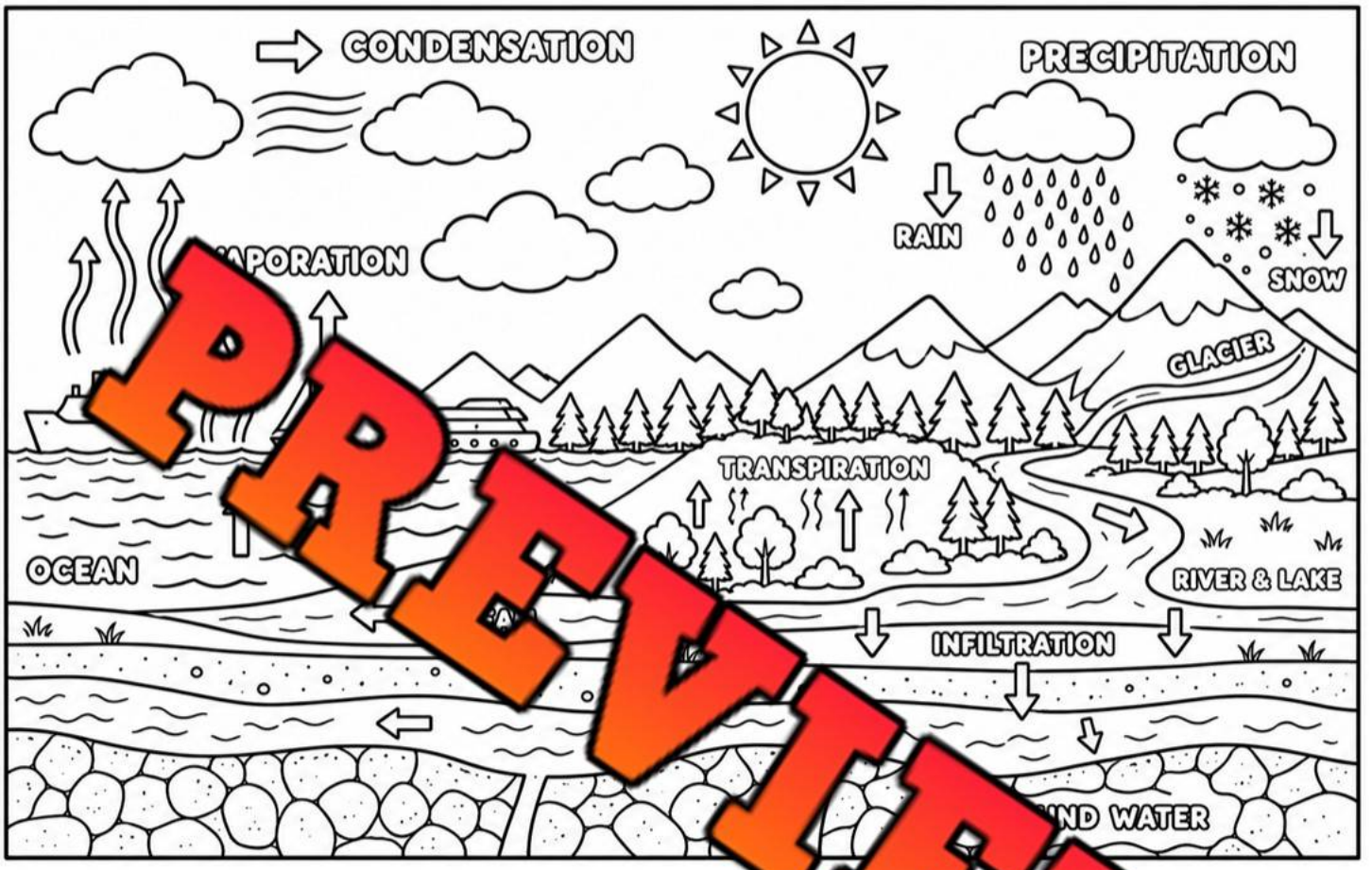
Curriculum Connection
E2.1

Water Cycle Diagram



PREVIEW

Water Cycle Explain how each process below circu ter w cycle.

Process	How It Circulates Wate
Precipitation	
Condensation	
Evaporation	
Transpiration	
Infiltration	

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Curriculum Connection
E2.1

Diagram

Label the parts of the water cycle.

Evaporation	Condensation	Transpiration	Infiltration
Groundwater	Ocean	Stream	Precipitation



PREVIEW

Questions

Answer the questions below.

1) Where are the main areas that water is stored? (note: they are not all i diagram)

2) Where does most of the water get evaporated from?

3) Where are two places that water goes when it pools on top of the soil?

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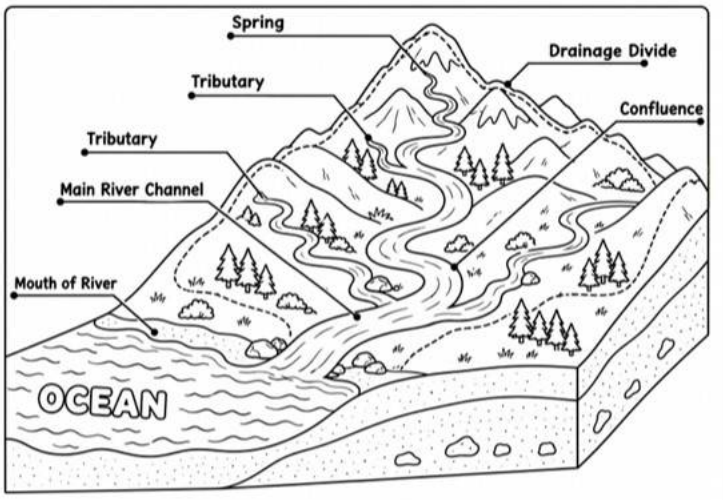
Curriculum Connection
E2.2

Watersheds

What is a Watershed?

A **watershed** is an area of land where surface water drains down into a common set of streams and rivers that all drain into a single larger body of water, such as a larger river, lake, or ocean.



Eve[illegible] lives in a watershed! The water tha[illegible]n your property will either b[illegible] drained down to a com[illegible] or[illegible] When the water reache[illegible] strea[illegible] takes it downward wh[illegible] til[illegible]ches a larger body of [illegible] water[illegible] metimes referred to as a drainage basin.

Watershed Important [illegible]

To understand how the wa[illegible]ined [illegible]houses to a large body of water, it is helpful to understand the ter[illegible]low

Spring – where groundwater returns [illegible]earth's [illegible]e through a natural opening in the Earth's crust

Draining Divide – the line that separates waters[illegible] th[illegible]nd hills or mountains. A neighbouring watershed will have its [illegible]eams, an[illegible]s that could lead to the same large body of water

Confluence – where two flowing bodies of water, like two rivers, [illegible] larger channel.

Tributary – is a stream or a river that flows into a larger river. A tributary does not flow directly into a sea or ocean

Flood Plain – a strip of flat, dry land that is beside a stream, river, or lake that gets covered by water during a flood

Subwatershed – a smaller watershed within the larger system. In the diagram above, if you lived in the mountains, your subwatershed is the small system that drains your water into tributaries.

Estuary – an area that is open to an ocean or sea where one or more rivers or streams meet. We will find brackish water in an estuary.

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Curriculum Connection
E2.2

Questions

Use information from the text to support your answer.

1) What is a watershed? Why are they important?

2) What is a drainage divide? How do you think gravity affects a drainage divide?

PREVIEW

Making Connections

Do you live near any watersheds? Explain your sub watershed.

True or False

Circle whether the statement is true or false.

1) A drainage divide is usually along hills or mountains.	True	False
2) A confluence is a smaller flowing body of water, like a stream or river.	True	False
3) A tributary is where two confluences meet to form one river.	True	False
4) An estuary is an area open to an ocean where rivers or streams meet.	True	False
5) A flood plain is the flat land beside a stream or river.	True	False

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E2.2

Importance of Healthy Watersheds

Importance of Healthy Watersheds
Watersheds are important to not only humans, but all living things. A healthy watershed provides many services that humans need that relate to water. Our ecosystems that support plant and animal life need healthy watersheds as well.



Importanc[illegible]ealthy Watershed – For Humans

- Provi[illegible]rinking water through the i[illegible]s[illegible]water through floodplains. Th[illegible]cess fi[illegible]ollutants and returns nutrients t[illegible]en [illegible]spend money to protect an[illegible]our w[illegible]d, it has been proven that we [illegible]mon[illegible]ding water treatment facilitie[illegible]
- Stores carbon in the soi[illegible]hel[illegible]enhouse gas emissions
- Increases our ability to deal with c[illegible]hang[illegible]ts, like flooding. When we use reservoirs to control water lev[illegible], we hav[illegible]re p[illegible]ction from climate change threats like drought and flooding.
- Reduced risk of invasive species because our [illegible]ter is designed for the species that have been surviving [illegible]nditio[illegible]many years. The conditions should be too challenging for invasive[illegible]s t[illegible]
- Provides opportunities for hydro electricity, with the moveme[illegible]
- Lower rates of illness and stress are associated with having views [illegible]atershed components.

Importance of a Healthy Watershed – For Plants and Animals

- The movement of water in streams and rivers helps ensure water is spread to soil and plants that need it to survive
- Watersheds have created wetlands, like swamps and marshes that provide thriving ecosystems full of biodiversity
- Watersheds provide filtered, clean water for plants and animals
- They connect ecosystems as streams connect to other streams. This allows animals to have a larger ecosystem to meet their survival needs

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Curriculum Connection
E2.2

Discuss Fill in the table with point form answers.

How Watersheds Help Humans	How Watersheds Help Plants/Animals

PREVIEW

Inference How do y… wat… …comes unhealthy?

True or False Circle whether the statement is true or false.

1) Watersheds help store carbon, which reduces greenhouse gases in the air.	T	F
2) Watersheds filter water by removing pollutants.	T	F
3) It is cheaper to not worry about watersheds and build more treatment plants.	T	F
4) Without healthy watersheds, we'd have more floods and worse droughts.	T	F
5) Watersheds can provide renewable energy.	T	F

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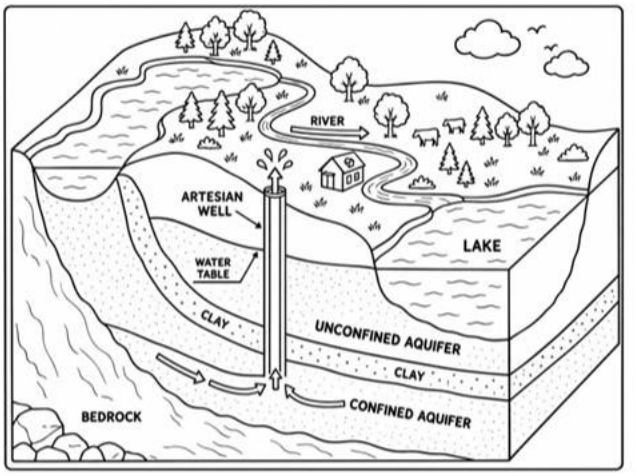
Curriculum Connection
E2.3

Water Table and Aquifers

What is the Water Table?



The **water table** is the upper-level underneath the ground that is permanently saturated, or filled, with water. I'm sure you have wondered where the water from puddl[illegible] land go. Some of the water is evaporate[illegible]st of it seeps into the soil, joining t[illegible]

[illegible]ea just [illegible]ground's surface is called the unsa[illegible]t is [illegible]the water table. This zone has both water and oxygen between the sedim[illegible]the so[illegible]dig down into the ground, you will be digging in this zone and likely won[illegible]water t[illegible]e water table is typically 4 to 10 metres below the ground.

The amount of water in the water t[illegible]ges f[illegible]ason to season. During the summer, the water table typically has less [illegible]ter in it. [illegible]ore [illegible] will evaporate and not seep into the ground. During late winter and sprin[illegible]water [illegible]fullest, as snow is melting and seeping into the ground.

Aquifers

An **aquifer** is an underground layer of material that contains water. The [illegible]rial could be sand, clay, or gravel. These materials allow water to get betwee[illegible]th[illegible]ch allows them to hold water. The material could also be rock, if the rock has void space[illegible]at water can enter.

Aquifers are like rivers or streams underground that allow the movement of water. Aquifers contain groundwater sources of water that are often accessed by wells for people to get clean water from.

An **unconfined aquifer** has direct contact with the atmosphere. Therefore, unconfined aquifers are found just below the ground level. The water table is considered an unconfined aquifer. A **confined aquifer** is surrounded by many rock and clay materials. It has no exposure to the ground level, as it is found deep underground.

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Curriculum Connection
E2.3

Questions

Use information from the text to support your answer.

1) What is a water table? Where is it found?

2) What is the difference between an unconfined aquifer and a confined aquifer?

PREVIEW

Diagram

Draw a diagram of the water table and aquifers underground.

True or False

Circle whether the statement is true or false.

1) A confined aquifer is right below the Earth's surface.	True	False
2) The water table is easy to access by digging with a shovel.	True	False
3) A well accesses groundwater in the water table.	True	False
4) A confined aquifer is surrounded by rock and clay.	True	False
5) Groundwater is clean and safe to drink from wells.	True	False

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Curriculum Connection
E2.3

Groundwater Diagram

Diagram Label the parts of the groundwater system.

Bedrock	Confining Bed	Confined Aquifer	Unconfined Aquifer
Saturated Zone	Unsaturated Zone	Water Table	Infiltration



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Curriculum Connection
A1.3, A1.4, A1.5

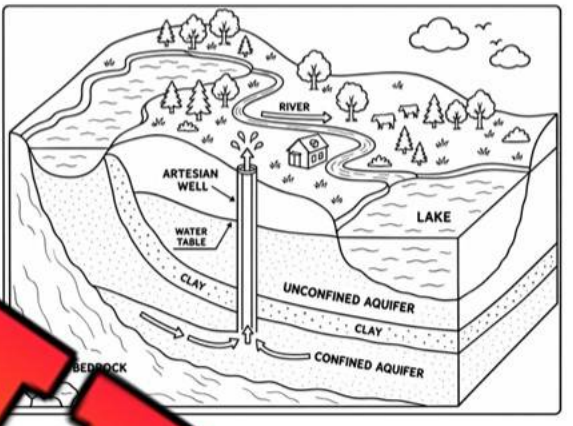
Experiment – Groundwater Model

Research Question — What are we learning more about?

Today, we will be making a model of groundwater that shows water in an aquifer as well as in our water table.

Material — What do we need?

- ✓ 1 large cl... vas
- ✓ Sand
- ✓ Gravel
- ✓ Water



Method — How do we complete the expe... t?

1) In the glass, layer sand and gravel alternating betw... he ... lass is about 3/4 full. This will create an aquifer.
2) Slowly pour water into the glass. Observe how the water makes ... way
3) Continue slowly pouring water into the container. Stop about 3 cm below the top of the aquifer. The level of water in the container is the water table. A **water table** describes the boundary between water-saturated ground and unsaturated ground
4) Slowly add a small amount of water to the container to represent rainfall. This demonstrates the recharging of the groundwater.
5) If possible, you could keep this model for days and weeks and observe how the water evaporates (is used) and how it recharges with rain.

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Curriculum Connection
A1.1, A1.3, A1.4, A1.5

Diagram

Draw a diagram below.

Draw the model you have made and label the following – aquifer, groundwater, water table, bedrock

Results

Answer the [illegible]s bel[illegible]

1) Describe what happened when you fi[illegible]ater [illegible] glass.

2) When the aquifer filled with water, did it become saturated [illegible]uns[illegible]

3) What does the glass represent? Is the glass permeable or impermeable?

4) What happens to the water table when it rains?

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Curriculum Connection
E1.1, E2.3

Research – Bottled Water Extraction

The bottled water industry earns money from the extraction of groundwater and bottling of that water. Many citizens in the regions these companies extract water from are worried about decreasing ground water levels.

Research a bottled water company and learn more about where they extract their water from. Find out if their extraction of water has led to any protests.



Research ...er the questions below.

1) Wh... ...mpany ... ...oose?

2) Where do they e... ...wat... ...m ... ...try, province, indigenous land, springs or aquifers)

3) How much do they pay for the water they extract?

4) Is there any controversy over the company's use of groundwater? Explain.

PREVIEW

Curriculum Connection
E1.1, E2.3

Research Answer the questions below.

5) Has anyone protested the company? How did they protest?



6) What other interesting [illegible] you te[illegible]ut this company's use of groundwater?

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Curriculum Connection
E1.1, E2.4

Climate Change – Melting Glaciers

Climate Change - Background

Scientific evidence has shown that our climate has warmed over the last 100 years due to human activity. The everyday actions of our society are creating greenhouse gases that are wrapping a thick blanket around our planet.

The burning of fossil fuels to generate energy is the primary reason for climate change. Since the Industrial Revolution, our society has relied on fuel burning machines to power our technologies. When fossil fuels are burned, the result is carbon dioxide emissions called greenhouse gases. These emissions rise into our atmosphere and disrupt the carbon cycle.

Global Warming

The term **global warming** refers to the long-term heating of the Earth's climate system. Scientists have found that human activities since the pre-industrial period (1850-1900) have increased average temperature by about 1 degree Celsius. This number is increasing by 0.2 degrees per decade. At this rate, you can see that we are warming the planet at an unsustainable rate.

2020	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
±0	+1.6	3.6	5.6	7.6	9.6	11.6	13.6	15.6	17.6	19.6

Melting Glaciers



As a result of human activities causing global warming, glaciers are melting. The **Muir Glacier** in Alaska has retreated and thinned since the 19th century. The images show the state of the glaciers in 1941, and 2004. The glacier has moved back about 11 kilometres and has decreased in thickness by more than 800 metres.

The ice sheets on Greenland and Antarctica are melting at a rapid rate. In Greenland, the ice sheet's mass has shed an average of 279 billion metric tons of ice per year. All of this ice is entering the Arctic ocean causing sea level rises. In Antarctica, every 40 hours, one billion metric tons of ice is melted. In total, the Earth is now losing 1.2 trillion tons of ice each year.

The effects of melting glaciers on our land is causing concern over rising see levels. If all glaciers were to melt, the water levels would rise a whopping 70 metres! This would put every coastal city underwater. Fortunately, it is not likely that all glaciers would ever melt, but we are heading in the wrong direction.

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Curriculum Connection
E1.1, E2.4

Questions

Use information from the text to support your answer.

1) Define the terms below.	
Industrial Revolution	
Global Warming	

2) How mu[illegible] is the Earth warming each year? Why is this unsustainable?

Reaction

What is your [illegible] to the [illegible] glaciers? Explain what you're thinking.

PREVIEW

True or False

Circle whether the statement is true or false.

1) The Earth is warming 1 degree Celsius every 100 years.	True	False
2) The Muir Glacier has melted to the point it has retreated 11 kilometres.	True	False
3) Each year, 1.2 trillion tons of glacier ice is melting.	True	False
4) The ice caps in Antarctica and Greenland are melting rapidly.	True	False
5) If all glaciers melt, the sea levels will rise 100 metres causing flooding.	True	False

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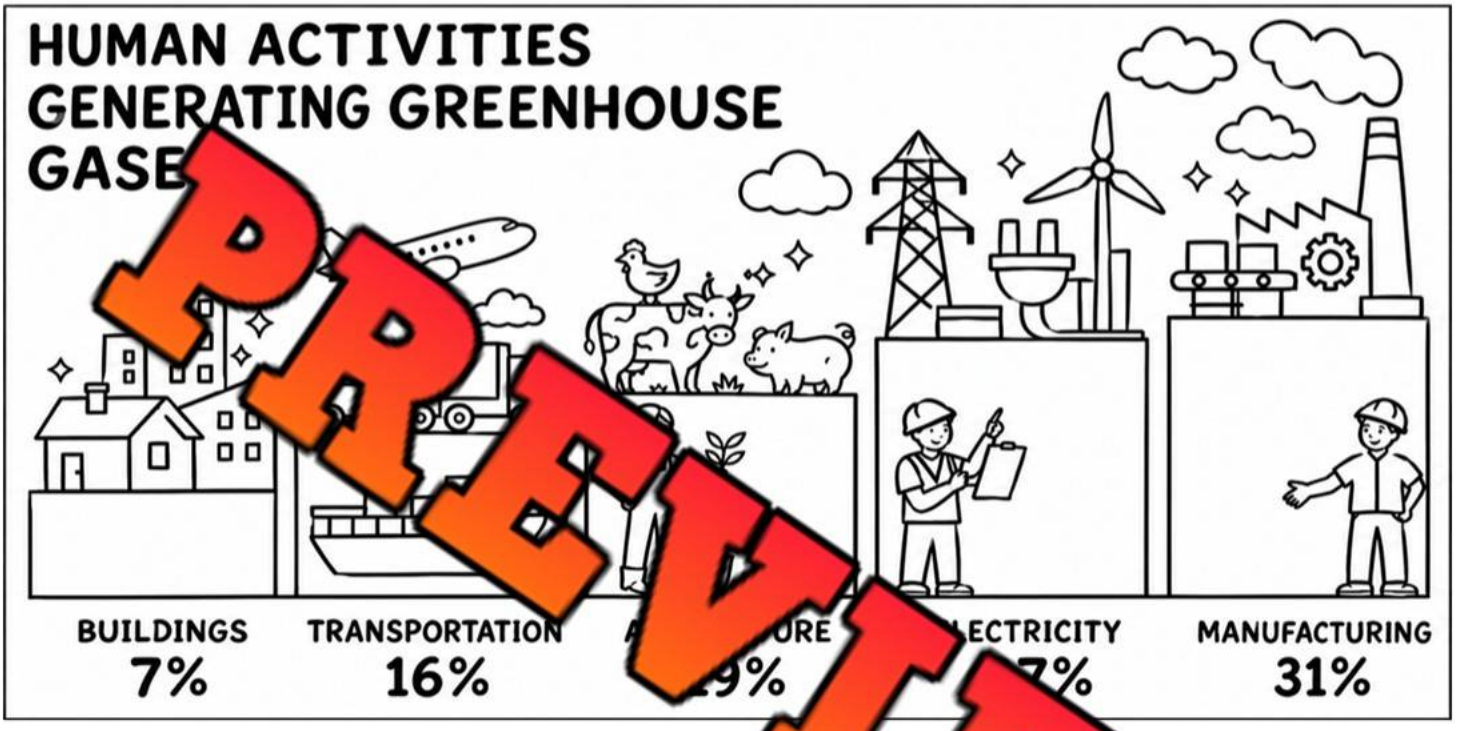
Curriculum Connection
E1.1, E2.4

Human Activities – Greenhouse Gases

The infographic below shows which human activities are polluting our atmosphere, causing global warming.



PREVIEW

Research How do the human activities crea g e gas Explain below.

Buildings	
Transportation	
Agriculture	
Electricity	
Manufacturing	

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Curriculum Connection
E1.1, E2.4

Effects of Melting Glaciers

Background – Why Are Glaciers Melting?

Glaciers are melting for two main reasons. First, the increase in temperatures due to global warming are melting glaciers at a rate much faster than they were melting before the industrial revolution. This fact tells us that our human actions are causing glaciers to melt.

The second reason is due to warming ocean temperatures. With the temperatures rising, the ocean's temperatures are rising also. This is causing melting of glaciers under the surface of the ocean. Scientists are concerned that the global ocean currents are changing warmer ocean waters to be pushed towards the north and south poles. This is melting the very important ice in Antarctica and Greenland.



Effects of Melting Glaciers

🌊 Rising Sea Levels

Since 1961, glacial melting has caused the levels to rise 2.7 centimetres.

☀️ Impact on the Climate

As glaciers are melting at the north and south poles, the oceanic currents are slowing, causing a changing global climate and creating extreme weather events, like hurricanes and typhoons.

🐧 Disappearance of Species

Glacier melting is causing the extinction of many species. Glaciers provide a natural habitat to many animals, including penguins, seals, and polar bears. Almost all penguins are found in Antarctica, where they live on glaciers. Icebergs provide habitats for these animals to take a rest as they travel around their ecosystem. Without these glaciers, many of these animals will become extinct.



💧 Less Freshwater

Melting glaciers help supply the river systems on our Earth. Scientist believe that by the year 2100, 85% to 100% of all arctic ice in Canada will be lost. This means the supply of freshwater into the rivers in Canada will be affected greatly. These regions that are currently being supplied with freshwater from melting glaciers will need to adapt to life with less freshwater available.

PREVIEW

Name: _____ 46

Curriculum Connection
E1.1, E2.4

Questions
Use information from the text to support your answer.

1) Why are glaciers melting?

2) Why wil[illegible]e animals become extinct if glaciers continue to melt?

PREVIEW

Summarize
Paraphrase [illegible] one sentence.

Rising Sea Levels	
Impact on Climate	
Disappearance of Species	
Less Freshwater	

Questioning
Write 2 questions you have about the reading.

1)	
2)	

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Curriculum Connection
E1.1, E2.4

Assignment – Melting Glaciers Infographic

Create an infographic that displays the issues with melting glaciers. Your infographic could focus on one or two of the aspects below or all three.

- Human activities causing melting glaciers
- How much ice is melting?
- Effects of melting glaciers



Your infographic needs statistics and illustrations that represent the problem.

PREVIEW

Research the statistics by answering the questions below.

1) What human activities are causing the melting of glaciers? Find statistics about global warming and what is causing it.

2) How much ice is melting? Find statistics to show why the problem is big.

Curriculum Connection
E1.1, E2.4

3) What are the effects of the melting glaciers? Find statistics that explain how melting glaciers will cause problems.

4) What pictures w dra h tics you decide to use. Practice drawing these pictures, or if you are a con write ideas for pictures you could look for. Also, practice the text you ing.

PREVIEW

Name: _____ 49

Activities – Glaciers and Climate Change

Word Search Find the words from the word bank.



Ice	Cap	Shelf	Iceberg	Sea
Fossil	Fuels	Carbon	Emissions	Cryosphere
Glacie	Melting	Freshwater	Climate	Change

H				I	U	O	H	F	I	S	I	D	V	E	S	B	Q
O	F					H	Q	R	N	D	S	L	E	U	F	F	X
Q	O	W			Y		M	O	E	E	I	Z	F	R	I	Q	X
M	S	O	B	H				W	S	I	C	E	S	R	Q	C	O
C	S	R	E	T	A		S			Y	C	L	I	M	A	T	E
Y	I	I	G	R	P	N	S	U			X	A	A	X	P	P	E	F
F	L	U	R	V	P	I	G	A	M	H		L		L	M	A	Z	W
S	O	E	I	L	M	X	O	E	P	B		C			G	O	M	Y
J	N	S	H	E	L	F	U	D	X	V	N			C		B	O	N
V	N	G	D	B	Z	M	E	L	T	I	N	G	E	P				I

PREVIEW

Word Scramble Unscramble the words from the word bank.



IFOSSL		BERECGI	
HESCEORPYR		ABCORN	
HEARSTWRFE		ENGILTM	
ELHSF		AELIGRC	
SEOINSISM		ULFSE	

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Curriculum Connection
E2.5

Bodies of Water

What are Bodies of Water?
A **body of water** is any significant accumulation of water on the surface of the Earth. Examples of bodies of water are oceans, seas, wetlands, deltas, lakes, ponds, and rivers.

Oceans
An **ocean** is a large body of salt water that fills a massive basin on the Earth's surface. We have one global ocean that are often divided into 5 smaller oceans. The five oceans are the Atlantic, Pacific, Indian, Arctic, and Southern. Oceans are the largest body of water. The global ocean covers 71% of the Earth's surface. The average depth of the global ocean is 3,688 metres!



Lakes
A **lake** is a large body of water that is surrounded entirely by land. Most lakes do not drain into an ocean or river, and are called **lakes**. Most of the Great Lakes are open lakes as some drain into others, but they all drain into the St. Lawrence River.

Seas
A **sea** is a smaller part of an ocean that is partially contained by an area of land. This means that all seas are found in areas where the ocean meets the land. There are 23 seas in the world, including the Mediterranean Sea and Black Sea. Seas are full of saltwater.

Wetlands
A **wetland** is a low-lying area of land that is covered with water either permanently or seasonally. Examples of wetlands are swamps, marshes, and bogs. Wetlands are full of grasses, trees, shrubs and mosses as well as aquatic plants like water lilies and cattails. A swamp is a wetland that has trees, while a marsh is a wetland with no trees.

Pond
A **pond** is a small body of water, less than 11 acres in size. They are often man-made. Ponds may become wetlands over time if plants begin to grow throughout the pond.

Deltas
A **delta** is a body of water that forms when a river splits and spreads out into several branches before entering a sea or ocean. The Fraser River delta is in British Columbia, where the Fraser River drains into the Strait of Georgia, and eventually into the Pacific Ocean. In the delta, the mixing of freshwater and saltwater produces brackish water.

Rivers
A **river** is a large stream of water that flows downhill into another body of water, like an ocean, sea, or lake. The St. Lawrence River flows downhill towards the Atlantic Ocean.

PREVIEW

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Curriculum Connection
E2.5

Definitions

What are each of the bodies of water?

Oceans	
Lakes	
Rivers	
[illegible]	
Wetlands	
Ponds	
Deltas	

PREVIEW

Questions

Use information from the text to support your answe[illegible]

1) What is a body of water? Do you live near any bodies of water?

2) What is the difference between an ocean and a sea?

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E2.5

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Fill in the blank space.

1) An _____ is the largest type of body of water.

2) A _____ is surrounded entirely by land.

3) A _____ is a low-lying area covered with water permanently or seasonally.

4) A river that splits and spreads into branches can form a _____.

5) A _____ is a large stream of water that flows downhill.

Name: _____ Mark

Fill in the blank space.

1) An _____ is the largest type of body of water.

2) A _____ is surrounded entirely by land.

3) A _____ is a low-lying area covered with water permanently or seasonally.

4) A river that splits and spreads into branches can form a _____.

5) A _____ is a large stream of water that flows downhill.

Name: _____ Mark

Fill in the blank space.

1) An _____ is the largest type of body of water.

2) A _____ is surrounded entirely by land.

3) A _____ is a low-lying area covered with water permanently or seasonally.

4) A river that splits and spreads into branches can form a _____.

5) A _____ is a large stream of water that flows downhill.

PREVIEW

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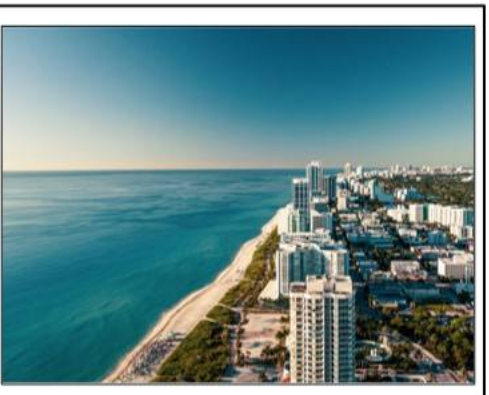
E2.5

Bodies of Water - Temperatures

How Bodies of Water Affect Temperatures



If you live near a large body of water, you will experience different temperatures as a result. The reason for this is because the temperature of the water in oceans and large lakes takes longer to change than the air temperature. Therefore, the temperature further inland will only be affected by the air temperature, but the temperatures on the coast are affected by both the body of water and the air temperature. Living on the coast means you will experience moderate temperatures, without experiencing the extreme heat or cold.

Why Does This Happen?

Seasons

Water stores more heat than most other substances. Water needs 4 and a half times more heat energy than air needs to change its temperature. This means that as the seasons change, oceans and large lakes takes 4 and a half times longer to warm up than the air does. This results in less dramatic temperature changes.

During the winter, large bodies of water release the heat they gained over the summer. This heat contributes to a warmer climate nearby. During the summer, the large lakes and oceans are absorbing heat which makes less heat available for the coastal region. The cooler bodies of water produce cooler winds which prevents extreme heat in the summer.

Ocean Currents

An **ocean current** is the movement of water from one to another. Ocean currents take warm water and heat from the tropical regions and send them to the north and south poles. As the warmer water moves north and south, it warms the cooler regions.

Comparing Coastal Cities and Inland Cities

Winnipeg vs Vancouver

Both Winnipeg and Vancouver have a latitude of 49 degrees North, meaning they are both the same distance from the equator. However, Vancouver is along the west coast of Canada, along the Pacific Ocean. Winnipeg is in Manitoba, so it is inland from any oceans.

Check out the average high temperatures for August and February in both cities. You can see that Winnipeg has a warmer summer and a much colder winter. Vancouver has less extreme temperatures because the Pacific Ocean cools the land in the summer and releases heat in the winter.



	August	February
Vancouver	23°C	8°C
Winnipeg	25°C	-9°C



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Curriculum Connection
E2.5

Questions

Use information from the text to support your answer.

1) During the winter, if you live along the coast of a large body of water, will the temperature be warmer or colder than a city further inland? Explain.

2) Dur[illegible] you live along the coast of a large body of water, will the temp[illegible] be wa[illegible] older than a city further inland? Explain.

3) How do large bodies of water affect [illegible]perat[illegible]earby cities?

PREVIEW

True or False

Circle whether the statement is true or false.

1) Vancouver is warmer all year than Winnipeg is.	True	False
2) Winnipeg has colder winters than Vancouver because they are further inland.	True	False
3) Coastal cities experience more extreme temperatures – very hot and cold.	True	False
4) Inland cities experience more moderate temperatures, less changes.	True	False
5) Ocean currents move warm water from the tropics to the poles.	True	False

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E2.5

Research – Coastal Cities vs Inland Cities

Cities that are at the same latitude will experience the same exposure to the sun's solar energy. However, there are other factors that affect the temperatures of a city, like whether it is on the coast or inland.

Compare the inland cities versus the coastal cities. Three Canadian pairs of cities with similar latitudes have been provided for you. Find 1 more pair of cities that have a similar latitude to compare as well. Use the high temperature for the data you find.

Research ... in the table below to compare the temperatures of each city.

Posit...	...	January	April	July	October
Coastal	...otia				
Inland	Sudbu...				

Position	City	J...		July	October
Coastal	St. John's				
Inland	Lethbridge				

Position	City	January	April	...y	...ctober
Coastal	Sault Ste. Marie				
Inland	Timmins				

Position	City	January	April	July	October
Coastal					
Inland					

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E2.5

Results Describe the relationships you discovered from your data collection.

1) Nova Scotia and Sudbury

2) St[illegible] Le[illegible]

3) Sault Ste. Marie and Timmins

4) Your choices

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E2.5

Microclimate – Victoria, BC

What is a Microclimate?
A **microclimate** has different atmospheric conditions than those in its surrounding area. **Atmospheric conditions** refer to temperature, wind, and precipitation. A microclimate means that your area could experience warmer or colder temperatures along with more or less wind and rain than all of the other areas in your region.

Why Do Microclimates Exist?
Microclimates can be caused by any of the following regions:

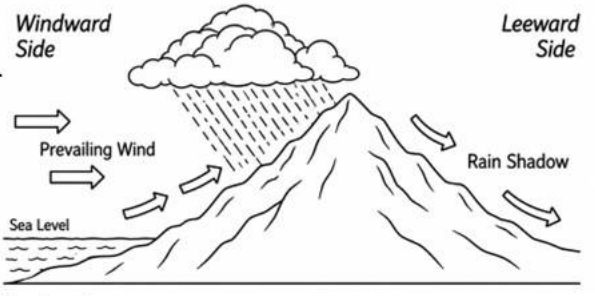
- Mountain regions – living at higher altitudes can have colder temperatures and more
- Coastal regions – bodies of water create moderate temperatures
- Urban regions – cities have warmer temperatures, less wind due to the wind being blocked by buildings, more rainy days

Microclimate – Victoria, BC
Victoria is the warmest area in Canada. It has the most mild climate of all of Canada, despite its latitude being 6° north of the southern part of Canada. Victoria is on an island, on the west coast of Canada. Therefore, Victoria is a coastal region microclimate, as its climate is much different than the cities of its neighbouring cities.

Winds in Victoria
With Victoria being on an island, it is very windy. The average wind speed in Victoria is 10kph. The average wind speed in the neighbouring cities is only 6.2kph. Therefore, the wind in Victoria is significantly different than its neighbouring cities, which contributes to its microclimate.

Temperature in Victoria
The average high temperature in Victoria in July is only 19°C, while in Abbotsford it is 25°C. That is a massive difference considering these areas are only 100km apart and have similar latitudes. In January, Victoria's average high temperature is 8°C. In Abbotsford, the high temperature in January is 6°C. Abbotsford still benefits from being close to the Pacific Ocean as its winters are more mild than the rest of Canada. However, a 2° C difference is still very significant.

Precipitation
Victoria has an average yearly rainfall of only 58.3cm. In Abbotsford, the average yearly rainfall is a whopping 153.8cm! Victoria does not receive as much rain because it is protected by a rain shadow from the Vancouver Island mountains to the northwest. The rainfall coming from the Pacific tends to get blocked by the mountains, causing less rain to reach Victoria.



PREVIEW

Name: _____ 60

Curriculum Connection
E2.5

Questions

Use information from the text to support your answer.

1) Why is Victoria considered a microclimate?

2) Why do[illegible]a receive less rain than neighbouring cities, like Abbotsford?

PREVIEW

Describe

Describe the microcli[illegible]te of [illegible]ining its atmospheric conditions.

True or False

Circle whether the statement is true or false.

1) Atmospheric conditions include temperature, wind, and precipitation.	True	False
2) Victoria has warmer summers and winters than neighbouring cities.	True	False
3) Victoria receives a lot of snow in the winter.	True	False
4) Victoria has a mild climate, meaning the temperatures don't get too high or low.	True	False
5) Victoria is a coastal microclimate that is also affected by mountains.	True	False

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Curriculum Connection
A1.2, A1.4, A1.5

Activity – Finding a Microclimate

Research Question

What are we learning more about?

A **microclimate** is the climate of a small area, compared to the larger area it exists within. Microclimates have different atmospheric conditions (wind, temperatures, precipitation) compared to the area surrounding it. Examples include caves, the sides of mountains, an oasis in a desert, and even urban areas that trap heat.

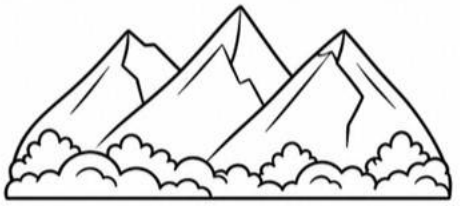
Today we will look for a microclimate on your school property. You'll want to find an area that experiences different wind patterns, temperatures, and precipitation.

PREVIEW

Materials

What do we need?

- ✓ Thermometer
- ✓ Clipboard
- ✓ Soil thermometer/moisture meter – optional
- ✓ An anemometer (wind speed meter). You can make one by completing the experiment on the next page – optional





Method

How do we complete the experiment?

1) Have students work in small groups. Let them try to discover microclimates on school property.

2) Students should use their tools (thermometer, anemometer) to gather data about their microclimate. If their data is different from the surrounding area, they may have found a microclimate. If students do not have any tools, they can use their senses to describe the wind and temperature.

3) Students will also need to write down what lives in the microclimate – tall trees, shrubs, flowers, grubs, spiders, squirrels, etc.

4) Share your findings with the rest of the class. Decide if this is a microclimate or not.

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Curriculum Connection
A1.2, A1.4, A1.5

Observations

Investigate 2 different locations

Location	Temperature	Wind	Precipitation	What Lives Here

PREVIEW

Results

Answer the questions below.

1) What is a microclimate?

2) Did you find a microclimate? Explain why one of the locations was or wasn't a microclimate.

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Curriculum Connection
E2.5

Coastal Storms

What is a Coastal Storm?
A **coastal storm** is a change in atmospheric conditions that create strong winds, heavy rain or snow and sometimes thunder and lightning. Coastal storms are also called tropical storms. These storms form in the vast oceans and then move towards landmasses, often causing massive destruction.

Types of Coastal Storms
There are three main types of coastal or tropical storms – hurricanes, cyclones, and typhoons. These storms are all the same, as they all form over warm ocean waters, rotate around areas of low pressure, and have wind speeds of over 119 km per hour. We have different names depending on where the storm happens.

PREVIEW

Hurricane
A hurricane will form over the Atlantic Ocean and Northeast Pacific.

Cyclone
A cyclone will form over the South Pacific Ocean and Indian Ocean.

Typhoon
A typhoon is formed over the Northwest Pacific Ocean.



How Coastal Storms Form
A coastal or tropical storm will form in the following steps:

1) The water needs to be warm, at least 26.5 degrees Celsius. This is why tropical storms begin in warmer areas near the equator.
2) When wind blows across the warm ocean water, the warm, moist air rises rapidly
3) As it rises, the moist air cools and the water in it condenses, forming large storm clouds
4) The cooling water also releases a lot of heat. This heat transfer creates enough energy to cause strong winds
5) The strong winds push even more air up from the ocean's surface causing more clouds and even more wind
6) The rapidly moving air creates an area of low air pressure in the centre. This middle part of the storm is called the eye of the storm. It is calm, but around the eye has the strongest, most devastating winds.

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Curriculum Connection
E2.5

Questions

Use information from the text to support your answer.

1) What is a coastal storm? What wind speeds need to be exceeded to be considered a coastal or tropical storm?

2) What is the difference between a hurricane, cyclone, and typhoon?

PREVIEW

Label

Fill in the blanks with the names of coastal storms form.



Ordering

Order the steps from first to last in the development of a coastal storm.

	The eye of the storm is formed.
	The moist air cools, creating large storm clouds.
	Water is warmed to a minimum of 26.5 degrees Celsius.
	Strong winds are created by warm and cool air moving causing changes in air pressure.
	Wind blows across the warm ocean water causing the moist air to rise.

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Curriculum Connection
E2.5

Research – Costal Storm

Choose one of the historic coastal storms below to learn more about. Research the cause of the storm and the effects the storm had on the communities it struck.

Examples:
- Hurricane Katrina, Hurricane Harvey, Hurricane Maria, Hurricane Irma, Hurricane Wilma
- Bangladesh Cyclone of 1942, Cyclone Nargis (Myanmar, 2008)
- The Ha[illegible]g Typhoon, Typhoon Nina, Typhoon Haiyan

Resea[illegible] questions below.

1) Which Coast[illegible]ou[illegible]se to research?

2) What year was the storm[illegible]

3) What category of storm was it?

4) What was the death toll of the storm?

5) How much destruction did the storm cause? How much money was needed for repair?

6) How many buildings were destroyed by the storm? How many people were left homeless?

PREVIEW

Curriculum Connection
E2.5

Research Answer the questions below.

7) What caused the storm?

8) What types of [illegible] occurred?

9) What other interesting facts did you learn about this [illegible]?

PREVIEW

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Curriculum Connection
A1.3, A1.4, A1.5

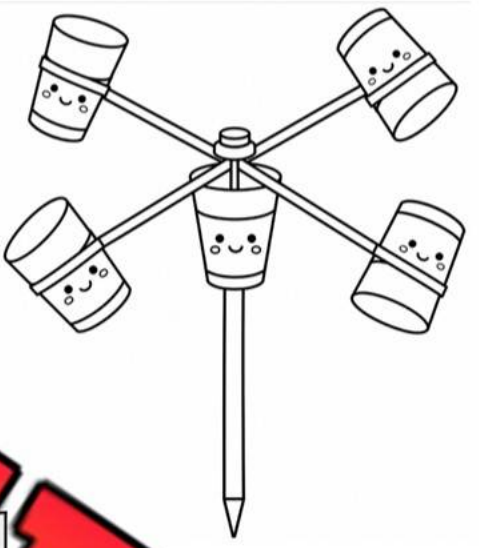
Experiment – Making an Anemometer

Research Question — What are we learning more about?

An **anemometer** is used to measure wind speed. It works by determining how many revolutions per minute (RPM) the tool makes. In other words, it is how many times the anemometer spins in a full circle in one minute.

Materials — What do we need?

- ✓ 1 paper
- ✓ 2 so straw
- ✓ 1 pin
- ✓ A paper pun
- ✓ Scissors
- ✓ Stapler
- ✓ Sharp pencil with an era e
- ✓ A fan with 3 different speed to tes



Method — How do we complete the experi ?

1) Take four of the paper cups and punch a hole in o each c ups, about a 2 cm below the rim
2) Take one of the paper cups and put one of the straws thro gh i of the straw inside the cup and staple it to the opposite side of th e cup. This will secure the straw to the cup. Repeat this process with the ot aw using just one other cup.
3) Using the fifth cup, punch four equally spaced holes in the sides of the cup, about 2 cm below the rim. Then punch a hole in the centre of the bottom of the cup
4) Take one of your cups with the straw through it and put the straw through the fifth cup. Attach one of the 2 remaining cups to the end by bending the straw inside the cup and stapling it. Repeat this step with the other cups.
5) Make sure your cups are all aligned, so that they open facing the same direction
6) Push the eraser end of the pencil through the bottom hole of the fifth cup.
7) Push the pin down through the two intersecting straws into the eraser. Do not push too far or the anemometer won't spin well due to friction

PREVIEW

Name: _____ 71

Curriculum Connection
A1.3, A1.4, A1.5

Observations | Test your anemometer

1) Now that your anemometer is ready, it is time to test it. Turn the fan on low and stand back about 6-8 steps

2) Use a marker to draw something on one of the cups. This will make it easier to count that cup spinning.

3) Hold the anemometer up and count how many times it spins around fully in one minute. If it moves too fast back up from the fan.

4) Repeat each of the different fan speeds and record the wind's RPM

	RPM – 1st Reading	RPM – 2nd Reading	RPM – 3rd Reading	Average
Low				
Medium				
High				

PREVIEW

Results | Answer the questions below.



1) What is an anemometer?

2) What did you notice about the wind speed and the fan speed?

3) When would it be helpful to know the wind speed?

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Curriculum Connection
E1.1, E2.6

Water Quality

What is Water Quality?
Water quality is how suitable water is for an intended purpose. This purpose could be for survival of different aquatic species, or it could be for human consumption. As we make sure aquatic ecosystems have quality water, we also help ensure water is safe for human use too. Below are 5 indicators that are measured to understand water quality.

Temperature and Dissolved Oxygen
The water temperature in an ecosystem is one of the most important factors. For optimal health, aquatic organisms need the water temperature to be within their optimal range. Therefore, if temperatures change due to human activities, the organisms that have lived there will be stressed to the point of death.
Temperature of water affects the amount of dissolved oxygen (DO) the water can hold. As water temperature rises, the amount of DO decreases. Aquatic organisms need the oxygen that is dissolved in the water to allow them to breathe.

pH Levels
The pH is a measurement of how acidic water is. A pH of 7 is neutral, a pH of 14 is basic, and a pH of 1 is acidic. Quality water ranges between 6.0 and 8.5. If the pH values go outside of the range of 4.5 and 9, the water is unhealthy for aquatic organisms. The pH can be changed by chemicals that are added to water through farming practices like using pesticides.



Nutrients and Minerals
Water should have nutrients available for living organisms to consume. Nitrogen and phosphorous are the two most important nutrients, as they are often in short supply and are needed by plants, algae, and microbes. Other nutrients like iron, manganese, and calcium are needed as well. When humans perform some activities, we change the amount of nutrients in the water. For example, when we use fertilizers high in nitrogen and phosphorous, these nutrients can get into the water, causing too much growth of algae. This changes the balance in the aquatic ecosystem, and can lead to unsafe, low quality water.

Bacteria
Water quality is complex because not all bacteria is bad. However, a common form of bacteria that exists in water is fecal matter. When fecal matter is in our drinking water, it can lead to cholera, and other diarrheal diseases. We can test how much fecal matter is in water by checking its E.coli levels.

Turbidity
The measurement of turbidity level tells us how clean water is and its clarity. Turbidity measures how many suspended solids there are in the water. Some water might be cloudy, indicating that there could be particles like sand, gravel, silt, clay, algae or organic matter from animals, plants, and algae.



PREVIEW

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Curriculum Connection
E1.1, E2.6

Summarize What do the indicators of water quality mean?

Temperature and DO	
pH Levels	
Nutrients	
Bacteria	
Turbidity	

Questions Use information from the text to answer the questions.

1) Why do you think not all water tastes the same? Why might that be?

2) Why might the pH levels in a stream be too acidic or basic? Why is that a problem?

PREVIEW

Name: _____ 74

Curriculum Connection
A1.2, A1.4, A1.5

Experiment – Testing pH Levels

Research Question What will the pH levels be in puddles, or local streams and rivers?

PREVIEW

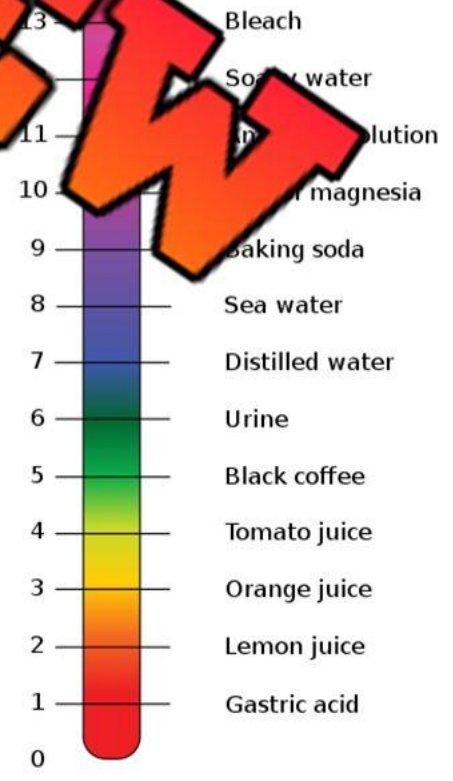
Ma… …ill you need for the experiment?

- ❑ A bottle or c… …lect w…
- ❑ pH strips - can be … …s or pool stores
- ❑ This paper to track your…
- ❑ Pencil to record results



Method How will you complete the ex… …nt?

1) Find local water sources nearby your school. For each source, collect water into your bottle or cup
2) Follow the instructions for the pH strips. Usually, you will saturate the strip with water and compare the colour to the colour guide they provide
3) Write the pH level result you found for the ecosystem you were measuring
4) Describe the ecosystem. Write down any factors that might influence the pH level in that area. Examples – farm or auto shop nearby, loose soil, other pollutants
5) Answer the remainder of the questions on the back of this page



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Curriculum Connection
A1.2, A1.4, A1.5

Observations

What did you notice as you completed the experiment?

1) What is the first source of water you tested? Describe the source (puddle, stream, etc.)

2) What was the pH of this water source?

3) What ar[illegible]he water source could impact the pH level?

1) What is the secon[illegible]rce [illegible]ted? Describe the source.

2) What was the pH of this water [illegible]urce

3) What around the water source could impact [illegible]level

1) What is the third source of water you tested? Describe the source.

2) What was the pH of this water source?

3) What around the water source could impact the pH level?

PREVIEW

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Curriculum Connection
E1.1, E2.6

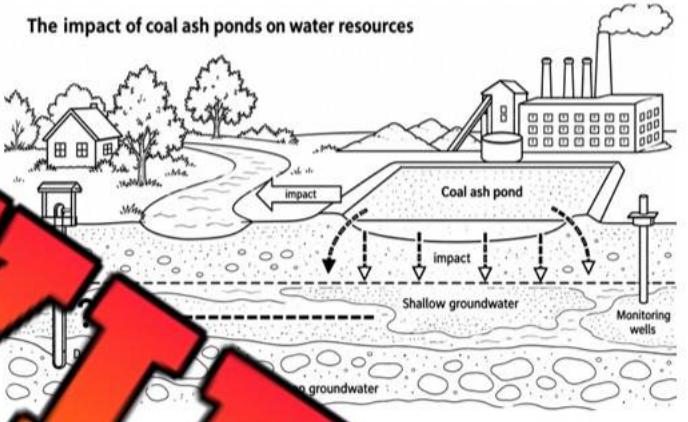
Human Activities Affecting Water Quality

Human Activities Affecting Water Quality
Having access to clean, drinkable water is essential to human life. Unfortunately, many human activities are threatening the availability of clean drinking water in many of the world's major cities. Below are 5 ways humans are causing water pollution.

1) Agriculture
To improve crop yields, farmers use fertilizers and manure to improve the soil quality. By doing so, the groundwater becomes polluted by the excess nitrates that seep down out of the fertilizer into the groundwater. Too high a concentration of nitrates in our drinking water can cause certain kinds of cancers, as well as birth defects.

PREVIEW

2) Fossil Fuel Pollution
The burning of fossil fuels does not cause global warming, it also affects our drinking water. When we burn coal for energy, a by-product is coal ash. Coal ash contains toxic chemicals and it is often stored in unlined ponds next to groundwater. When it rains, the ash can leach into the groundwater. Coal ash ponds are adding dangerous pollutants to our water.



3) Sewage
Population growth in urban areas can lead to overwhelmed wastewater treatment plants. In Gauteng, South Africa, the rapid population growth has caused the wastewater treatment plant to work at 200% capacity. This is causing raw sewage to back up and spill into surrounding fields, which is causing leaching into surface and groundwater.

4) Pharmaceuticals
In Canada, doctors prescribe antibiotics and narcotics to help their patients. Unfortunately, these pharmaceuticals do not disappear when they are consumed. Instead, when someone who is heavily medicated urinates, many of the excess chemicals that are not absorbed by the body end up back in our water systems. In addition, when we discard pills improperly, they end up in landfills and can leach into the water. Our wastewater treatment plants are not equipped to remove traces of these chemicals from our water.



5) Development
The development of our cities, from rural to urban is part of the problem as well. A city with a high population density creates more pollution. Also, the removal of ecosystems to build cities destroys important wetlands that help keep our water clean naturally.

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Curriculum Connection
E1.1, E2.6

Questions Use information from the text to support your answer.

1) How do agricultural practices affect our water quality?

2) How do [illegible]euticals affect our water quality? Why might this be a newer problem?

Overpopulation How is overpopulatio[illegible]eading to poorer water quality?

PREVIEW

True or False Circle whether the statement is true or false.

1) Prescription drugs like antibiotics enter our water and affect its quality.	True	False
2) Rural areas produce more water pollution.	True	False
3) Ash ponds are a result of burning coal for energy.	True	False
4) Agriculture is one of the biggest contributors to poorer water quality.	True	False
5) Many agricultural practices result in too many nitrates in our water.	True	False

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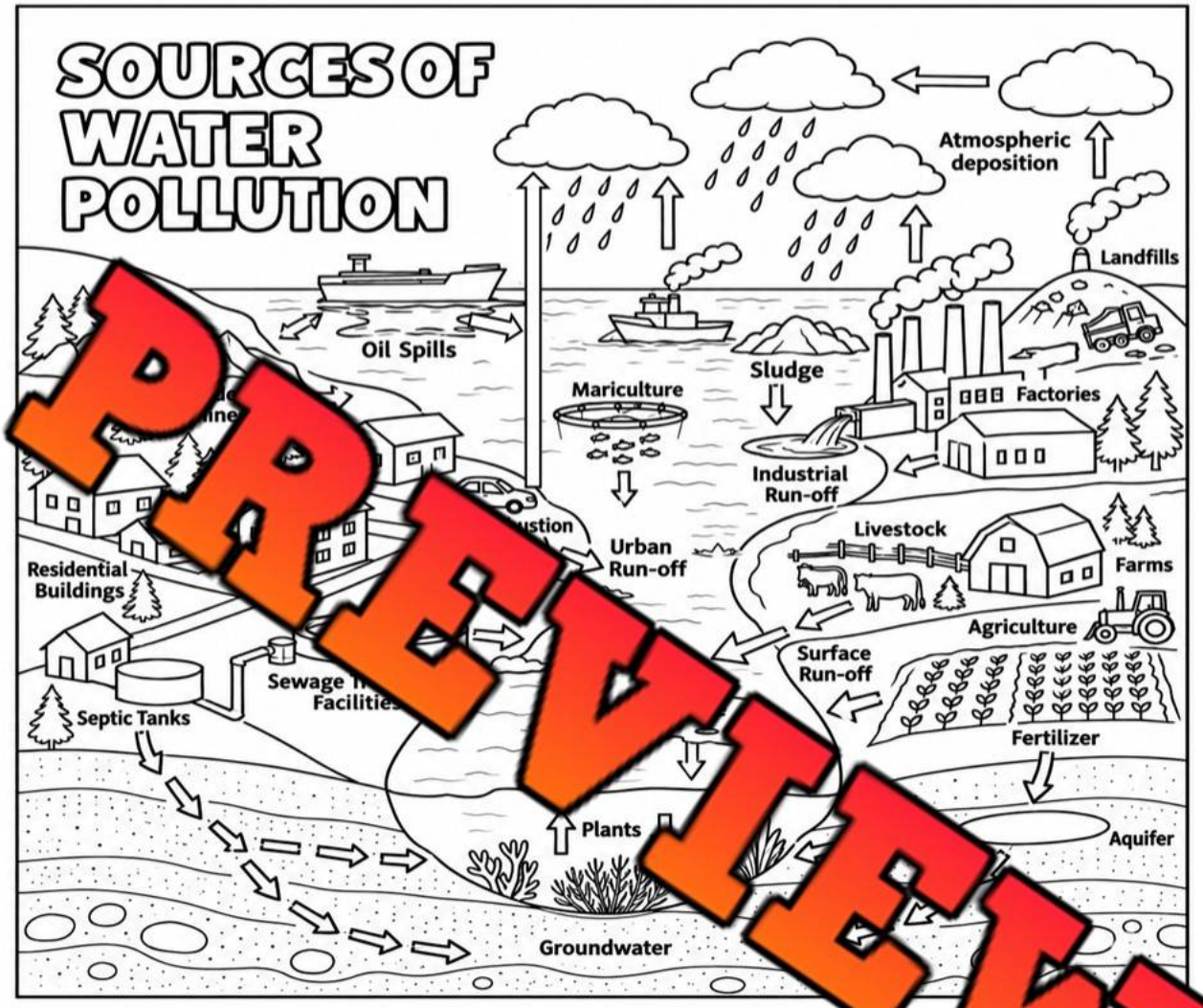
Curriculum Connection
E1.1, E2.6

Human Activities Affecting Water Quality



PREVIEW

Analyze What human activities above do you see affecting

1)	
2)	
3)	
4)	
5)	
6)	

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Curriculum Connection
E1.1, E2.6

Research – How Human Activities Affect Water Quality

How are human activities causing problems with each of the water quality indicators below.



Research Determine how humans affect the water quality indicators below.

1) What hu[illegible]activities cause changes in dissolved oxygen?

2) What human activities cause change[illegible] tem[illegible]e?

3) What human activities cause more or less nutrients in our water?

PREVIEW

Curriculum Connection
E1.1, E2.6

4) What human activities cause bacteria to be added to water?

5) What human activities cause turbidity issues in water?

6) What human activities should we stop doing to keep our water q

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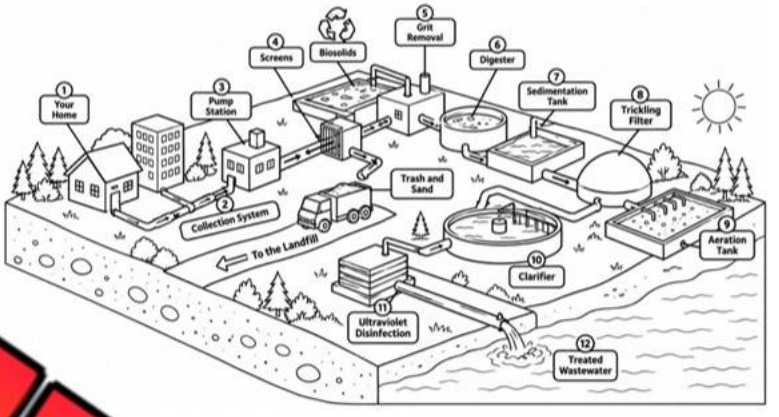
Curriculum Connection
E1.3, E2.7

Primary and Secondary Water Treatment

What is the Difference Between Wastewater and Sewage?

Wastewater is any water that has been negatively affected in quality. Wastewater can come from human activities in their homes, or commercial buildings. It can also come from factories, where a higher percentage of chemicals are disposed of in the water. Wastewater could be created through agricultural practices, or it could be rainwater from gutters on a house.



Sewage is a type of wastewater that is pro[illegible] by people in a community[illegible] carried to a sewage treatmen[illegible] through a sewer syste[illegible] types of sewag[illegible] water. **Blackwate[illegible]** is wa[illegible] ha[illegible] been used in toilets, **g[illegible]ater** i[illegible] wastewater from [illegible]shwas[illegible] bathtubs, and washing [illegible]chi[illegible] Blackwater needs more tr[illegible]t to beco[illegible]**water**, which is clean, drinking water.

From Wastewater to Drinkable W[illegible] – P[illegible]ndary Water Treatment

Below are the steps of a typical wastewa[illegible]ment

1) When water leaves our homes or sc[illegible], it is ta[illegible] p[illegible]ping station close by
2) The wastewater is pumped to the main water tr[illegible]ent pl[illegible]
3) There is a screen that removes large materi[illegible]h as [illegible]a[illegible]stics
4) Grit and heavy inorganic solids are removed at t[illegible]e treat[illegible]
5) The primary clarifiers allow any organic material to s[illegible] can[illegible]parated from the water. Grease is also removed during this step
6) The organic material and grease are pumped to a digester, which[illegible] further and become methane-rich gas. This gas can be used as an[illegible]er[illegible]e to generate electricity
7) The water that moves on is called **effluent water**, which is water that flows out as treated wastewater. This water isn't ready to drink, but it is free of sediments and will look clean
8) The effluent water moves to an aeration tank, where any contaminants like phosphorus are removed
9) The water then goes to the secondary clarifier, where chemicals are added to removed more contaminates
10) The last step is the ultraviolet disinfection of the water. This step disinfects the water ensuring it is clean. The water is then usually released into a body of water
11) Another treatment plant will take the water from the body of water and treat it further to ensure its quality

PREVIEW

Name: _____ 87

Curriculum Connection
E1.3, E2.7

Questions

Use information from the text to support your answer.

1) What is the difference between wastewater and sewage?

2) How is [illegible]er created? Give examples.

PREVIEW

Summarize

How is wastewater [illegible] so it becomes drinkable water?

True or False

Circle whether the statement is true or false.

1) Blackwater is water from the bathroom sink.	True	False
2) Water from toilets is treated and becomes whitewater we drink.	True	False
3) The disinfecting process uses ultraviolet technology.	True	False
4) A digester allows organic matter to break down to create methane gas.	True	False
5) Water from these treatment plants usually returns directly to our homes.	True	False

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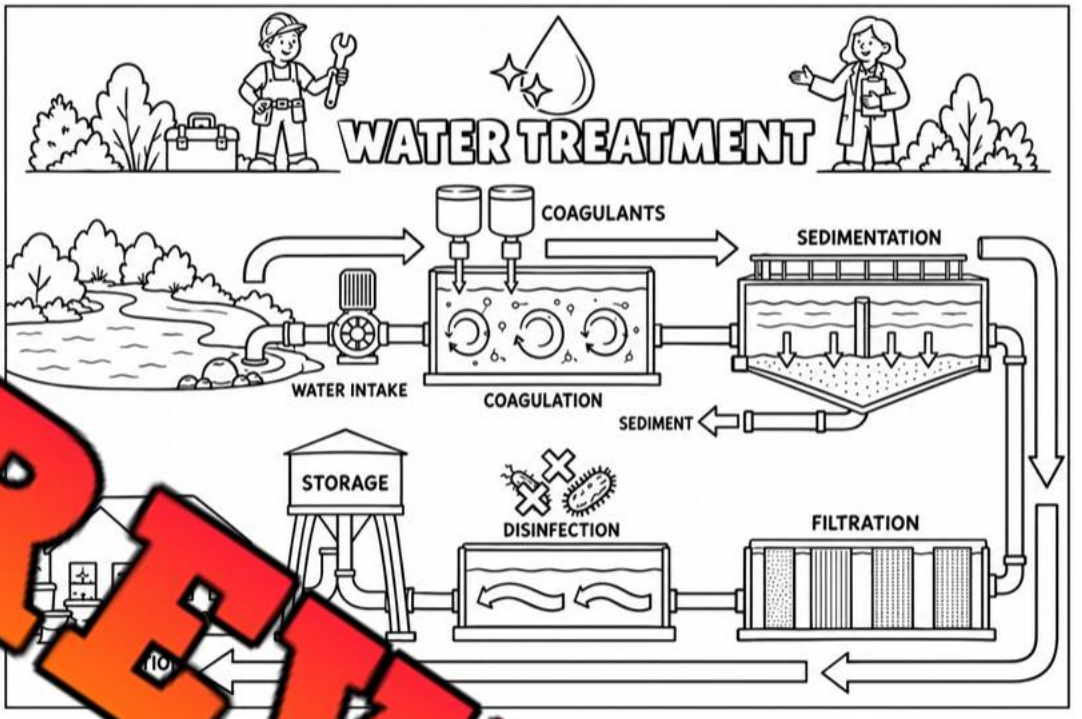
Curriculum Connection
E1.3, E2.7

Research – Tertiary Water Treatment

When treated water is returned to a body of water, it is then taken through another process of treatment before we drink it. Research t[illegible]s from the [illegible] to lea[illegible] about [illegible]rocess.



Research

Answer the questions below.

1) What does water intake in the diagra[illegible]to?

2) What is coagulation in water treatment?

3) What is sedimentation in water treatment

4) What is filtration in water treatment?

5) What is disinfection in water treatment?

PREVIEW

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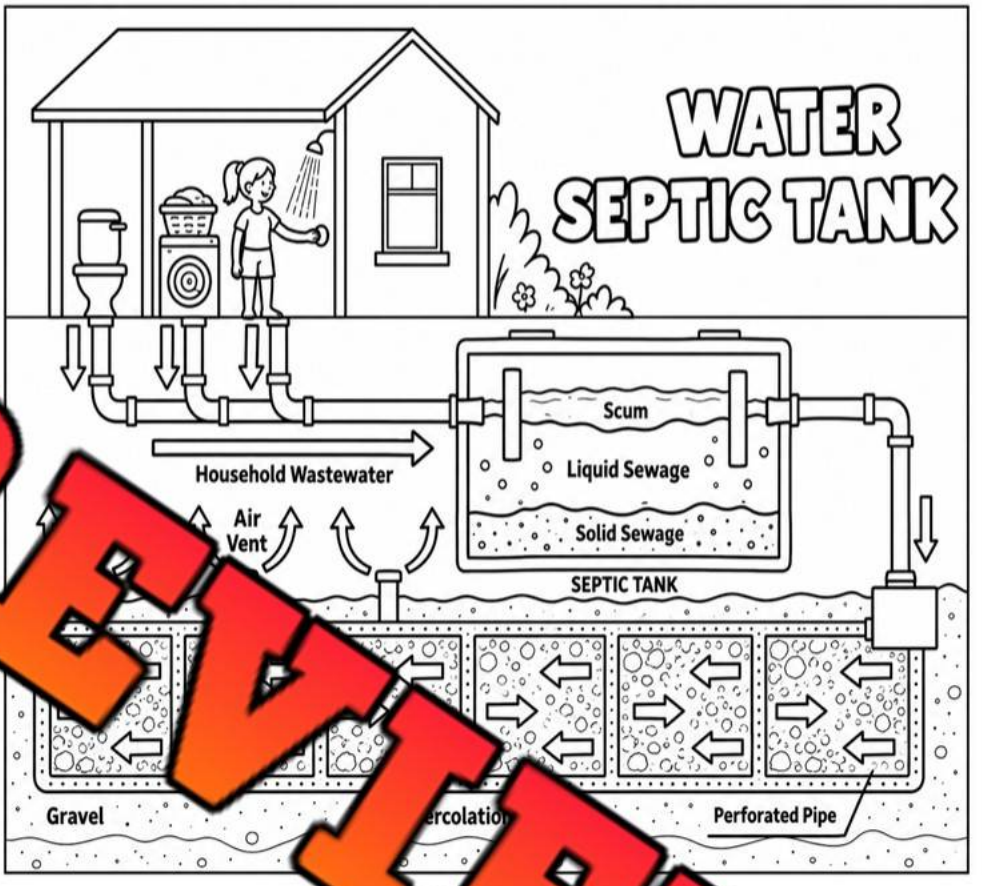
Curriculum Connection
E1.3, E2.7

Rural Wastewater Treatment – Septic Tanks

What is a Septic System?
A **septic system** is an underground wastewater treatment structure that is commonly used in rural areas that do not have sewer syst[illegible]. Below are the steps [illegible]ater takes before b[illegible]oduced back i[illegible]



1) W[illegible]water is [illegible] a household [illegible] into a sep[illegible]ol
2) The watery wa[illegible] called effluent, fill[illegible] most of the tank
3) The scum floats to the top. It is composed of fats, like greases in oils that often come from our kitchen sink
4) The solid sewage comes from toilets. It sinks to th[illegible]or
5) There is an outflow pipe that has a screen on it to blo[illegible]olid[illegible]g the septic tank
6) The effluent flows through the outflow pipe and into the draina[illegible]rea has perforated pipes, which are pipes with holes in them.
7) The water will drain through the holes in the pipes so that it is returned back to the environment. These pipes rest on a gravel bed, which further filters the water
8) The water will seep down into the groundwater and aquifers

Pros of a Septic Tank
- ✓ Most cost efficient – no monthly fees with a septic tank
- ✓ Durability - lasts a long time if properly maintained

Cons of a Septic Tank
- ✓ Requires pumping – every three to five years, the solid sewage needs to be pumped
- ✓ Backed up drains – the pipes in the septic tank can get clogged if toilets are misused
- ✓ Broken pipes – tree roots, digging, or earthquakes can break pipes underground

PREVIEW

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Curriculum Connection
E1.3, E2.7

Questions

Use information from the text to support your answer.

1) Where are septic tanks commonly used? Why is that the case?

2) How do [illegible]nks work?

PREVIEW

Pros/Cons

What are the [illegible] septic tank?

Pros	Cons

True or False

Circle whether the statement is true or false.

1) Most houses in big cities have a septic tank.	True	False
2) A cottage is more likely to have a septic tank.	True	False
3) Septic tanks take wastewater and release it back into the groundwater.	True	False
4) You could drink the water that comes out of a septic tank.	True	False
5) Scum floats, like oils and greases from our kitchen.	True	False

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Curriculum Connection
E1.3, E2.7

Research – Local Water Treatment Plant

Not all rural areas have their own water treatment plants. Instead, many families use a septic tank to manage their wastewater.

In Ontario, there are 423 water treatment plants. If your community has only septic tanks, research a community close to you that has a water treatment plant. Learn more about the process of how wastewater is treated before it becomes drinkable water.

Research and answer the questions below.

1) Which city did you choose? What is the name of the water treatment plant?

2) How many people does the water treatment plant service?

3) How many pumping stations are part of the treatment system?

4) Describe the process of how water is treated at the wastewater treatment plant.

PREVIEW

Curriculum Connection
E1.3, E2.7

Research Answer the questions below.

5) How many people work for the city's water system? What are some of the jobs these people have?

6) What process of d… violet, chlorination, ozone, chloramines?

7) Which body of water is the treated w… ed i…

8) What other interesting facts did you learn ab… r cit… at… tment system?

PREVIEW

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Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Making A Water Filter

Research Question Can we filter dirty water and make it clean again using the materials below?

_____

_____

_____

Mat… …will you need for the experiment?

- ❑ 2-litre pla… …ptie… …clean
- ❑ Dirty water (u… …coffe… …ld crunched up leaves, cooking oil, or tiny pieces of foam)
- ❑ Measuring cup
- ❑ Spoon
- ❑ Stopwatch or any clock with a seco… …d
- ❑ Filtering materials – use as many as you can fi… …tivat… …coal, gravel, sand (coarse and/or fine), cotton balls
- ❑ Coffee filter (old sock, napkin, paper tower will …or…

PREVIEW

Procedure How will you complete the experiment…

1) Cut the top off the 2-litre bottle and flip it over to fit it back inside the cut part of the bottle
2) Place the coffee filter or paper towel into the bottom of the filter
3) Add all your materials as layers into your filter. Do this strategically in terms of size of materials.
4) Record the order of your materials on the back of this page. Draw a diagram of the filter
5) Stir the dirty water and measure a cup of it
6) Pour the dirty water into the filter. Time how long it takes for the water to pass through the filter
7) Carefully scoop out the filter materials. Make a note of which materials took what out of the water.



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Curriculum Connection
A1.3, A1.4, A1.5

Observations

What did you notice as you completed the experiment?

1) Which materials did you use for the layers in your filter?

2) Draw a [illegible]m of the layers of your filter. Label each layer.

3) How long did it take for the water to [illegible]ough [illegible]er?

4) When you took the materials out, did you notice [illegible]t which parts of the dirty water?

5) Compare your observations with your classmates. Did you notice a relationship between the cleanliness of the water and the time it took for it to pass through the filter? If so, why would that be?

PREVIEW

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Curriculum Connection
E1.2

How the Indigenous Use Water

Honouring Water – First Nations, Métis, and Inuit
Water is honoured by indigenous groups. Water is the most life sustaining gift on Mother Earth. It provides an interconnection between living things as all living things need water. Water flows between us, within us, and it replenishes us. Water is the blood of Mother Earth.

The Indigenous understand that water is the giver of all life. Without clean water, all life will perish. The Indigenous recognize the sacredness of water, so their lifestyles promote the protecting of water from pollution, drought, and waste.

Water Is
For many Indigenous water is critical to all aspects of their lives. They fish in the waters and food for energy. They use rivers and lakes for transportation routes using ca

The Inuit in the ice to travel along. They use sea mo the sea ice is an extension of th ce all em to travel from community t nity. connects them with the ocean the majority of their food.



Indigenous Sustainable Water Practices
Farming
The Indigenous farm using minimal water. They gr lan to withstand periods of drought. They also do not farm in excess, as t enou meet the needs of their community. The Indigenous also do not use s ilizer that negatively affect the quality of their drinking water. Yet, the Indigeno sed to poor drinking water because of the farming practices other comm . Many Indigenous communities do not have the infrastructure setup to tre water even though it is not their activities that are degrading the water in the fi ace.

Pollution
The Indigenous understand that pollution is not an option. Their spiritual connection to Mother Earth means that when the Earth is unhealthy, they feel unhealthy. This means the problems with water pollution other communities are having, are not being caused by the Indigenous.

Water is Sacred – Indigenous Day



Pollutants like the ones from factories in the form of ash pools are not being caused by the Indigenous. **First Nations Versus Fossil Fuels** is an organization of First Nation members that oppose the water and air polluting burning of fossil fuels.

PREVIEW

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Curriculum Connection
E1.2

Question How do the Indigenous view the following differently than other communities.

Farming	
Pollution	

Questi[illegible] in[illegible]ion from the text to support your answer.

1) How do the [illegible] peop[illegible] bout water? How do they use water?
_____
_____
_____
2) Do the Indigenous people create poo[illegible]nking w[illegible] is p[illegible] drinking water affecting them? Is that fair? Explain.
_____
_____
_____
_____

True or False Circle whether the statement is true or false.

1) The Inuit use sea ice to travel from community to community.	True	False
2) The Indigenous feel that when the water is unhealthy, they are unhealthy too.	True	False
3) The lifestyle of Indigenous people creates a lot of pollution.	True	False
4) Development is more important to the Indigenous than the Environment.	True	False
5) To the Indigenous, water is the giver of life.	True	False

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Curriculum Connection
E1.2

Research – Clean Drinking Water for Indigenous Communities

Everyone in Canada should have access to clean drinking water. The Canadian government is working with First Nations communities to achieve clean drinking water on reserves.

Research Learn more about the quality of drinking water on reserves.

1) What is a drinking water advisory?

2) How many First Nations communities had drinking water advisories?

3) How many First Nations communities do not have access to clean water?

4) Why is it unfair that these First Nation communities do not have access to clean water? Who is doing most of the polluting of their water?

PREVIEW

Research Answer the questions below.

5) Why do drinking water advisories in First Nation communities happen?

6) How was the Grassy Narr… Na… (A… eschoseewagong Netum Anishinabek) affected by mercu… poiso… …d the poisoning? Does the poisoning still affect the community? E…

PREVIEW

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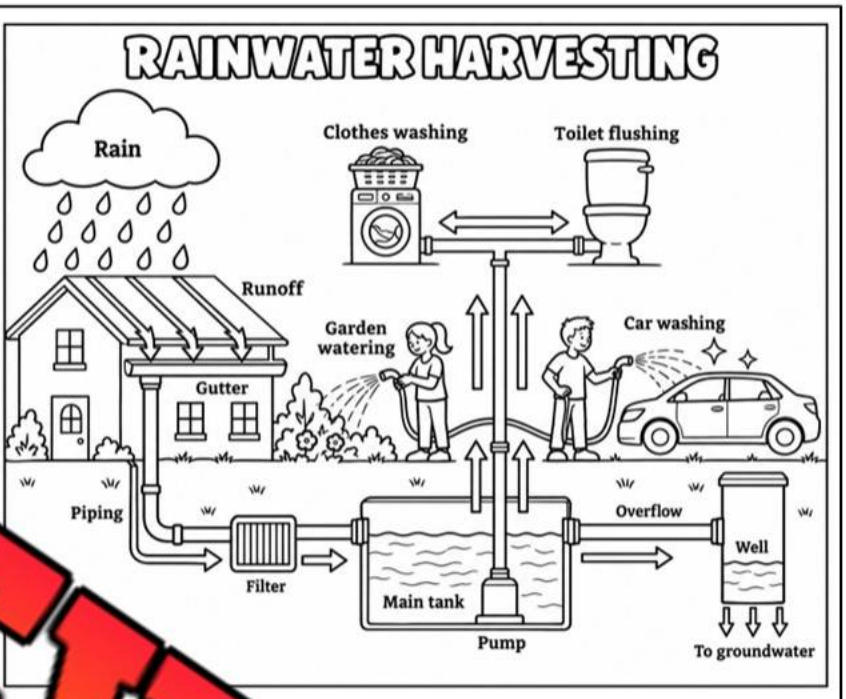
Curriculum Connection
E1.3

New Technologies – Rainwater Harvesting



What is Rainwater Harvesting?

Rainwater harvesting is collecting rainwater run-off from a structure in order to store it for later use. We can harve[illegible]water by channelling the rainw[illegible] the roof of our hous[illegible] storage tank. Ra[illegible]ater h[illegible]n be as simple as coll[illegible] a ba[illegible] It can also be comp[illegible]d, wi[illegible] systems that harvest rain[illegible] larger tanks that supply an ent[illegible] use[illegible]

Rainwater is safe to use for almo[illegible]eed. Y[illegible]sh your clothes and car, water your garden, and flush your toilet with untre[illegible]rainw[illegible]u may even be able to drink your rainwater, if you filter and treat the ra[illegible]er a[illegible]

Rainwater Harvesting Around the World

The idea of rainwater harvesting may seem foreign to you, bu[illegible]s be[illegible]nd the world. In rural areas in countries like Brazil, China, New Zealan[illegible]ater is scarce. These places have began using rainwater harvesting to meet thei[illegible]r needs.

Even though Brazil has 18% of the world's total freshwater, only 28% of Brazil's cities have enough water. Drought is a big problem in Brazil's rural areas and when it does rain, it only does so intermittently.

In 2003, a program called "Programa Um Milhão de Cisternas" ("One Million Cisterns") was created to provide one million homes with rooftop rainwater harvesting systems. These systems collect and store rainwater until the dry season. All that is needed is a gutter, a pipe, and a 16,000L tank. To get water out of the tank, a manual pump can be used. Having these systems is providing millions of people water in Brazil.

PREVIEW

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Curriculum Connection
E1.3

Questions

Use information from the text to support your answer.

1) What is rainwater harvesting? What can you do with rainwater?

2) How is rainwater harvesting helping rural areas in Brazil?

PREVIEW

Diagram

Draw a diagram to show how a rainwater harvesting system works.

True or False

Circle whether the statement is true or false.

1) Rainwater can be used to drink without treating or filtering it.	True	False
2) Rainwater harvesting is done by collecting water runoff from a roof.	True	False
3) Rainwater harvesting allows rural areas in some countries to get water.	True	False
4) All of Brazil has access to freshwater.	True	False
5) Rainwater is the same as ocean water.	True	False

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Curriculum Connection
E1.3

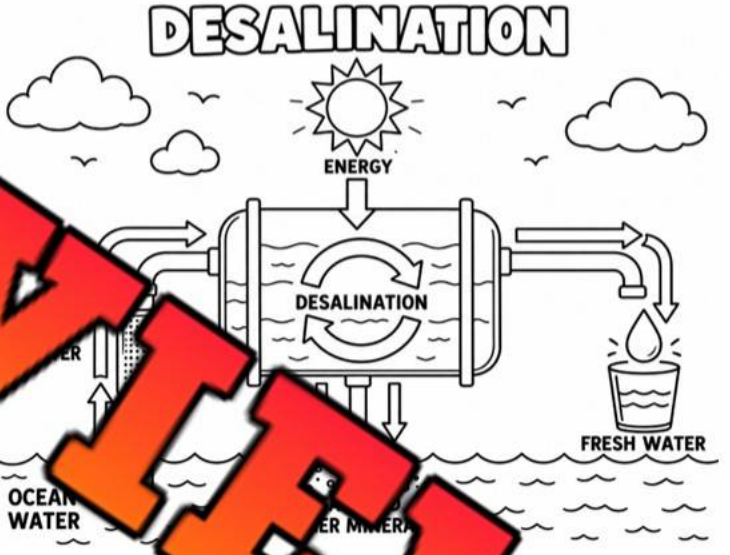
Desalination Techniques

What is Desalination?

Desalination is the process by which saline water is converted into freshwater we can drink. With 97.5% of all surface water on the earth being salt water, it could become important to develop desalination methods to provide us with more freshwater. In the past, it has required too much energy to convert salt water into freshwater. The more energy-efficient method is treating the freshwater we already have.

How scientist know that our misusing of freshwater could lead to more and more com running out of freshwater. That is why energy-efficient methods of desalina tant. Today, only 1% of the freshwater we use comes from the desal

PREVIEW



Process of Desali

One of the mo ods desalination is ca tillati

Distillation is when a elevates the temperature alt water so that it begins to eva The evaporated water condenses on cool surface creating water droplets. These droplets are freshwater as the salt and other minerals do not evaporate.

Solar distillation is when the sun is the primary heat source that causes the evaporation. In this process, water is pumped up from th thr filt and into a desalination tank. The filter ensures no large sedimen r pi tank. The evaporation inside the tank leads to freshwater condens through the out pipe. The salt and minerals return to the ocean through e on the bottom.

Advantages and Disadvantages of Solar Distillation

Advantages of Solar Distillation	Disadvantages of Solar Distillation
✓ Simple to design and build	✓ Rate of distillation is very slow (6 litres a day)
✓ Low installation cost	✓ Only works on sunny days
✓ Simple maintenance	✓ Will not provide enough water for a lot of people
✓ Can be used at the household level	✓ Can become corroded by the salt and minerals

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Curriculum Connection
E1.3

Questions

Use information from the text to support your answer.

1) Why might improving desalination techniques be important?

2) What is a solar distillation system? What are their pros and cons?

PREVIEW

Diagram

Draw your diagram of a solar distillation system.

True or False

Circle whether the statement is true or false.

1) A solar distillation system turns saltwater into freshwater.	True	False
2) Most of the Earth's water is freshwater.	True	False
3) Desalination techniques could be useful in giving us more freshwater.	True	False
4) Desalinating is done a lot now and provides us with a lot of freshwater.	True	False
5) Desalination techniques use too much energy right now to be effective.	True	False

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Curriculum Connection
A1.2, A1.4, A1.5

Desalinization Science Experiment

Research Question — What are we learning more about?

Desalinization is the removal of salt from water. Since freshwater (non-salt water) is scarce compared to the amount of saltwater available, using desalinization techniques could end water shortages.
Today, we will test one desalinization technique.

Material — What do we need?

- ✓ Large pot
- ✓ Salt
- ✓ Water
- ✓ Spoon
- ✓ Boil safe mug
- ✓ Tinfoil
- ✓ Ice
- ✓ Stovetop
- ✓ Plastic spoons to taste - optional





PREVIEW

Method — How do we complete the experiment?

1) Mix salt into a large pot of water. If you use warm water, the salt will dissolve faster. You can let students taste the saltwater at this point.
2) Place a mug inside the pot. Be careful not to get any saltwater in the mug.
3) Cover the pot with tinfoil. Seal the edges but allow enough slack for the middle to dip slightly.
4) Put the ice cubes in the middle.
5) Put the pot on the stovetop and turn it on, bringing the water to a boil.
6) Let the saltwater simmer for about 10 minutes or until the ice cubes melt. Don't let it boil dry.
7) Turn off the heat and let the pot cool for 20 – 30 minutes. Once cool, carefully remove the tinfoil.
8) Have students taste the water in the mug using their spoon. You can also have them taste the water left in the pot.

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Curriculum Connection
A1.2, A1.4, A1.5

Observations

What happened? How did each of the liquids taste?

Liquid	How Did It Taste? Describe the saltiness. Rate it from 0 – 10 (10 being most salty thing you've ever had)
Saltwater Mixture Before Boiling	
Water in	
Saltwater Left in the Pot	

PREVIEW

Results

Answer the q bel

1) What is desalinization? Why is it imp

2) Why was the water in the mug freshwater? What happe e s

3) Why was the water left in the pot more salty than it was originally? Explain using the term concentration.

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Name: _____ 120

Curriculum Connection
A2.2, A3.1, A3.2, A3.3

STEM – Water Testing Technologies

Changing Technologies



For farmers, the most important thing is the quality of their soil and water. In the past, farmers had to send their soil and water samples to science laboratories to test the quality. The process was time-consuming and cost a lot of money.

Toda[illegible]rmers can use something called an AgroPad t[illegible]eir water and soil quality. To run the test, you [illegible]groPad (a card about the size of a bank card), and put a drop of water or soi[illegible] than 10 seconds, the card will change colours.

[illegible]you use[illegible]Pad app on your smartphone to scan the card. The app will then give you the [illegible]ne[illegible] to understand the quality of your water and/or soil. The app will test t[illegible]e, m[illegible]um, aluminium, and nitrogen levels found in the soil and water. If farm[illegible] test [illegible]d water, they can add the nutrients it needs to be healthy. Healthy [illegible]an[illegible]er crops and more food for everyone!

The AgroPad is ma[illegible]BM. It is h[illegible]mily farms around the world. IBM understands that 80% of foo[illegible]ide[illegible]m family farms. These family farms need to be supported by the fiel[illegible] sci[illegible]gy.

PREVIEW

Multiple Choice

Circle the correct answe[illegible]

1) The AgroPad is made by	IB[illegible]	Microsoft
2) The AgroPad can test the quality of water and	[illegible]	[illegible]ir
3) You can find out if your water or soil has too much	C[illegible]	[illegible]ulum
4) You can add _____ if your soil is low in something	Wate[illegible]	Nutrients
5) Family farms grow what percentage of food worldwide?	50%	80%

Question

How is technology helping farmers around the world?

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Name: _____ 121

Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

STEM – Water Testing Invention

Create your own invention that tests the quality of water and adds nutrients to make the water quality better. Use the legend below to know what to add.



Test Results	What to Add When High Levels	What to Add When Low Levels
Levels of pH	Sodium bisulfate	Sodium Bicarbonate
Levels of Chlorine	Hydrogen peroxide	Chlorine
Levels of Magnesium	Sodium	Magnesium
Levels of Aluminum	Malic acid	Aluminum
Levels of Nitrogen	Chlorine	Nitrogen

PREVIEW

IF/THEN — Write code for your invention.



If the pH is high and magnesium is low

THEN

If chlorine is high and nitrogen is low

THEN

If nitrogen is high and aluminum is low

THEN

If the levels of pH, magnesium and nitrogen are high

THEN

If the pH, nitrogen, magnesium, and aluminum are low

THEN

If the pH and chlorine are high, but the aluminum and magnesium are low

THEN

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Name: _____ 122

Curriculum Connection
A1.1, A2.2, A3.1, A3.2, A3.3

STEM – Water Testing Invention

Draw your invention. Make sure the invention has:

- ✓ A place to put the water
- ✓ A screen to tell you the results
- ✓ A start button
- ✓ Any other buttons it will need to work



PREVIEW

Name: _____ 123

Curriculum Connection
A1.1, A2.1, A2.2, A3.1, A3.2, A3.3

Questions Answer the questions about your machine below.

1) How does your water testing machine work?

2) What [illegible] your machine have?

3) For at least 2 buttons, [illegible] that [illegible] machine what to do when the button is pressed. For example, if on b[illegible] pre[illegible] light.

4) How will your machine help people? Explain its impact on the world.

PREVIEW

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Name: _____ 124

Curriculum Connection
A3.1, A3.2, A3.3

STEM Math connection – answer the questions below.



1) How much does it cost for you to make your machine? Think of the parts you will need and estimate a price.

2) How ma nits will you make at first?

3) How much w s co u in total?

4) How much will you sell one u or?

5) How much net profit will you earn if you sell 1,000 u or net pr u'll find the gross and subtract the cost to build the 1,000 units.

6) If you want to make $1 million in net profits, how many units will you need to sell?

7) If you invent this with 2 other friends (3 total people), how many units will you need to sell to each earn $5 million in net profits?

PREVIEW

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Name: _____ 125

Curriculum Connection
A1.1, A2.2, A3.1, A3.3

Writing Code – Ottawa's Water Service

Automation is so much more efficient than manually performing work. Furthermore, automation makes less mistakes, as there are no user-errors. That is why the City of Ottawa has hired you to automate their billing service.

They would like you to write a code that charges people based on how much water they use. Below is what they want to charge residents for how much water they use.



...fier	Amount of Water	Cost
...	Up to 6 cubic metres	$1.00/m^3
...	...to 25 cubic metres	$1.50/m^3
...	...cubic metres	$2.00/m^3
...	...re tha...bic metres	$2.75/m^3



PREVIEW

Coding Write code using ...statem...at will send a bill to residents in Ottawa based on th...r u...

Name: _____ 126

Curriculum Connection
A2.1, A2.2

STEM Fill in the code below by calculating the cost of the water for the resident.

1) Fill in the blank below to determine how much the resident owes.

email = input ("please enter your email so we can send you your bill")

if resident uses [40 m^3] of water

then set [balance owed] to [ ]

send [balance owed] to [email]

2) Describe how the above works.

3) Fill in the blank below to determine how much the resident owes.

email = input ("please enter your email so we can send you your bill")

if resident uses [112 m^3] of water

then set [balance owed] to [ ]

send [balance owed] to [email]

4) Fill in the blank below to determine how much the resident owes.

email = input ("please enter your email so we can send you your bill")

if resident uses [351 m^3] of water

then set [balance owed] to [ ]

send [balance owed] to [email]

PREVIEW

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Name: _____ 127

Activities – Water Quality



Word Search

Find the words from the word bank.

Water	Quality	Temperature	Turbidity	Nitrates
Bacteria	Treatment	Septic	Sewer	Service
Desalina	Wastewater	Fertilizer	Methane	Conservation

R				A	L	I	N	A	T	I	O	N	E	J	M	U	S
R	F	N	C			R	E	S	N	O	C	F	T	Z	L	K	B
Y	O	N	P		R		I	L	I	T	R	E	F	B	Z	H	T
W	A	S	T	E			E		M	B	A	C	T	E	R	I	A
X	O	W	M	D	I	J		E		T	I	N	V	E	D	O	A
X	E	T	E	M	P	E	R	A		U	R		A	T	E	R	V	P
E	N	A	H	T	E	M	M	O	S	T		E		M	E	N	T	M
J	B	Z	O	K	X	Q	U	A	L	I					S	I	H
E	O	Y	T	I	D	I	B	R	U	T	E				E	S	I
A	H	K	G	F	Q	T	E	C	I	V	R	E	S	Y			X

PREVIEW

Word Scramble

Unscramble the words from the word bank.



ENATTTMER		NOIADSLINATE	
UTYITRBDI		ATRWE	
ATNMEEH		STRNTAIE	
LYTAUIQ		ECSPTI	
ICRAAETB		EERTUAPEMTR	

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Name: _____ Date: _____

Unit Test – Water Systems

Multiple Choice /10

1) An ice sheet is the _____ type of glacier. a) Largest b) Smallest c) Tallest d) Shortest	2) Which type of ice floats in the ocean? a) Ice cap b) Ice Shelf c) Ice Sheet d) Iceberg
3) What is the term for water seeping into the ground a) Evaporation b) Condensation c) Infiltration d) Deposition	4) What is the term for a stream or river that flows into a larger river? a) Confluence b) Tributary c) Spring d) Estuary
5) A man-made lake is called a a) Drainage Divide b) Basin c) Watershed d) Reservoir	Which type of well provides the safest a) Dug b) D well c) d w d) None above
7) Which aquifer is surrounded by rock and clay with no exposure to the ground level? a) Unconfined aquifer b) Reservoir aquifer c) Ground aquifer d) Confined aquifer	8) When an a is a due to being on a coast or a) Microclimate b) Tropical climate c) Macroclimate d) Climate Zones
9) Which type of tropical storm hits North America? a) Cyclones b) Hurricanes c) Typhoons d) None of the above	10) Which term explains how cloudy water is? a) pH level b) Bacteria c) Turbidity d) Dissolved Oxygen

PREVIEW

Definitions – What does the term mean (1 mark each) /4

Term	Definition (what does it mean)
Glacier	
Watershed	
Freshw	
Aquifer	

PREVIEW

Short Answer Questions (2 ea ch)

1) What are the three states of w r on e How is the water moved around the Earth?

2) Where does rainwater that lands on your roof end up? Explain its j rn

3) What is a microclimate? How does living on the coast sometimes cause a microclimate?

Long Answer (5 marks each) **/10**

1) How do human activities cause changes in our freshwater? How is the freshwater treated so that it can be reused?

2) Explain why we should conserve o usa w can we do this? What changes can we make in our homes chools? m scientific discoveries could provide us with more freshwater?

PREVIEW